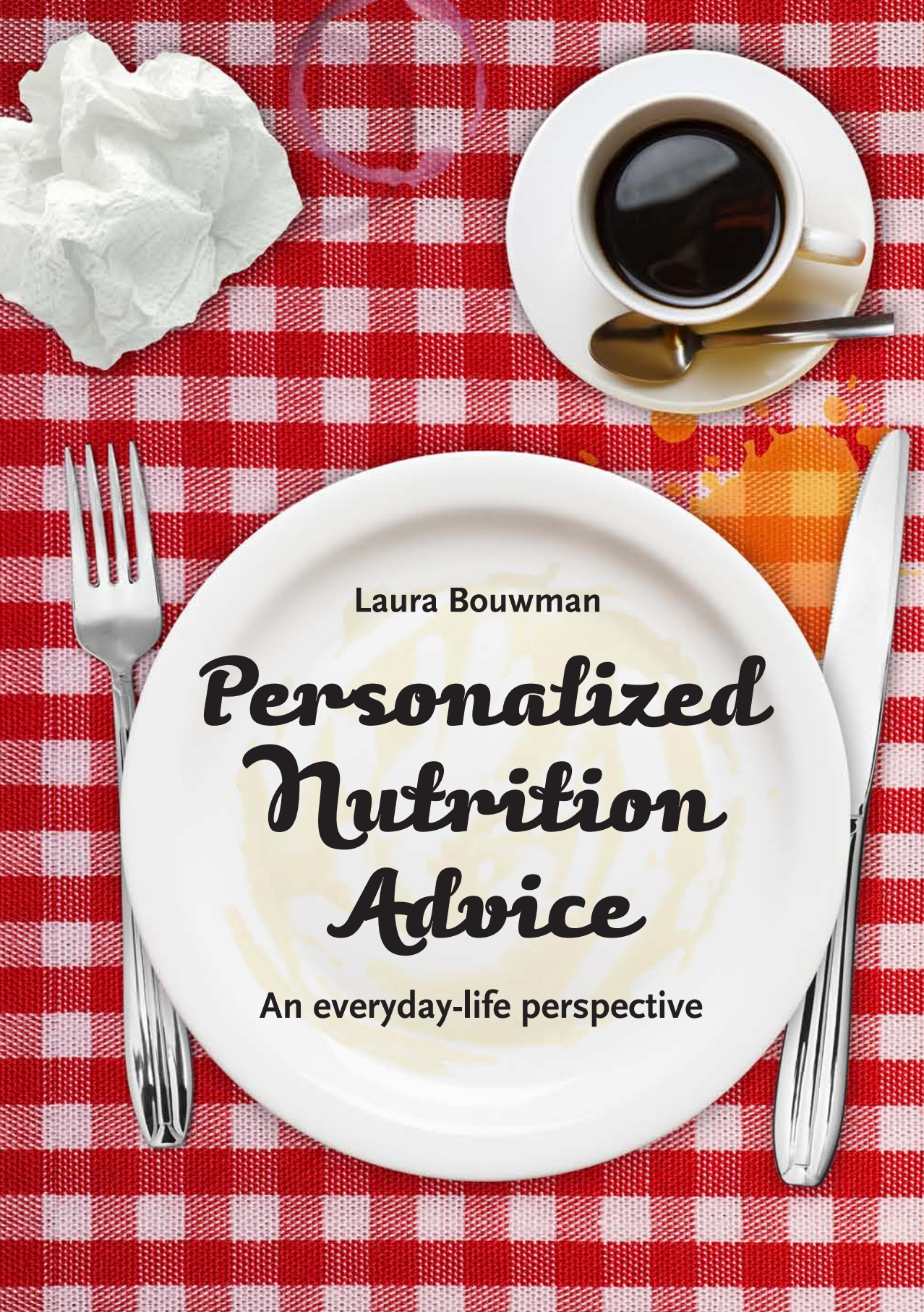
Laura Bouwman
Personalized Nutrition Advice
An everyday-life perspective

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Personalized Nutrition Advice

an everyday-life perspective

Laura Bouwman

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Abstract

This thesis presents societal preconditions for Personalized Nutrition Advice (PNA) that result from an everyday-life perspective on this innovative approach. Generally, PNA is regarded as promising, because it provides users with highly specific information on individual health risks and benefits of eating habits and the desirable changes, which may induce a high sense of personal relevance. Rapid developments in interactive computer technology (ICT) and nutrigenomics science are the innovative drivers in this area. Although indicated as promising, the limited impact of personalized advice on eating practices up to now, signals a mismatch with consumers' everyday life. In our studies, we found that the pursuance of nutrition advices assumes that consumers have a focal concern on health, which is not always the case. Consumers value uncomplicatedness and convenience of healthful eating and the flexibility to eat for pleasure as well. More flexible advice would therefore better match with consumers' complicated everyday life, in which health is just one of several ambitions, including social ones.

A change of eating practices requires the alteration of other practices besides those directly related to the food choice chain. Advice should provide for consumers' ability to organize healthful eating within existing chains of social practices, including discursive ones. In everyday-life, consumers have to persist in their intentions to eat healthfully vis-a-vis relevant others. In our study, consumers presented themselves as being uncomplicated, to avoid the image of health freakiness. Based on the finding that being someone who makes great effort in relation to healthful eating is a disfavored image, we conclude that for structural change, the healthy choice should become a 'practically and socially easy choice'. We propose that PNA can contribute to this goal by using an 'Action Approach'. The basic idea of this approach is that, besides being well-informed and motivated, consumers need to become actively involved in eating for health. By this, we mean that they are able to practically and socially organize their eating practices in order to ensure health benefits. This would involve the stimulation of a process of critical reflection on the uncomplicatedness of healthful eating and the integration of advice on the practical and social organization of changing eating practices towards health. Consumers themselves should become co-designers of this advice, as they are experts on everyday-life problems and solutions which occur when they try to pursue their healthful eating intentions.

The integration of a diversity of expertise on social, ethical and practical requirements in early stages of the development process of innovative PNA is essential. Yet, our study showed that actors in diverse societal sectors were reluctant to engage in the development process of ICT and gene-based PNA. Their evidence-based working practices required that first, scientific support on the effectiveness should become available. Based on their expertise on public needs and wants, they called for a request to slow down the innovation process on behalf of the public. Current working life also does not allow for much change in roles and responsibilities, which may be needed to integrate the innovation in working practices of societal actors. In our qualitative study amongst general practitioners (GPs), we found that participants hold rather critical views on nutrition advice, and certainly on the innovative drivers. A lack of robustness, a low match with patients' needs and equivocalness of nutritional studies were perceived as blocking GPs involvement.

The social acceptability of PNA requires a participatory process. But an invitation to join the innovation process does not of necessity elicit pro-active involvement. This requires the stimulation of a critical reflection process on the meaning of 'evidence' from the

perspectives of concerned actors and the consequences for the innovation processes. Such an exercise should aim at finding solutions, as to overcome the block about involvement. It should also target reflection on the meaning of expertise, keeping in mind the required increasing role of consumers in the design of PNA.

In sum, we conclude that the alignment of PNA with societal preconditions is possible if the development process evolves as a participatory process, in which all societal actors are convinced about the valuable contribution their experience and expertise offers to this search for new ways to effectively promote healthful eating.

Voor mijn ouders, die mij de liefde voor goed eten bijbrachten.

Voor Harry, Sven en Mats, die elke dag die liefde met mij delen

Voorwoord

Het bouwen van een brug tussen de wetenschap en de praktijk bleek geen eenvoudige taak. In de jaren voorafgaand aan mijn promotieonderzoek werkte ik in de alledaagse praktijk van de voedingsadvisering. Daar ondervond ik dat het bevorderen van gezond eten meer inhoudt dan het verspreiden van informatie en het aanbieden van aantrekkelijke, gezonde producten. Ook ontdekte ik dat een succesvolle samenwerking tussen de maatschappelijke partijen die zich met voedingsadvies bezighouden, een kwestie is van op dat ene moment met de juiste feiten komen, volhouden en bovenal, van goed onderhandelen. Na jaren praktijk was het wennen om die bevindingen te plaatsen in een wetenschappelijk kader. Mijn eeuwige twijfel: mis ik iets en is dit wel de juiste weg? Het alledaagse perspectief dat centraal staat in mijn onderzoek bleek een confrontatie te zijn met mijn eigen denkbeelden over de verklaarbaarheid en veranderbaarheid van de wereld. Alle collega's bij COM, bedankt voor de unieke blik in de keuken van de communicatie die jullie mij boden. Als ik toch weer met oogkleppen op de mens isoleerde van zijn context, dan was jullie boodschap luid en duidelijk: interactie Laura, interactie.....

Interactie was er tijdens deze periode ook met andere wetenschappelijke disciplines. Fré, Frans en Ben en alle andere NuGO-leden, jullie zijn de experts aan de 'overkant'. De afstand tot de voedingswetenschap bleek (meestal) minder ver dan verwacht, bedankt voor jullie support. - Siân, your way of working resembles mine: head high and off we go. Thanks for being supportive in so many ways. Frank, we showed to be good partners by bringing our idea to the market, how about that champagne?- Ook de Heelsum-groep bleek een goede sparringpartner. Het was een waar genoegen deel uit te maken van deze voedings(advies)minnende groep binnen de huisartsenwereld.

De opzet en uitvoering van de kwalitatieve onderzoeken vergden grote inzet van hersenen en handen. Siet, Gerda en Janneke, vele dames maken licht werk, bedankt! Dank ben ik ook verschuldigd aan de geïnterviewden, die open en eerlijk hun visie met mij deelden.

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Beste promotoren en co-promotoren,
Ik had vier experts om op te bouwen. Cees, bedankt voor je niet aflatende inspiratie. Je hebt mij steeds weer teruggebracht naar de kern van dit proefschrift: dat eten als sociale activiteit een sociale aanpak vereist. De Mont Ventoux was een makkie in vergelijking met het doorploegen van de bestaande theorieën en het formuleren van onze "Actie Aanpak". Gert Jan, je hebt mij binnengehaald bij COM voor onderzoek naar een genenkaart. Het liep anders. Geïndividualiseerd voedingsadvies bleek breder; zo breed zelfs dat de door jou zo geliefde intermediairs, de huisartsen, een prominente plek kregen. Bedankt voor je inzet en enthousiasme. Hedwig, jouw passie voor de discursieve analyse klinkt door in mijn onderzoek. Ik heb vastgeroeste denkbeelden en rechttoe rechtaan analyses achter mij gelaten en een nieuwe dimensie in het onderzoek ontdekt. Bedankt voor alle inspiratie. Overleg met jou hernieuwde steeds mijn motivatie om nog een stapje verder te kijken. Maria, je hebt steeds de focus teruggebracht naar health promotion, als deze

ondergesneeuwd dreigde te raken. Tijdens de kritieke momenten had ik er het bijltje al bijna bij neergelegd. Jij gaf mij dat zetje in de rug, jij las kritisch al mijn brouwsels en zette de puntjes op de i. Bedankt dat je mij geleerd hebt niet te (ver)oordelen, maar de mens te nemen zoals hij is en van hieruit te zoeken naar oplossingen.

Zie het niet als een eindpunt, maar als een begin. Noëlle, wat een waarheid. Ik knoop dit voor altijd in mijn oren. Harro, het was net zo erg als je voorspelde. Maar nu vrienden en familie, ik heb weer tijd om te koken. Brouwertjes, Nils, Renate, Maarten, Tina, Liesbeth, Ester, Kasia, Paul, bij deze de uitnodiging. Maartje, wetenschap begint bij ons in de Eng. Met de handen in de modder en de zon op mijn rug bleken oplossingen dichterbij dan gedacht. Houd vol, jij bent de volgende!

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Introduction to the thesis

1.1 Setting the scene

Personalized nutrition advice receives extensive attention in contemporary nutrition promotion because it is expected to be more effective than general advice in inducing more healthful eating. Both innovative developments in interactive computer technology (ICT) and, more recently, developments in research into the interaction between food and genes and the impact on health, are drivers in this area (cf. Brug, Oenema & Campbell, 2003; Kreuter, Farrel, Levith et al., 1999; Kroeze, Werkman, & Brug, 2006; Watzke & German, 2007).

This thesis started as part of a larger program at Wageningen University: the MyFood program that aimed to provide insights into diverse aspects of personalized nutrition advice. The overall aim of the program was to find new ways to motivate healthful eating on a personal level, as a strategy to combat the growing number of diet-related illnesses. Within the MyFood program, our aim was to formulate preconditions for personalized nutrition advice that is socially acceptable both for consumers and for societal actors who play a role in nutrition communication. Within the latter group, we paid special attention to the perspectives of general practitioners, because they play an important gatekeeper role in the healthcare system in the Netherlands as well as in other countries (DeAlmeida, Graca, Lappalainen et al.; Harrington, Noble, & Newman, 2004; Hiddink, Hautvast, Van Woerkum et al. 1997; Loureiro & Nayga, 2006; Mant, 1997; Thompson, Summerbell, Hooper et al., 2003; van Dillen, Hiddink, Koelen et al. 2006; Visser, Hiddink, Koelen et al., 2008).

In this chapter, firstly the ecological orientation towards complex health problems is discussed. This orientation emphasizes the interaction between the individual and his/her ecosystem and forms the basis of this research. Next, specifically the issue of unhealthful eating is discussed from an everyday –life perspective, followed by the drivers behind personalized nutrition advice. The chapter ends with the research aim, questions, and outline of this thesis.

1.2 An ecological orientation towards health

The Bangkok Charter of Health Promotion uses the definition of health as defined in the 1948 WHO constitution that health is a state of complete physical, social, and mental well-being, and not merely the absence of disease or infirmity. It is regarded as a basic human right and, correspondingly, all people should have access to basic resources for health (cf. WHO, 2006). In health promotion, health is considered less as an abstract state and is expressed in functional terms, namely, that health is a resource for everyday life, not the object of living. It is a positive concept emphasizing social and personal resources as well as physical capabilities. It is well documented that health is most influenced by a combination of individual or group actions, genetic predisposition, and a wide range of social and environmental factors such as history and culture, employment and education, and the availability of health insurance (cf. Green & Kreuter, 2005). One of the current

key issues in public health is the primary prevention of non-communicable illnesses such as diabetes, cardiovascular diseases, and obesity. The increasing prevalence of these illnesses can be attributed to the interaction of lifestyle factors including unhealthful diets, low levels of physical activity, smoking, and various genetic and environmental factors (Ministry of Health, Welfare and Sports, 2004; WHO, 2004).

Nowadays, health promotion efforts that aim to combat these illnesses are often based on the ecological orientation that stems from the recognition that most public health challenges are too complex to be understood adequately from single levels of analysis (Stokols, 1996). This orientation emphasizes the interaction between, and interdependence of, influencing factors within and across all levels of a health problem (cf. NIH, 2005; Rogers, 1968). Research that seeks to understand health behavior, therefore, has to recognize that a powerful role is played by the ecosystem and its subsystems, such as family, organizations, community, culture, and the physical environment in which people live (Goodman, Wandersman, Chinman et al.,1996; Green & Kreuter, 2005; Kickbusch, 1989). The need for further understanding of the interaction between individuals and their physical and social context is widely addressed in health communication (Bennett, Murphy, & Carroll, 1995; Green, 2006; Hawks, Smith, Thomas et al., 2008; Rogers, 1968; Stokols, 1996) as well as in food choice literature (cf. Chamberlain, 2004; Clendenen, Herman, & Polivy, 1994; Germov & Williams, 2004; Lupton, 1996; Rozin, 1996; Shepherd, 2001; Smith, 2002, 2004).

The growing attention that is being focused on ecological orientation has fuelled the development of health promotion interventions that combine an individual behavior change approach with approaches that influence the ecosystem (Kok, Gotlieb, Commers et al. 2008; Stokols, 1996). Based on planning models such as Green and Kreuters' (2005) PRECEDE-PROCEED model, preconditions for health behavior are systematically identified and manipulated at the individual behavioral level (e.g. beliefs, knowledge, self-efficacy, skills) and at the multiple levels of the environment in which people live (e.g. availability, affordability, social support). However, although interventions take into account the contextual factors, individual behavior is still the point of departure. From this starting point, individuals and their context are assumed to be static entities that can be disjointedly influenced. Such interventions, however, fail to address the reciprocal interaction between both determinants because it is unknown how consumers themselves give meaning to contextual opportunities and barriers in their everyday life.

1.3 An everyday-life perspective on healthful eating

In this thesis, the failure to address this reciprocal interaction is considered in relation to the issue of unhealthful eating. Two contradictory trends emerge in food consumption. On the one hand, decades of intense nutrition promotion efforts have created awareness and understanding of healthful eating: to eat a variety of food, more fruit, vegetables, and fish and avoid too much fatty and sugary food, calories, and salt, and have also created the intention to do so in practice (cf. Eurobarometer, 2006; Health Canada, 2004). On the other hand, studies show that, in the Netherlands as well as in other countries, most consumers eat less fruit and vegetables and more products high in energy, saturated fat, and sugar than recommended (Centers for Disease Control, 2005; Ocke & Hulshof, 2006; WHO, 2004). This latter type of dietary intake is indicated as one of the main causes of the increasing prevalence of obesity and consequent rise in adult onset of diabetes, nowadays a major public health concern in the Netherlands, as well as globally (Kreijl, Knaap, & Van Raaij, 2006; WHO, 2004).

In the literature, the gap between good intentions and practices that are not in line with recommended dietary intake is addressed in several ways. One idea is that, if consumers do not perceive an imbalance between their current intake and intake considered healthy from a nutritionist point of view, they see no reason to change. Although most people eat less fruit and vegetables and more products high in saturated fat, sugar, and salt than recommended, according to the latest Eurobarometer, a majority of Dutch (95%) and European (83%) citizens considered that what they eat is good for their health (Eurobarometer, 2006). This is considered a misperception that can be corrected by the provision of information about what an individual actually eats (e.g. 100 grams of vegetables per day) as compared with what he/she should eat, namely, 200 grams a day (Brug, Campbell, & van Assema, 1999; De Nooijer, de Vet, Brug et al., 2006; Oenema & Brug, 2003).

Another idea is that of implementation intentions, that is, concrete plans to perform certain behavior within a specific context. These plans are concrete if-then plans that create a mental link between a specified future situation and a particular goal-directed behavior. For instance, someone who intents to eat more vegetables might plan *when* and *where* to buy these vegetables and *how* to use them in the evening meal (Gollwitzer, 1999). Implementation intentions effectively promote fruit and vegetable consumption, a low-fat diet, and healthful eating in general. Yet, up to now, implementation intention research has insufficiently considered the highly social nature of eating, although some evidence suggests that forming a plan to ignore unwanted social influence may have a beneficial influence on goal attainment (Webb & Sheeran, 2006, p. 337). This thesis examines the gap between intentions and practices from an everyday-life perspective. This perspective takes the *interaction* between consumers and context as the central focus of research, rather than studying them separately. The idea is to abandon the concept of acting on individuals and context disjointedly and to take the consumer and his or her everyday actions regarding food choice as the point of departure. In other words, what is at stake is not the context that influences the consumer, but rather how consumers manage their context when they try to change. By taking this starting point, the consumer is an actor in promoting or hindering healthful eating. We regard them as actively making choices in everyday interactions alongside the food chain of buying, preparing, and consuming food as well as alongside other social actions, such as working and enjoying free time (Figure 1.1). These actions are all intricately bound up with each other. Within these interactions, health can be more or less of an issue, depending on the importance of other functions of eating, such as pleasure or maintaining relationships. The basic strategy is to support the consumer in what he or she is already willing to do, but finds not to be so easy in everyday life.

Figure 1.1: The everyday-life perspective on healthful eating

1.4 Personalized nutrition advice

The idea of working narrowly to the everyday life may be linked to tailored nutrition advice. In the realm of nutrition promotion, this is often named personalized nutrition advice. Such advice differs from other nutrition promotion approaches in two ways: first, the messages or strategies are intended for one particular person rather than for a group of people; and, second, the messages or strategies are based on individual assessments (Kreuter & Skinner, 2000). Studies show that tailored advice is more effective than general advice because it is customized to individuals to increase the chances of the message being viewed as personally relevant (Brug, Oenema & Campbell, 2003; Contento, Bach, Bronner et al., 1995; Kreuter, Oswald, Bull et al. 2000; Noar, Chabot, & Zimmerman, 2008; Skinner, Campbell, Rimer et al., 1999).

The provision of personalized nutrition advice is no longer the sole domain of dieticians. The rapid developments in interactive computer technology (ICT) applications, particularly the internet, allow for tailored interventions with large reach at relatively low cost (cf. Brug, Oenema & Kroeze, 2005; Eng, 2004). In such interventions, computer programs are used to collect data about an individual's dietary intake (e.g. fat intake), his/her health status (e.g. gender, age, body mass index), and psychosocial factors that mediate behavior change (e.g. intentions, perceived self-efficacy). Users receive personalized feedback that is assumed to be more effective than general messages because of its high level of specificity. Firstly, the feedback provides the user with insight into the specific mismatches between her/his dietary intake and nutritional recommendations. As discussed in section 1.3, consumers are often unaware of these mismatches and therefore see no reason to change their way of eating. Personalized feedback has proven to be an effective strategy to overcome such misperceptions (Brug, Glanz, van Assema et al., 1998; Lechner, Brug, de Vries et al. 1998; Oenema & Brug, 2003).

Secondly, the data about a person's health status and dietary intake are used to compile feedback about his/her *specific vulnerability* to the onset of diet-related illnesses. The specificity of this feedback is expected to be further increased by including information about the person's genetic make-up. This information is expected to become available in the future from nutrigenomics studies, and is not yet used in personalized advice. Nutritional genomics (aka nutrigenomics) is the innovative discipline of nutrition research that studies the interaction between food, genes, and health at the molecular level (NuGO, 2008). A genetic test for vulnerability to diet-related illnesses, such as cardiovascular disease, could be added to a personal risk assessment, one that is currently comprised of indicators such as body mass index and blood cholesterol (Ordovas & Corella, 2007). Up to now, the complexity of researching diet-gene interactions has limited the translation of research findings into practical applications of personalized nutrition advice (Ordovas & Shyong Tai, 2009). However, even without scientific consensus about the validity of the tests, companies already offer DNA tests that indicate an individual's vulnerability to, for instance, type II diabetes, osteoporosis or heart disease (Genelex, 2008; Salugen, 2008; Sciona, 2008; Suracell, 2008). In their recent report, the US Government Accountability Office (GAO) concludes that "such tests mislead consumers by making predictions that are medically unproven and so ambiguous that they do not provide meaningful information to consumers" (GAO, 2006 pp 5). At present it is not known how people will use such information and whether it will motivate more healthful eating than the information currently supplied in personalized nutrition advice (cf. Haga, Khoury, & Burke, 2003; Marteau & Weinman, 2006).

Thirdly, users receive recommendations about the *specific actions* required to reduce this risk. These actions are tailored to the psychosocial factors that mediate health behavior. For instance, a user with a low perceived self-efficacy towards healthful cooking will receive easy recipes with step-by-step instructions. The assumption is that such feedback will turn barriers (low perceived self-efficacy) into opportunities (high perceived self-efficacy) and lead to healthful eating.

Studies indicate that computer-tailored advice is more effective than generic messages in *motivating* individuals to adopt more healthful behavior such as not smoking, diet, and physical activity (Brug et al., 1998; Curry, Grothaus, & Wagner, 2005; De Nooijer, Oenema, Kloek et al., 2005 ; Kreuter & Stretcher, 1996; Kroeze, Werkman & Brug., 2006). Few studies have measured the effect on dietary intake, although (Oenema, Tan, & Brug, 2005), for instance, found a small reduction in fat intake. However, these studies also conclude that, although promising, the impact of personalized nutrition advice on dietary intake is still limited. (Kreuter, Oswald, Bull et al., 2000) argue that current interventions insufficiently address the contextual influences on the processing of tailored healthful eating information and on the ability and motivations to make the recommended changes. More recently, Brug et al. (2005) have suggested that interventions should better address the categories of behavioral determinants that help people to act on their positive intentions in order to bridge the intention-behavior gap.

1.5 An everyday-life perspective on personalized nutrition advice

From an everyday-life perspective, several remarks can be made with regard to current personalized nutrition advice. Firstly, it specifies risks and benefits with respect to long-term physical health and thereby assumes that health is one of the focal concerns in consumers' lives. This idea resembles that of "healthism", introduced by Crawford (1980) to describe a new form of health consciousness that refers to a preoccupation

with personal health as the primary focus for the achievement of health and well-being. Healthy behavior thereby became the paradigm for good living. The focus in personalized nutrition advice on attaining health can be viewed as a social expression of healthism. Studies show, however, that eating also involves other functions such as taste, convenience, cost, and the maintenance of relationships (Connors, Bisogni, Sobal et al., 2001; Falk, Bisogni, & Sobal, 1996; Falk, Sobal, Bisogni et al., 2001) that often take precedence over health (McQueen, 1996). Scrinis (2008b) as well as others (for example Pollan, 2008) argue that the narrow focus on health, so-called nutritionism, may have limited value in everyday life.

Secondly, the recommended actions in personalized nutrition advice are based on research about the relationship between food consumption and health, the underlying assumption being that consumers are able to follow recommended dietary guidelines, regardless of other everyday practices. Studies indicate, however, that this is not in line with how consumers themselves give meaning to healthful eating (Pajari, Jallinoja, & Absetz, 2006; Ristovski-Slijepcevic, Chapman, & Beagan, 2008; Sneijder & te Molder, 2006).

In this thesis, we study how an everyday-life perspective can be used in personalized nutrition interventions. Much effort has already been put into providing specific, personalized feedback based on individual characteristics and the social context. We take the research further by focusing on the processes that occur when people with healthful eating intentions are faced with opportunities and challenges in their everyday context.

1.6 An everyday-life perspective on the involvement of societal actors

The innovative approaches of computer technology and nutrigenomics emerge at the junction of different disciplines and technologies and may directly influence people's lives. If applications with a technological character, as is the case, are to be applied in nutrition promotion, new issues and discussions may arise about whether personalized nutrition advice is the "right" approach to combating diet-related illnesses (cf. Fisher, Mahajan, & Mitcham, 2006). In addition, new technologies are considered to be bound up with the restructuring and redistribution of current roles and responsibilities (Rip & Van den Belt, 1988). In order to allow for the integration of their perspective in the development process, early involvement of societal actors such as health professionals, health educators, and the food industry is needed, not so much to smoothen the introduction of the technology as to improve socio-technical decision making more generally (Wilsdon & Willis, 2004).

Studies indicate that the use of ICT may benefit actors by providing them with low cost, large reach interventions with a large flexibility. However, social, ethical, and practical concerns have been raised, for example in relation to the protection of user privacy and a growing demand for additional expertise (Eysenbach, 2000; Grosel, Hamilton, Koyano et al., 2003; SPICH, 1999).

Issues have also been raised about the consequences of gene-based advice for consumers as well as for diverse working practices (Castle & Ries, 2007; Chadwick, 2004; Darnton Hill, Margetts, & Deckelbaum, 2004; FoodEthicsCouncil, 2006; German, 2005; Korthals, 2005; Meiboom & Verweij, 2003). For instance, concerns have been raised about the availability of tests direct to consumers, while the scientific status is unclear and regulation lags behind (FoodEthicsCouncil, 2006; Hogarth, Javitt, & Melzer, 2008).

If we look at the involvement of actors from diverse sectors, from a health promotion perspective, collaborative efforts have proven to benefit the development process of, for instance, smoking cessation programs (Best, Stokols, Green et al., 2003). The process

benefits not only from the exchange of expertise, experiences, and access to networks and resources, but also from the generation of involvement resulting in more commitment to initiating and maintaining health promoting activities (Butterfoss, Francisco, & Capwell, 2001; Butterfoss, Lachance, & Orians, 2006; Granner & Sharpe, 2004; Wallerstein, Polascek, & Maltrud, 2002). Green and Kreuter (2005, p. 20) point out that, from a moral perspective, societal actors should participate in the development process of innovative developments that will influence their working conditions.

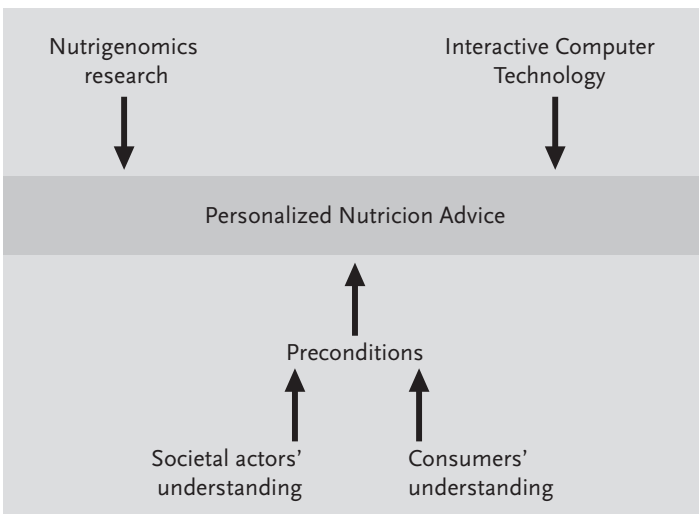
In theory, there is an overall willingness among actors to engage in joint initiatives. The high priority that is given to tackling the issue of unhealthful eating in policy and health promotion documents (Department of Health, 2004; Ministry of Health, Welfare and-Sports, 2004; WHO, 2004, 2006) has increased awareness among groups of societal actors that function as intermediaries in nutrition promotion, such as the food industry, the healthcare system, and the health education and health promotion sector, about the need to jointly create an environment in which the healthful choice is the easy choice. However, despite extensive research on this topic, many such initiatives fail in practice.

This gap can be considered similar to the consumer intention-behavior gap, signaling a mismatch with everyday working life. Little is known about how societal actors in nutrition promotion deal with these issues that already impact their working life (ICT) or will do so in the longer term (nutrigenomics). This thesis, therefore, considers this failure from an everyday-life perspective and studies how societal actors *themselves* make sense of personalized nutrition advice and their own role and responsibility in the development process.

1.7 Aim and outline of the thesis

This thesis aims to contribute to the search for new ways to motivate healthful eating on a personal level, as a strategy to combat the growing number of diet-related illnesses. Therefore, we have studied how consumers' and societal actors' understanding can be integrated in innovative personalized nutrition advice (Figure 1.2). The thesis is a compilation of seven articles that are published or submitted for publication.

Figure 1.2. An everyday-life perspective on personalized nutrition advice



To accomplish this goal, three sub-goals are formulated:

1. to explore consumers' understanding of healthful eating;
2. to explore societal actors' understanding of innovative personalized nutrition advice;
3. to compare consumers' and societal actors' understanding and the consequences for innovative personalized nutrition advice.

For each sub-goal, several research questions have been formulated and are addressed in the chapters.

Chapter 2: general outline

Question: What promises and pitfalls of innovative personalized nutrition advice are identified in the literature?
In this chapter, Rogers' diffusion of innovation theory (1995) is taken as the starting point for the exploration of the potential effectiveness of innovative personalized nutrition advice in motivating healthful eating and the societal questions that may arise.

Chapters 3 to 6: exploring consumers' understanding

Chapter 3
Question: What health communication concepts form the basis of personalized advice?
In this chapter, we discuss the concepts that, according to health communication theories, influence perceived personal relevance of healthful eating advice in relation to creating awareness, the threat and the coping appraisal.

Question: Can information about genes, nutrition and health influence perceived personal relevance of healthful eating advice?
We also explore the potential influence of including information derived from nutrigenomics research on perceived personal relevance of healthful eating advice.

Chapter 4
Question: How do consumers themselves make sense of healthful eating in everyday practices?
The results of a qualitative study among Dutch consumers that targeted the exploration of consumers' understanding of healthful eating are discussed in relation to the understanding of such eating in nutrition promotion.

Chapter 5
Question: What are the implications of using an everyday-life perspective for the development of health behavior interventions?
In this chapter, we propose a new strategy, the Action Approach, that starts from an everyday-life perspective on influencing health-related practices. This strategy may be used in addition to existing approaches that aim to explain differences found between good intentions and bad behavior.

Chapter 6
Question: What are the implications of using an everyday-life perspective for the development of innovative personalized nutrition advice?
This chapter firstly discusses the innovations of nutrigenomics and computer-tailored

personalized dietary advice within the context of health communication theory. Secondly, it discusses how the Action Approach, which starts from the consumers' everyday understanding of healthful eating, can be used in the design of innovative personalized interventions.

Chapters 7 and 8: exploring societal actors' understanding

Chapter 7

Question: How do societal actors involved in nutrition communication themselves make sense of involvement in innovative personalized nutrition advice?

In this chapter, we present the results of a qualitative study among Dutch societal actors in health education, healthcare, health insurance, social science, the food industry, and the media. We used in-depth interviews to explore how they handle issues of responsibility and initiative in relation to the development process of innovative personalized nutrition advice.

Chapter 8

Question: How do general practitioners perceive involvement in innovative personalized nutrition advice?

The results of a qualitative study among general practitioners working in diverse countries are presented in this chapter. We used in-depth interviews to ascertain their perceived barriers to, and opportunities for, involvement in gene-based advice.

Chapter 9: Conclusion and discussion

Question: What are the implications of using an everyday-life perspective for innovative personalized nutrition advice?

In this final chapter, we first present a conclusive oversight of the findings. Secondly, we compare consumers' and societal actors' understandings and discuss the implications for innovative personalized nutrition advice. Thirdly, we discuss our conclusions in relation to findings of other studies and propose directions for future research.

2

Personalized Nutrition communication through ICT-application: how to overcome the gap between potential effectiveness and reality

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2.1 Introduction

In the last decades, effort put into improving dietary habits through health education has not been very effective: actual consumption does not match with basic recommendations for healthy nutrition. Despite some improvements, diets still contain too much saturated fat, sugar and salt and insufficient vegetables, fruits and fish. The growing burden of disease due to obesity, diabetes, cardiovascular and malignant diseases stresses the need for new and more effective health promotion strategies to change nutrition behavior (Department of Health, 2004; Ministry of Health, Welfare and Sports, 2004; RVZ, 2002).

Recent research showed that consumers have an awareness of health-topics like losing weight and lowering cholesterol (van Dillen et al., 2004), but this awareness does not necessarily lead to behavior change. High personal relevance and a stimulating social, political and physical environment are key-areas for effective behavior change interventions. The intervention itself should be based on prior research and on health behavior change theory and has to include clear defined goals (Contento, Bach, Bronner et al., 1995; Contento, Randell, & Basch, 2002; Hillsdon, Foster, Naidoo et al., 2005; Rootman, 2001)

The rapid development of Interactive Computer Technology (ICT) opens doors to tailored assessment and -advice at relative low costs (Leeuwis, 2004). The potential effectiveness of interactive, personalized nutrition communication is promising as a way of addressing personal relevance, flexibility, interactive options and number of people that can be reached (Eng, 2004; Eng, Gustafson, Henderson et al., 1999; SPICH, 1999; Stout, Villegas, & Kim, 2001). Currently, many Internet sites offer more or less individual tailored nutrition advice. Few web-based interventions include information of

the ineffectiveness in terms of nutrition behavior change (Bensley & Lewis, 2002; Evers, Prochaska, Prochaska et al., 2003).Their usefulness for growing burdens of disease due to obesity, diabetes cardiovascular and malignant diseases is not clear.

The need for innovative and more effective health promotion strategies to change nutrition behavior was identified as high priority at Wageningen University, the Netherlands. In 2004 researchers from the nutrition, behavioral and communication department started working closely together to take a step forward by stimulating co-operation between science and society in order to improve consumer health.

In this article we will present the framework for the research on the social acceptance of personalized nutrition communication through ICT applications and results of a literature study on this topic. First we will define the research area of Health Promotion using Interactive Communication Tools. Second, we describe the framework, derived from literature, that we will use for our research on stakeholders and consumer perspectives on Personalized Nutrition Communication. In the final part of the article we present topics for discussion and suggestions for further research.

2.2 Interactive Computer Technology in health promotion

The research area that focuses on applications designed to interact directly with consumers, with or without presence of health care professionals is named 'Consumer Health Informatics' (CHI). CHI analyses consumers' needs for information, studies and implements methods of making information accessible to consumers and models and integrates consumers' preferences into medical information systems. In this area of research different disciplines are integrated such as public health, health promotion and education and communication (Eysenbach, 2000). A more narrow description of the research area is defined by Robinson et al. (1998): interactive computer technology in the field of health communication, Interactive Health Communication (IHC) is '*the interaction of an individual –consumer, patient, caregiver or professional- with or through an electronic device or communication technology to access or transmit health information, or to receive or provide guidance and support on a health-related issue*'. The definition that captures the basics of health promotion was defined by the WHO Regional Office for Europe and published in the Ottawa Charter for Health Promotion in 1986: '*health promotion is the process of enabling individuals and communities to increase control over, and to improve their health'*(WHO, 1986).

Based on these definitions, Health Promotion using Interactive Health Communication tools as central in this research can be defined as 'the use of interactive technology to provide access to or transmission of health information between consumers, health professionals, caregivers or between consumers and the computer- interface, in order to enable individuals to increase control over, and improve their health'.

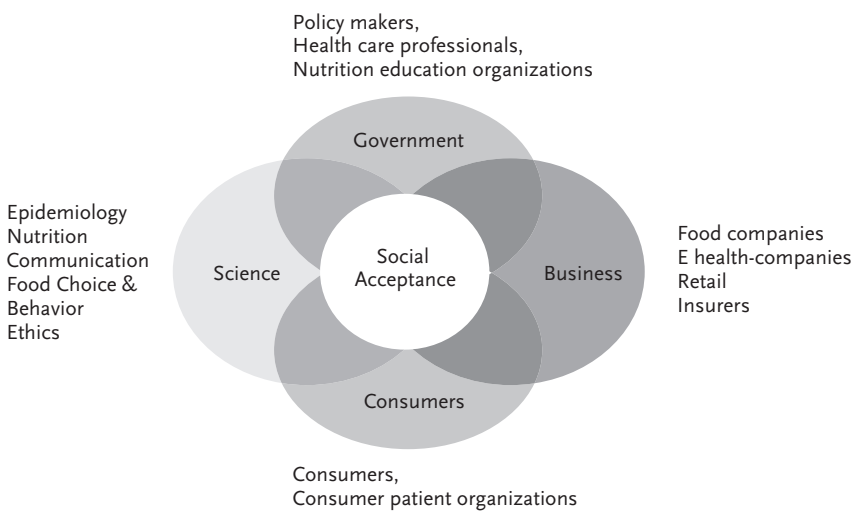
2.3 Framework for social acceptance of personalized nutrition Communication

The application of Interactive Health Communication technology can play an important role in providing interactive, individual tailored nutrition communication. IHC media can supplement face-to-face interaction with electronically mediated ones and lead to lower costs for nutrition interventions. In combination with the increasing demand of consumers to take responsibility for their own health, these are synergistic forces that promote nutrition communication in an information age health-care system. In this

system, consumers can ideally use information technology to gain access to personally relevant information, interact with support groups and health professionals and gain more control over their own health. It can be argued that IHC technology should become an integral part of modern concepts of nutrition communication in public health and national healthcare policies, thereby utilising healthcare resources more efficiently (Eng, 2004; Eysenbach, 2000).

Increased access through interventions based on IHC technology that provide personalized nutrition communication will influence individuals and society. It will actualize important social-ethical issues like shifting responsibilities for health, easy and equal access of health and privacy. Individualization of food and eating habits can influence the responsibility of a person for providing food to their family and social network. Also many practical issues related to the actual product of nutrition communication based on ICT are at stake. The increasing complexity of nutrition communication will complicate tasks of health professionals and demand more of their costly time without addressing the lack of reimbursement (Korthals, 2005; Meiboom & Verweij, 2003; SPICH, 1999). The first step in this research is to explore of the perspectives of stakeholders and consumers (Figure 2.1) on chances and barriers to successful introduction of Personalized Nutrition Communication.

Figure 2.1: Stakeholders in nutrition communication



During the research specific attention will be paid to the perspectives of health care practitioners for integrating interactive applications in primary health care practice. The framework we will use for our research is based on a literature study in a diverse range of research fields.

2.4 Diffusions of Innovations

In the first edition of the book 'Diffusions of Innovations' in1962, Everett Rogers identified characteristics of innovations that affect the rate at which they are adopted. Today,

his 'perceived attributes of innovations' still offer an excellent basis for this research. Perceived attributes are individual, subjective evaluations, derived from individuals' personal experiences and perceptions and conveyed by interpersonal networks, drive the innovation process and thus determine an innovation's rate of adoption. According to Rogers (1995) almost 50 to 87 percent of the variance in the rate of adoption is explained by five attributes:

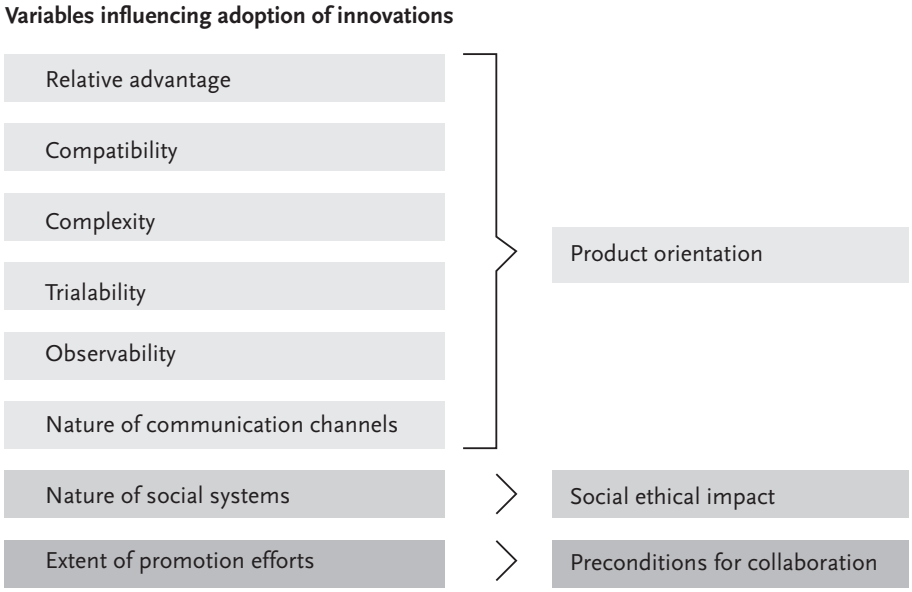
- *relative advantage*: the degree to which an innovation is perceived as being better than the idea it supersedes;
- *compatibility*: the degree to which an innovation is perceived as consistent with existing values, past experiences, and needs of potential adopters;
- *complexity*: the degree to which an innovation is perceived as relatively difficult to understand and use;
- *trialability*: the degree to which an innovation may be experimented with on a limited basis;
- *observability*: the degree to which results of an innovation are visible to others.

Other variables affecting the adoption rate of an innovation are:

- *type of innovation decision* (individual-optional innovation decisions are generally adopted more rapidly than a collective innovation decision, for instance by an organization)
- *nature of the communication channels* diffusing the innovation (mass media, interpersonal)
- *the nature of the social system* in which the innovation is diffusing (norms, degree of network interconnections)
- extent of change agents' promotion efforts (adoption of opinion leaders)

Based on Rogers' attributes three key-areas are defined: product orientation, social-ethical issues and preconditions for collaboration (Figure 2.2).

Figure 2.2: Key-areas for research on social acceptance of personalized nutrition communication; derived from Rogers, (1995)



Product orientation

Relative advantage: effect

Already in the review in 1995, Contento (1995) stressed the need for research on the effectiveness of new media like Internet. At this moment, still little is known about the specific contribution of interactive health communication media (IHC) to the effectiveness of health promotion interventions. The Science Panel on Interactive Communication and Health (SPICH, 1999) offers an 'Evaluation Reporting Template' containing six key criteria that can be applied to most IHC programs. The criteria measure accuracy and appropriateness of content, usability, maintainability, bias and efficacy and effectiveness. The first criteria can be measured relatively easily looking closely into the program. Efficacy (a programs impact under controlled conditions) and effectiveness (impact under real-life circumstances) are measures of the extent to which a program actually has its intended impact. Do programs aiming at nutrition behavior change actually move people into changing behavior?

A review of on-line health assessment programs, based on these criteria, concluded that most sites lack information with regard to evaluation results and effectiveness. Only seven percent of the sites provided such information (Bensley & Lewis, 2002). The lack of evidence of the effect of interactive applications in nutrition communication, can influence stakeholders perception on the advantage of this innovation.

Relative advantages: technology and tailoring

In Interactive Health Communication many underlying basic technologies can offer different advantages. Medical devices and information systems will benefit from the rapid increase of processing power and data storage capacities. Networking bandwidth and data compression facilitates the share of large information files between health care providers (e.g. image-files from radiology-tests). The fast development of encryption technology that permits secure transmission of data will facilitate the need for confidentiality of personal information in health care practices. Wireless technology like handheld palm-top devices, allow clinicians access to computerized patient records at any time and place. The number of information appliances will accelerate not only in computers but also in telephones, televisions and other devices. The availability of software-programs that filter information and find and retrieve information over a network that helps end users, the so called intelligent agents, will grow. An interesting area is the development of sensors for measuring health parameters that connect with computers. Blood pressure monitors can become an integral part of computer devices and allow monitoring of previously more costly parameters (Grosel, Hamilton, Koyano et al., 2003).

The increased capacity to store, present, sort and analyze data, offers opportunities to retrieve optimal strategies for personalized communication through tailoring. Several cognitive and behavioral models include personal relevance as an essential part of effective interventions. The Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1986b) states that individuals are more motivated to elaborate and actively process information that is perceived as personal relevant, which in turn is more likely to induce attitude change. Research by Kreuter and Stretcher (1996) showed that personalized advice on health stimulates active processing of information significantly more compared to general advice. Factors that contribute to personal relevance are beliefs concerning health, motives for and perceived relevance of change, barriers to behavior change, self-efficacy to perform the desired behavior, preferences, current practices and habits, and preferences of information sources. The Stages of Change model assumes that information should be tailored to an individual's specific stage of behavior change. This tailoring contributes

to personal relevance of the intervention (Prochaska, DiClemente, Velicer et al., 1993). The perceived personal relevance can be increased by tailoring the information to an individual's interests. Research has shown that personalized advice is more effective compared to general advice in reducing fat-consumption (Brug, Steenhuis, van Assema et al., 1996; Campbell, DeVellis, Stretcher et al., 1994), increasing vegetable and fruit consumption (Brug, Glanz, van Assema et al., 1998; Campbell, Honess-Morreale, Farrel, et al., 1999), increasing physical activity (Bull, Kreuter, & Scharff, 1999; Kreuter & Stretcher, 1996; Marcus, Emmons, Simkin et al., 1998) and smoking cessation (Curry et al., 1995; Prochaska et al., 1993; Stretcher et al., 1994). Oenema (2004) concluded that respondents that received web-based tailored interventions had a significantly greater intention to change fat and fruit intake than respondents that received generic nutrition information. They rated the intervention as more personally relevant, more individualized and newer. The higher effectiveness of personalized advice is attributed to the higher personal relevance.

Relative advantages: contribution to empowerment

Improved access to health information on demand, broader choices, and options for promotion of interaction among users and between professionals and consumers all facilitate empowerment. Empowerment is closely related to health outcomes in that powerlessness has been shown to be a broad-based risk factor for diseases. Several studies have shown that people who feel 'in control' over a situation concerning their health, have better outcomes compared to those that feel 'powerlessness' (Anderson, Funnel, Butler et al., 1995; Israel & Sherman, 1990). Interactive self-assessment tools, for instance concerning diet, can help individuals to focus on central issues and take action to improve their health. Increasing access to health information and alternative treatment can facilitate shared decision making, which is important for health related empowerment of people (SPICH, 1999). Empowerment through IHC technologies can also be facilitated by online support groups that can make people feel connected to others with similar health conditions (Gustafson, Robinson, Ansley et al., 1999).

Social-ethical impact

One of the barriers for the slow pace at which the Public Health Care system includes IHC into practice is due to social-ethical barriers (Grosel et al., 2003). Insecurity on the impact of IHC applications on structure, process and outcomes of health and health care postpones regulatory decisions. Meaningfulness of personalized nutrition communication is a major issue, specifically about the promises that are made, and commercial goals can interfere with health goals. Inaccurate or inappropriate use of IHC applications can result in people losing trust in health care providers and make people search for inappropriate care.

Rogers defines compatibility as the degree to which an innovation is perceived as consistent with existing values, past experiences, and needs of potential adopters. The variable 'nature of social systems' refers to the existing norms and the degree of network interconnections. The increasing access to personalized nutrition communication through Internet causes important changes for individuals, health professionals, businesses and society at large and is sure to raise ethical issues about existing values and norms (Korthals, 2005; Schulenberg & Yutrzenka, 2004). It will offer new and unforeseen possibilities and problems, questions about consequences for individuals and society and on what will be discovered and created. These issues are likely to affect perceptions of the benefits and risks and will therefore largely contribute to the success

or failure of this innovation. From the literature we derived important areas of ethical concerns on responsibilities for health and health care, privacy-issues, the information gap and influence on collective and individual habits, values and norms related to food choice.

Responsibilities for health and health care

The source of advice contributes to the efficacy of interventions. General practitioners and dieticians are perceived as the most trustworthy sources of information on nutrition (DeAlmeida et al., 1997; Harrington et al., 2004; Hiddink et al., 1997; Mant, 1997; RVZ, 2002; Thompson et al., 2003; Van Dillen et al., 2004). In 1989 the report of the United States Preventive Services Task Force concluded that health behavior counseling is more likely to save lives and improve health compared to what doctors normally do for preventive care (physical examinations and screening tests) (AHCPR, 1997). The enthusiasm over the importance of health promotion was tempered by later studies. These conclude that counseling leads to behavior change in only 1 to 5 percent of the patients (Stange, Woolf, & Gjetlema, 2002). Still, clear focus on the need for preventive health promotion exists in many countries. The most recent publication on healthy living of the Dutch Ministry of Health, Welfare and Sport (2004) estimates that at least 20 percent of all disabling illnesses is attributable to unhealthy lifestyles. Between 5 and 9 percent of total expenses for health care in the Netherlands are the result of unhealthy lifestyles, obesity and high blood pressure.

Prevention has therefore high priority in health care. All relevant parties, including health-care services, insurers, municipalities, companies, manufacturers, schools and the public at large, need to take responsibility. People need to be reached in the doctor's consultation room, at home, at work, at school and where they spend leisure time. Regarding public health, incentives will be provided to identify lifestyle related health risks in a timely manner and to address these issues with patients. In reality, many general practitioners are skeptical whether counseling on healthy lifestyles is worth their time. Busy clinicians lack the time, skills and resource for such advice and do not (yet) receive financial reimbursement for this type of activities. Research in the United States on a large number of patient observations showed that time spent on health promotion was less than 0.7 minutes averaged across all visits and less than 1.35 minutes during visits in which it occurs (Stange et al., 2002).

Individual physicians and dieticians sometimes offer Internet-sites and email-appointments but their number is still very limited. Health professionals may perceive IHC technology as a threat to professional autonomy and authority. Their status as the most important source of health information may decrease. They have to accept the increasing role and responsibility of patients in decisions on health. Health professionals will have to find a balance between their role as an authority and as a facilitator or partner in care (Gustafson et al., 1999; SPICH, 1999; Van Woerkum, 1999).

Privacy-issues

IHC applications for tailoring health information to individuals will raise issues on the risk of abuse of personal information. Sensitive personal data, beyond the traditional medical record, will be collected so issues on privacy and informed consent will be raised (Korthals, 2005; RVZ, 2004; Schulenberg & Yutrzenka, 2004; SPICH, 1999).

Information-gap
IHC technology can reach large audiences at relative low costs. This can facilitate equal access to information on health. But there is also a potential risk for widening the information-gap between the information-rich and information-poor. Mass media is known for widening the information gap because of a larger effect on well-informed, well-educated people in the mass media audience (Rogers, 1986; Tichenor, Donohue, & Olien, 1970). Already in 1974 several possible impacts of new communication technologies were addressed by Katzman (1974). An increased amount of information would be communicated to all individuals in an audience, but the information-rich were likely to benefit more. Information-rich people have more knowledge and more options to put this knowledge into practice. Therefore, information-rich have a larger demand for gaining knowledge. Also, an information overload will require technology that provides relevant information. Information-rich people will be more likely to have access to this technology. Both impacts will contribute to widening of the information-gap. In health care, the same was observed. In earlier decades, during the industrial age, the inverse care law described the idea that availability of good medical care tends to vary inversely with the need for medical care in the population served (Eysenbach, 2000; Hart, 1971). In the information age, people with low education and low health literacy might suffer from a 'inverse information law' meaning that access to appropriate information is particularly difficult for those who need it most (Eysenbach, 2000; RVZ, 2002; SPICH, 1999). Active focus of public health policy on the need for broad and equal access to Interactive Health Technology is needed to prevent the widening of the information-gap.

Collective and individual habits, values and norms related to food choice.
The focus in IHC is on individual choices and decisions. But food choice is largely embedded in the collective values and norms of society. During family meals, shared diners with friends, celebration of religious or cultural festivities, individual choices put pressure on the expression of care, friendship and belonging. Individuals face these issues daily and take them into account in their risk-benefit evaluation of individual nutrition advice. In their choice of certain foods people express their values and norms and their identity. Personalized nutrition communication may affect an individual's perspective on food, health and disease and therefore their identity. It also might influence the possibilities of sharing collective values of food in cultural and social interactions (Korthals, 2005). Easy changes in food choice like eating more fruits and vegetables, might have large health benefits. Considering that not many people comply with general nutrition guidelines, the question of legitimacy of more complex, personalized communication can be raised.

2.5 Preconditions for collaboration

Large reviews on health interventions define a stimulating social, political and physical environment as key-areas for effective interventions (Contento et al., 1995; Contento et al., 2002; Hillsdon, Foster, Naidoo et al., 2005). A participatory, multi-strategy approach, involving stakeholders and public will contribute to this stimulating environment. The focus in a participatory approach is on helping people to identify their *own* concerns and can therefore contribute to personal relevance (Koelen & Van den Ban, 2004). Some of the most effective interventions on the prevention of smoking have occurred through multiple community interventions that were developed and implemented through a network involving scientists, practitioners and a wide range of public, private and non-profit organizations (Best et al., 2003). Investing in the formation of collaboration

networks that promote, support and sustain ongoing dialogue and sharing of experiences can contribute to a supportive environment in which the healthy choice is the easy choice. Interactive applications can be used, as an additional tool next to personal contact, for maintaining frequent contact between the network participants. Assuming that an IHC –based intervention is successful, large databases will be produced containing valuable information on information-needs and personal characteristics of the users. Policy makers, health professionals, insurance companies and other relevant stakeholders can use these results for more consumer-oriented health policies. This facilitates a multi-strategy approach. Privacy-issues related to the use of personal information always need to be taken into account. The interactive character of IHC media also facilitates on-going participation of users, stakeholders and developers. New technologies can turn stakeholders and users into co-developers and active participants in the process (SPICH, 1999).

2.6 Discussion

To create a supportive environment, collaboration of relevant stakeholders is essential. The growing burden of disease due to obesity, diabetes, cardiovascular and malignant diseases has a large impact on all members of society on the individual and collective level. The urgency to develop effective interventions to change nutrition behavior is high. Government, health care, insurers, nutrition-education organizations, industry and consumer organizations all have expressed their concern about the increasing problem of obesity. In their statements, they all stress the need for social responsibility and collective action in order to make the healthy choice the easy choice. The Dutch Ministry of Health, Welfare and Sports, the British Department of Health and the WHO stated in their most recent strategies the need for a preventive approach to health in which all stakeholders feel responsible for the goal of reducing lifestyle related diseases (Department of Health, 2004; Ministry of Health, Welfare and Sports, 2004; RIVM, 2002; WHO, 2002). Although the precondition of a common goal with high urgency seems to exist, the formation of a collaborative alliance will be difficult.

In this article, many trends and chances that facilitate successful introduction of IHC in nutrition communication were addressed. However, the fast growing number of nutrition related websites that lack scientific base and that are partly biased by commercial messages, can be a large barrier.

Insights into chances and barriers is not enough to pave the way to nutrition behavior change through web-based communication. Large effort needs to be put into further development of personalized assessments, insights in food behavior and criteria for effective web-based interventions. The contribution of empowerment to behavior change is still not defined very clearly. This complicates the definition of the capabilities of IHC technology to facilitate empowerment through interactive tools. Insecurity on effectiveness of interactive interventions hinders the investment in the development of evidence-based Internet-based programs.

Finally we want to bring to the discussion that there is still uncertainty on the effect of the consumption of specific foods on health. In recent research, it was found that increased fruit and vegetable consumption did not lead to a statistically significant reduction in the development of major chronic diseases (Hung, Joshipura, Jiang et al., 2004). The effects on health of specific foods to individuals is even further away from being 'scientifically proven'. This lack of conclusive evidence can influence the perspectives on the usefulness of personalized nutrition communication. However, interventions need to be based

on the constantly changing state of the art of science. Early research on the options of putting future insights of science into nutrition interventions is needed. Future research in the MyFood program will focus on the social acceptance of Personalized Nutrition Communication based on insights in the interaction between genes and nutrients. Also effort will be put into the formation of a collaborating platform for discussion on successful introduction of Personalized Nutrition Communication.

3

The personal factor in nutrition communication

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3.1 Introduction

Many causes of premature death and illnesses are preventable or at least postponable at the level of individual behavior. As individuals, if we did not smoke, exercised more, ate less saturated fat and more fruit and vegetables, we would probably be healthier. In the last decades, a lot of effort has been put into improving dietary habits through nutrition communication. However, it has not been effective in changing the behavior of populations or individuals: in most European countries, actual consumption is not in line with basic recommendations for healthy nutrition. Although consumers know what they should be doing, diets still contain too much energy, saturated fat, sugar and salt and insufficient vegetables, fruits and fish. Dietary habits are important determinants of health since unhealthy eating, coupled with poor lifestyle choices, increase the risk of disease such as obesity, diabetes, cardiovascular disease and cancer. The growing rate of diet-related diseases accentuates the need for innovative approaches that motivate people to eat healthily (Department of Health, 2004; Ministry of Health, Welfare and Sports, 2004; WHO, 2002) A promising approach is personalisation of nutrition communication. Reviews on health interventions (Contento, Back, Bronner et al., 1995; Contento, Randel & Basch et al., 2002) and research on the effect of personalisation (Brug, Glanz, van Assema et al., 1998; Curry, Grothaus, Wagner et al., 2005; Kreuter & Stretcher, 1996) have shown that information that is personalized to a targeted individual's characteristics and situation is more effective in influencing that person's health behavior than general information. Central to this chapter is perceived personal relevance, since personalized nutrition communication that is not perceived as relevant to the individual will not induce motivation to eat healthily in the long term. We discuss how personal relevance is integrated in communication, fear arousing communication theory and health behavior change. In most theoretical models, concepts relating to this personal factor are included, such as selective perception, perceived personal risk, effectiveness of recommended actions and self-efficacy (Bandura, 1982; Janz & Becker, 1984; Petty & Cacioppo, 1986a; Rogers, 1983; Sears & Freedman, 1971; Van der Pligt, 1996). The innovative field of nutritional genomics is expected to give more insight into the interaction between diet, genes, protein and metabolites, and health (Muller & Kersten, 2003). The possible influence of this innovation on perceived personal relevance of nutrition

communication is discussed in section 3. Finally, we discuss some of the issues surrounding the personalization of nutrition communication and topics for future research.

3.2 The personal factor in theory: personal relevance

In communication and fear arousing communication theory and health behavior change, concepts include personal factors in several stages of the behavior change process: creating awareness, the threat appraisal and the coping appraisal. Weinstein's *precaution adoption model* identifies a series of steps preceding the taking of preventive action: the first three of which relate to awareness (Weinstein, 1988):

- realize that a specific risk exists;
- acknowledge that the risk is significant and can affect people;
- recognize that one is personally vulnerable to the risk.

Creating awareness about health communication

Every day, we are confronted with an enormous number of messages. Nutrition information is provided through mass media channels, on product labels, bill-boards, on the Internet and in specific cases through schools or by health professionals. It is impossible to pay attention to all of these messages: we have to be selective. People have a tendency to expose themselves to information that is consistent with their own attitudes and opinions (Sears & Freedman, 1971). This process is also known as *selective perception*. Attention is only given to information that is perceived as somehow personally relevant; this means that exposure does not automatically elicit attention. However, what 'personally relevant' means is not defined specifically in the literature. Batra and Ray (1983, p. 127) define relevant as 'stronger' and providing topics that are 'of interest' or 'valued' by individuals. McGuire (1985, p. 233) describes relevant as 'interesting'. Personal relevance can be described as 'consistent with personal attitudes and opinions'. Sherif et al.'s *social judgment theory* (1965) also states that people tend to accept ideas that agree with their own personal view. Messages that are not in line with their personal latitude (range) of acceptable options are ignored or dismissed. Another important factor relating to message content is the level of involvement. According to the *elaboration likelihood model* (Petty & Cacioppo, 1986a), the persuasive impact of a message can be central or peripheral. The key variable is involvement: the extent to which an individual is motivated and able to think about the position advocated in the message (issue-relevant thinking). When involvement is high, elaboration is also high. Elaboration involves cognitive processes such as evaluation, recall, critical judgment and inference and occurs through the central persuasive route. Changes are stronger when induced through the central route. An issue that becomes more personally relevant to a recipient will increase his/her motivation to engage in thoughtful consideration and action (Petty & Cacioppo, 1986a). Communication that contains information opposed to personal beliefs, attitudes or opinions induces uncomfortable feelings. People tend to reduce those feelings by avoiding dissonant information. This process is known as 'cognitive dissonance' (Festinger, 1957). A person who strongly believes that healthy food tastes bad will ignore information that aims to persuade him/her to eat healthily by saying that healthy food is tasty. Research has shown that many people have misperceptions about their personal food intake. They rate their food intake as 'healthy' and therefore do not consider nutrition communication on healthy eating as personally relevant (Brug, Hospers, & Kok, 1997; Brug, van Assema, Kok et al.,1994; Glanz, Brug, & van Assema, 1997; Lechner, Brug, & De Vries, 1997).

Threat appraisal in health communication

In between creating awareness and the behavior change process, feelings of personal risk will depend on the perceived severity of the consequences for an individual's health, and the effectiveness and costs of preventive behavior. Well known models of preventive health behavior such as the *health belief model* (Janz & Becker, 1984), *theory of planned behavior* (Ajzen & Madden, 1986) and *protection motivation theory* (Rogers, 1983) contain the concepts of perceived severity and vulnerability as influencing factors on motivation to change behavior. These models assume that people are able to adequately assess the risk to themselves associated with their behavior.

Perceived severity

In most communication about nutrition, the messages included are about the consequences of unhealthy eating. The theory of planned behavior, protection motivation theory and health belief model all include severity as the influencing factor for perceived personal relevance. Fear appeals are often made to spell out the severity of nutrition-related diseases such as diabetes and cardiovascular diseases, but the fact that these are outside the experience of most people may explain why the appeal is not effective. Gleicher and Petty (1992) and Liberman and Chaiken (1992) state that fear arousal can induce two different coping strategies: either acting as a motivator to induce intensive (and accurate) message processing or inducing defense motivation, both temporarily. Defense motivation is most likely to occur when a health threat is both severe and personally relevant because personal beliefs are being threatened. According to the heuristic-systematic model (Liberman & Chaiken, 1992), the processing goal of defense-motivated people is to confirm the validity of a particular attitudinal position (I am eating healthily) and to disconfirm the validity of others (your eating choices place you at risk). Defense-motivated people will process information selectively in the way that best supports their own beliefs (see also: selective perception). Risk perception research has raised questions about the assumptions of most models in preventive health behavior, which is, as stated above, that people are able to adequately assess the risk to themselves associated with their behavior. Risk assessment is a complex process influenced by several factors that interfere with accurate assessment of personal risk. The catastrophic effect, controllability, reversibility and whether the risk is taken on a voluntary basis or not influence risk perception and thereby fear arousal. For instance, perceived risks of unhealthy lifestyles (voluntary) are known to be lower that perceived risks of new technology (non-voluntary) (Koelen & Lyklema, 2004). Thus, people tend to have misperceptions about their personal behavior depending on the context in which the risk information is presented, the way the risk is being described and their personal and cultural characteristics (Van der Pligt, 1996). Furthermore, estimation of personal risks tends to be biased. Many people overestimate small probabilities (plane crashes) and underestimate large probabilities (heart disease). Risks that are cognitively available through personal experience or intense media coverage tend to be overestimated. This bias process is related to Tversky and Kahneman's (1974) availability heuristic and refers to people's tendency to judge an event as more probable to the extent that it is more easily pictured or recalled. The lack of knowledge about the specific relationship between food intake and individual risk of disease may interfere with the perceived severity of nutrition communication and contribute to misperceptions of personal risk.

Perceived vulnerability

In protection motivation theory and the health belief model, perceived vulnerability or susceptibility refers to the subjective risk of acquiring an illness if no countermeasures are taken (Koelen & Van den Ban, 2004). In combination with high perceived severity, perceived vulnerability is known to build blocks of fear and induce the personal relevance of messages. Research shows that people are quite aware of the relative risk of specific activities or behavior, but this tends to change when personal risk needs to be assessed. For instance, smokers accept the association between smoking cigarettes and disease but do not believe themselves to be personally at risk (Pechacek & Danaher, 1979, p. 389). This is referred to as unrealistic optimism from Weinstein's (1980) paper that focused on comparative risks in health risk perception. Van der Pligt (1996) describes six causes of unrealistic optimism that can lead to perceived personal invulnerability, perceived control, egocentric bias, personal experience, stereotypical or prototypical judgment, self-esteem maintenance and coping strategies. Risks judged to be under personal control tend to induce feelings of optimism (Otten & Van der Pligt, 1992). People generally know more about their own protective behavior than about that of others, causing egocentric bias that can cause optimism. They also tend to focus on their own risk-reducing behavior and are less aware of their personal behavior that can increase risk. Personal experience with a risk tends to be relatively vivid and can decrease unrealistic optimism. Stereotypical or prototypical judgment is a relatively extreme image people have of high risk groups, which are unlikely to fit with their self-image, thereby increasing optimism. Generally, people tend to rate their own actions, lifestyle and personality as better than that of others: this is known as self-esteem maintenance or enhancement. The last factor that influences unrealistic optimism relates to coping strategies. Conditions of high stress or threat can induce denial, thereby reducing emotional distress but also reducing the likelihood of preventive actions or their success. In general nutrition communication, vulnerability is addressed without reference to the personal factor. Recent research on the stage model of processing of fear-arousing communications developed by Das et al. (2003) concluded that, unless individuals can be persuaded of their vulnerability to health risk, they are unlikely to take protective action (De Hoog, Stroebe, & de Wit, 2005). Through face-to-face consultation, vulnerability to nutrition-related disease can be made more personally relevant, based on assessment of the individual's lifestyle (e.g. calories), physical parameters (e.g. blood pressure) and environmental circumstances (e.g. sedentary work). As in relation to communication on severity, uncertainties about whether unhealthy eating will actually lead to illness, also known as probabilistic outcomes, interfere with the strength of the messages and thereby with perceived vulnerability (Zimbardo & Leippe, 1991).

Coping appraisal in health communication

In the following section, personal factors in models of preventive health behavior that influence the coping appraisal, such as perceived effectiveness of the recommended action or response efficacy, perceived self-efficacy and cost-benefit evaluation, are discussed.

Perceived effectiveness of the recommended action

The appraisal of recommended actions in terms of being effective in reducing or avoiding health risks is included in several theories. Having undertaken on an extensive review, Sutton concludes that increasing communication on the efficacy of the recommended action strengthens the individual's intentions to adopt that action (Sutton, 1982). In protection motivation theory, motivation to engage in the recommended behavior is also

co-dependent on the appraisal of both response efficacy and self-efficacy (Rogers, 1983). In the health belief model, the effectiveness of a recommended action is a function of the perceived extent to which preventive behavior will reduce the threat (perceived benefits) and the perceived negative aspects of a preventive behavior (perceived barriers) (Janz & Becker, 1984). Recommendations in most nutrition messages are generic, or sometimes tailored to specific life stages such as childhood or pregnancy. Perceived effectiveness of the recommended action at the individual level can therefore be low. As during the threat appraisal, uncertainties about the effectiveness of recommended actions (or probabilistic outcomes) can interfere with perceived effectiveness of recommended actions. For instance, a healthy diet is not necessarily a safeguard against the development of cardiovascular disease (Koelen & Van den Ban, 2004).

Perceived self-efficacy

In Bandura's (1982) *social learning theory* (later called cognitive learning theory), the central concept relating to personal factors is 'self-efficacy'. It describes a cognitive state of taking control in which people believe they are capable of carrying out the specific behavior and can help create and control their environment in doing so. This concept of reciprocal determinism of behavior and environment is associated with concepts of self-management and self-control and is influenced by several processes, such as direct experience. It is also influenced by the storing and processing of complex information in cognitive operations that facilitates anticipation of the consequences of actions, represents goals and weighs evidence from different sources to assess personal capabilities. This leads to a situation-specific self-appraisal that induces feelings of confidence or insecurity about behavior in new, unpredictable or stressful situations. Self-efficacy is, then, the perception of one's own capacity to successfully organize and implement new behavior largely based on experience with similar actions and situations encountered or observed in the past, also called performance history (Green & Kreuter, 2005). Self-efficacy is also influenced by indirect or vicarious learning experience gained by observing others (modeling), such as a parent, teacher or television personality who seems to enjoy a specific behavior. is assumed that people learn more from models that are competent, attractive, likable, admired and loved. Also, similarity to/empathy with the observer is known to influence learning (Koelen & Van den Ban, 2004). Another influence on self-efficacy stemming from others is verbal persuasion. Strong persuasive messages from a respected, trusted person, such as a dietician, can have a positive influence on feelings of self-efficacy. Besides influencing behavior, self-efficacy affects thought patterns and emotional reactions, thereby inducing or reducing feelings of anxiety or coping ability. It is linked to specific skills and, by personalising communication, attention can be paid to an individual's feelings of self-efficacy. Communication about what to eat can, for instance, be matched with an individual's level of cooking skills. Perceived behavioral control in the theory of planned behavior is closely related to self-efficacy and refers to the fact that people can have positive attitudes towards certain behavior but simply lack the resources to carry out the behavior. In protection motivation theory, the coping appraisal will be positively influenced by response efficacy, the equivalent of effectiveness of recommended action and self-efficacy.

Cost-benefit evaluation

The above mentioned theories on health behavior also include an evaluation of the material and immaterial costs and benefits of changing behavior in line with the recommended action. Those perceived benefits and costs are anticipated or expected, but not yet

realized. The cost-benefit evaluation is integrated in both the threat appraisal (severity of health costs) and the coping appraisal (effectiveness/health benefits). At the same time, other consequences relating to physical, mental, social and economic values will also be evaluated. Healthy meals that are not appreciated by certain members of the family can raise issues at meal times. These social 'costs' of healthy eating can be perceived as high and have a negative influence on the cost-benefit evaluation. In the theory of planned behavior, the behavioral beliefs reflect beliefs about the consequences of performing the behavior. Together with the evaluation of those consequences, attitudes towards certain behavior are influenced. The perceived barriers in the health belief model refer to the perceived negative aspects of a particular recommended behavior, such as financial and social costs, and the efforts required to carry out the behavior. In protection motivation theory, these are referred to as response costs. If these costs are perceived to be too high, the personal relevance of the recommended action can be perceived as low (Koelen & Van den Ban, 2004). Figure 3.1 represents important personal factors in the early stages of the behavior change process. In Table 3.1, an overview is presented of the discussed concepts. Table 3.2 provides an overview of the factors discussed relating to personal relevance and interfering concepts in stages of behavior change. Table 3.3 contains the personal factors in the discussed theory.

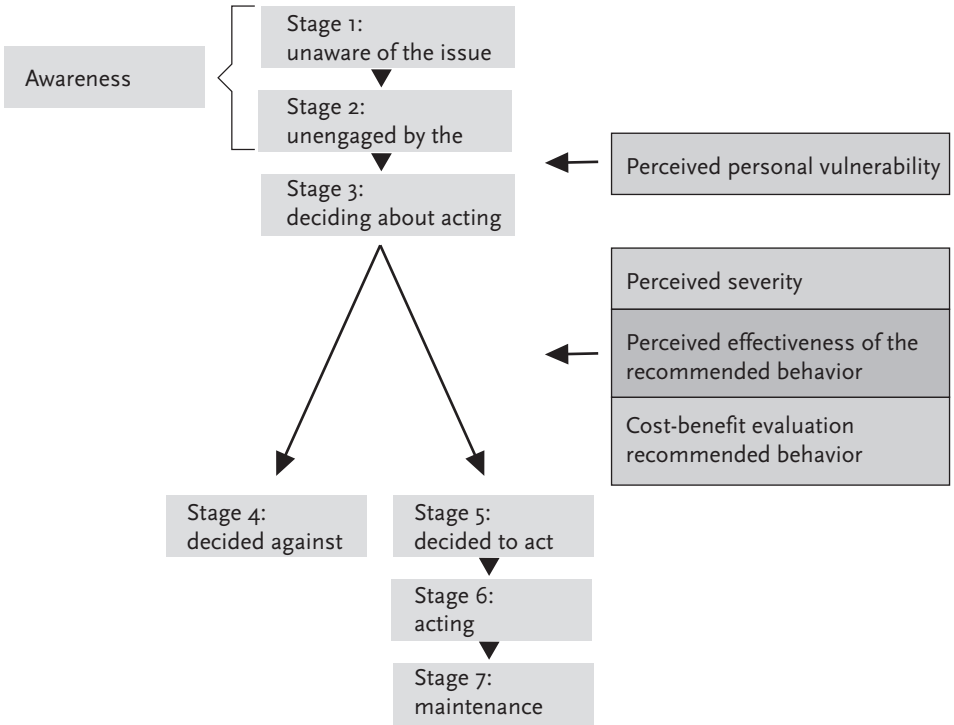
Table 3.1: Personal factors influencing perceived personal relevance

Concepts	Reference
Optimistic bias/unrealistic optimism	Weinstein, 1980
Selective perception	e.g. Sears and Freedman, 1971
Defence motivation	e.g. Liberman & Chaiken, 1992
Probabilistic outcomes	Zimbardo & Leippe, 1991
Misperception/bias of personal risks	e.g. van der Pligt, 1996

Table 3.2: Factors relating to personal relevance and interfering concepts

	Awareness	Threat appraisal	Coping appraisal
Personal relevance	Personal risk perception	Perceived severity Perceived vulnerability	Perceived efficacy of the recommended action Cost-benefit evaluation Perceived self-efficacy
Interfering concepts	Selective perception Cognitive dissonance Optimistic bias	Defence motivation Optimistic bias: unrealistic optimism	Probabilistic outcomes Fatalism

Figure 3.1: Personal factors in different stages of behavior change (based on Weinstein, 1988)



3.3 Influence of information about genes, nutrition and health on personal relevance

It has already been acknowledged that individual variability affects individual dietary and nutrient requirements, nutritional status and hence health. Therefore, recommendations on nutrient intake vary according to age, sex and ethnicity (Darnton Hill, Margetts, Deckelbaum et al., 2004). The relatively new science of nutrigenomics examines the response of our genes, proteins and metabolism to different foods. Nutrigenomics is expected to lead to evidence-based dietary intervention strategies for maintaining, and perhaps restoring, health and fitness and preventing diet-related disease. It is expected that, in the long-term, nutrigenomics technologies will be used to determine how our body responds to foods to affect our long-term health (Muller & Kersten, 2003). Nutrigenomics is also targeting the assessment of personal vulnerability to the development of nutrition-related illnesses through genetic testing. Next to a personalized assessment, the availability of a personalized 'solution' by means of a diet, product or nutrient that helps to prevent nutrition-related diseases is a requisite for the concept of Personalized Nutrition to become integrated in health behavior change strategies. The assumption is that individuals will be able to use this information to reduce their risk of common diseases such as heart disease, diabetes and obesity or to improve overall health and well-being. But not much is known yet about how individuals will actually use the information and whether it will contribute more to behavior change than the information currently supplied (Haga, Khoury, Burke et al., 2003; Marteau & Lerman, 2001; Massoud, Ragozin, Schmidt et al., 2001; McCain & Schmid, 2003).

The most promising contribution to behavior change may lie in the reduction of uncertainties on a general and personal level, thereby reducing the influence of the interfering concept of probabilistic outcomes. The expected insights into the relationship between genes, nutrition and health may provide a stronger base for designing clearer health messages about severity and effectiveness of the recommended actions. On a personal level, advice based on genetic testing can provide insight into individual vulnerability to nutrition-related illnesses and into the effectiveness of preventive strategies, thereby strengthening messages targeted at perceived personal vulnerability and perceived efficacy of recommended actions. Also, beliefs about the effectiveness of a treatment recommendation based on genotypic information could be strengthened. From research, it is known that tests offering great certainty of result (clinical validity), with available treatment and prevention options, are more readily undertaken (Marteau & Croyle, 1998). Another potentially positive influence on perceived personal relevance is the avoidance of optimistic bias that leads to feelings of invulnerability. Uncertainties as to whether or not an individual is at risk of developing nutrition-related disease can be influenced by the results of genetic testing.

However, information on individual genetic make-up can also have undesired effects on motivation to change behavior. It is known that, when fear appeals become too strong, some people will react defensively; this leads to inaction. Also, higher susceptibility to developing nutrition-related disease can induce feelings of fatalism, thus decreasing motivation to change. Given the common perception that genetic risks are immutable, motivation to change behavior may be decreased by weakening beliefs that changing behavior will reduce risk. Perceived self-efficacy could also be negatively influenced by weakening the belief in the ability to change behavior: 'It's in my genes so I can't change it'.

Table 3.3: Concepts relating to personal factors in discussed theories

Theories	Concept related to personal factors	Reference
Heuristic-systematic model	Defense motivation	Liberman and Chaiken, 1992
Social judgment/involvement theory	Involvement Latitude of acceptance	Sherif, Sherif and Nebergall, 1965
Elaboration likelihood model	Involvement	Petty & Cacioppo, 1986
Cognitive dissonance theory	Cognitive dissonance	Festinger, 1957
Social learning theory/social cognitive theory	Self-efficacy	Bandura, 1982
Theory of planned behavior	Behavioral beliefs Outcome expectancy Perceived behavioral control	Ajzen & Madden, 1986

Protection motivation theory	Perceived severity Perceived vulnerability Intrinsic/extrinsic rewards Response efficacy Self-efficacy Response costs	Rogers, 1983
Health belief model	Perceived severity Perceived susceptibility Perceived benefits and barriers	Janz & Becker, 1984
Precaution adoption model	Perceived awareness	Weinstein, 1988
Stage model of processing fear-arousing communications	Perceived vulnerability Perceived effectiveness of recommended actions	Das et al, 2003

Further research has to be undertaken to gain more insight into how people will include information on genetic make-up in the process of behavior change and whether it will either enhance or decrease motivation. In Table 3.4, an overview is presented of the possible contribution of innovations to perceived personal relevance of nutrition communication in respect of creating awareness, the threat appraisal and the coping appraisal.

Table 3.4: Possible contribution of information on nutrition-genes-health to perceived personal relevance of nutrition communication in stages of the behavior process

	Awareness	**Threat appraisal**	**Coping appraisal**
Contribution of information on nutrition-genes-health	Reduce probabilistic outcomes	Strengthen severity messages Strengthen effectiveness of recommended actions	
Contribution of genetic testing		Increase accuracy of vulnerability assessment	Increase accuracy of recommended actions

3.4 Future perspective

The main conclusion to be drawn is that not enough is known yet about the impact of personalized nutrition interventions with respect to both reach and effect on behavior. The possible negative influence of information about the relationship between genes and health on perceived self-efficacy, as discussed in this chapter, is a point of concern. Current evidence does not suggest that providing people with DNA-derived information about risks to their health increases their motivation to change behavior beyond that achieved with non-genetic information (Lerman, Croyle, Tercyak et al., 2002; Marteau & Lerman, 2001). In the authors' view, the question as to whether and how the inclusion of information on genes and health will influence perceived personal relevance of nutrition information, and thereby affect the motivation to eat healthily, needs to be central in

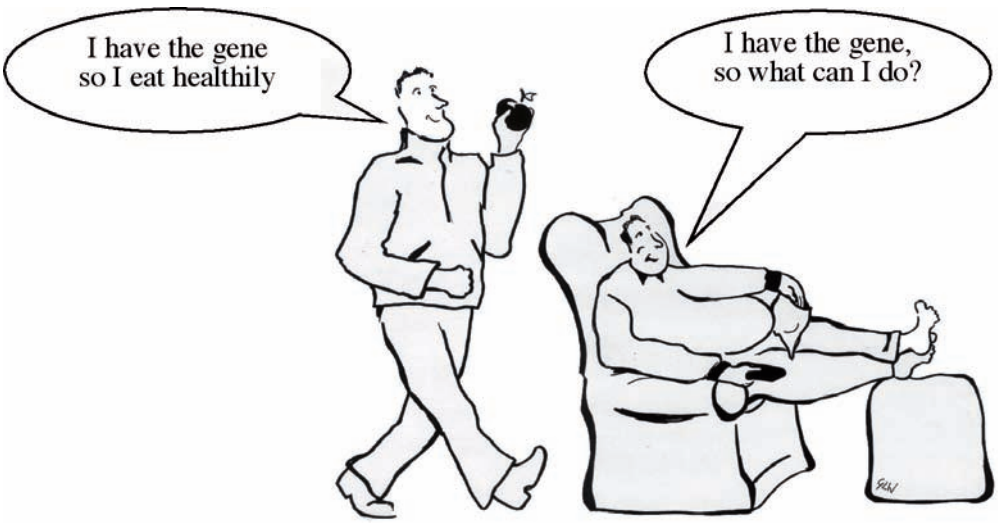
further research. Such insights could contribute to the development of more effective health communication. Figure 3.2 presents an amusing depiction of the dilemma faced.

The authors suggest that more effort needs to be put into understanding factors that influence personal eating style and are therefore perceived as personally relevant in nutrition communication. Eating style is an important, relatively constant characteristic that reflects individual beliefs and behavior concerning production, distribution and consumption of food. It is often based on the notion that a certain diet offers specific individual benefits or cause harm and is constructed in the context of daily life. Research should start with exploring whether and how 'genes' are currently used represented in Personal Eating Style.

A last point of discussion is the fact that personalized nutrition communication based on information from nutrigenomics will only contribute to health and well-being if end-users are sufficiently motivated and enabled to follow up personalized recommendations on food intake. But the empowerment of individuals to improve their food intake depends not only on individual behavior but also on the interaction with the legal, physical and social environment. Providing this stimulating environment in which the healthy choice is the easy choice is partly the responsibility of many: for instance, government for the right regulation, health professionals and education offices for services, information and social support, and industry for products. Views on how nutrigenomics-based personalized nutrition communication will impact on individuals and society need to be exchanged among all actors concerned to ensure its legitimate and successful introduction. Like other new technologies, personalized nutrition will entail benefits and risks and may change social structures, culture, norms and values. These will best be addressed by the people that will be confronted with personalized nutrition in their daily life. Early involvement in the development and implementation process of innovations influences personal commitment to those innovations. The WHO also recently stated that capacity building through partnerships is an important strategy to promote health. Partnerships are important for bringing together diversity in expertise, skills and resources for more effective health outcomes (WHO, 2006). However, partnerships can only be successful if participants share visions about goals, leadership and the necessary investment of each participant. Most often, this does not reflect reality.

A first step towards an open dialogue to create partnerships on personalized nutrition was taken at the round table discussion at the conference of the European Nutrigenomics Organization, in November 2005. The views of representatives from different scientific disciplines, industry and government were collected about who should be involved in a dialogue and what topics should be on the agenda. Although the discussion was very lively, it was clear that its content remained scattered leaving many topics touched upon yet not explored in depth. The reactions of the participants were limited to their own specific interest, and the discussion did not elaborate further on specific topics. Further action is needed to facilitate extensive and fruitful dialogue about relevant topic such as dissemination of knowledge, practical relevance of scientific insights and social-ethical issues such as expected high costs of applications.

Figure 3.2


I have the gene
so I eat healthily
I have the gene,
so what can I do?

4

I eat healthfully but I am not a freak Consumers' understanding of healthful eating in the everyday context

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Submitted for publication

4.1 Introduction

Nutrition promotion nowadays is often based on the ecological notion that most public health challenges are too complex to be understood adequately from single levels of analysis (Kok, Gotlieb, Commers et al., 2008; Stokols, 1996). This orientation highlights the reciprocal interaction of factors within and across all levels of a health problem and, therefore, the powerful role of the ecosystem and its subsystems, such as family, organizations, community, culture, and the physical environment in which people live (Goodman, Wandersman, Chinman et al., 1996; Green & Kreuter, 2005; Kickbusch, 1989; Koelen & Van den Ban, 2004). Based on planning models, for example Green and Kreuters' (2005) PRECEDE-PROCEED model, preconditions for health behavior are systematically identified and manipulated at the individual behavioral level (e.g. beliefs, knowledge, self-efficacy, skills) and at the multiple levels of the environment in which people live (e.g. availability, affordability, social support). New initiatives, such as intervention mapping (Bartholomew, Parcel, Kok et al., 2001; Brug, Oenema & Ferreira, 2005), further try to improve the quality of nutrition promotion activities. A promising approach in this realm is tailored nutrition advice, also called personalized nutrition advice. Studies show that tailored advice is more effective than general advice because it is customized to individuals to increase the chances that the message will be viewed as personally relevant (Brug, Oenema & Campbell, 2003; Contento, Bach, Bronner et al., 1995; Kreuter, Farrell et al., 2000; Noar, Chabot, Zimmerman et al., 2008; Skinner,Campbell, Rimer et al., 1999). However, the impact on behavior is still limited.

Even though these approaches are designed to address all levels of a health problem by combining an individual behavior change approach with approaches that influence the environment, the different levels are seen as distinct domains for different interventions, often at the cost of a thorough understanding of the interactions between them. In particular, the way in which individuals actively deal with their context is often poorly understood.

In this paper, we develop new, useful insights by looking more closely at how consumers deal with food-health concerns. We analyze how Dutch consumers *themselves* give meaning to healthful eating and to the related contextual opportunities and barriers

in their everyday life. The findings are discussed in relation to how healthful eating is currently understood in the literature about personalized nutrition advice, which is indicated as being a promising strategy to motivate healthful eating practices.

4.2 Personalized nutrition advice

Personalized nutrition advice differs from other nutrition promotion approaches in two ways: first, the messages or strategies are intended for one particular person rather than for a group of people; and, second, the messages or strategies are based on individual assessments (Kreuter & Skinner, 2000). The provision of personalized nutrition advice is no longer the sole domain of dieticians. The rapid developments in interactive computer technology (ICT), particularly the internet, allow for tailored interventions with large reach at relatively low cost (cf. Brug, Oenema, Kroeze et al., 2005; Eng, 2004). In such interventions, computer programs are used to collect data about an individual's dietary intake (e.g. fat intake), his/her health status (e.g. gender, age, body mass index), and psychosocial factors that mediate behavior change (e.g. intentions, perceived self-efficacy). Users receive personalized feedback that is assumed to be more effective than general messages because of its high level of *specificity*.

Firstly, the feedback provides the user with insight into the *specific mismatches* between her/his dietary intake and nutritional recommendations. People are often unaware of these mismatches and therefore see no reason to change their way of eating. In the Netherlands, as well as in other countries, most people eat less fruit and vegetables, and more products high in saturated fat, than recommended (CentersforDiseaseControl, 2005; Ocke & Hulshof, 2006; WHO, 2004). Yet, according to Eurobarometer (2006), a majority of Dutch (95%) and European (83%) citizens consider that what they eat is good for their health. Personalized feedback has proved to be an effective strategy to overcome such misperceptions (Brug, Glanz, van Assema et al., 1998; Lechner, Brug, de Vries et al., 1998; Oenema & Brug, 2003).

Secondly, the data about a person's health status and dietary intake are used to compile feedback about his/her *specific vulnerability* to the onset of diet-related illnesses. The specificity of this feedback is expected to be further increased by including information on the person's genetic make-up. This information is expected to become available in the future from nutrigenomics studies and is not yet used in personalized advice. Nutritional genomics (aka nutrigenomics) is the innovative discipline of nutrition research that studies the interaction between food, genes, and health at the molecular level (NuGO, 2008). A genetic test for vulnerability to diet-related illnesses such as cardiovascular disease could be added to a personal risk assessment, one that is currently comprised of indicators such as body mass index and blood cholesterol (Ordovas & Corella, 2007). Up to now, the complexity of researching diet-gene interactions has limited the translation of research findings into practical applications of personalized nutrition advice (Ordovas & Shyong Tai, 2009). However, even without scientific consensus about the validity of the tests, companies already offer DNA tests that indicate an individual's vulnerability to, for instance, type II diabetes, osteoporosis, or heart disease (Genelex, 2008; Salugen, 2008; Sciona, 2008; Suracell, 2008). At present it is not known whether and how people will use such information and whether it will motivate healthier eating than the information currently supplied in personalized nutrition advice (Bouwman & Koelen, 2007; Bouwman, Koelen, & Hiddink, 2007; Bouwman & Van Woerkum, 2009 ; Haga et al., 2003; Marteau & Weinman, 2006).

Thirdly, users receive recommendations about the *specific actions* required to reduce this risk. These actions are tailored to the psychosocial factors that mediate health behavior. For instance, a user with a low perceived self-efficacy towards healthful cooking will receive easy recipes with step-by-step instructions. The assumption is that such feedback will turn barriers (low perceived self-efficacy) into opportunities (high perceived self-efficacy) and lead to healthful eating.

Even though studies indicate that computer-tailored advice is more effective than generic messages in motivating individuals to adopt healthier behavior such as not smoking, diet and physical activity (Brug et al., 1998; Curry, Grothaus, Wagner et al., 2005; De Nooijer, Oenema, Kloek et al., 2005 ; Kreuter & Stretcher, 1996; Kroeze, Werkman, Brug et al., 2006), the impact on behavior is still limited. Kreuter, Oswald, Bull, and Clark (2000) argue that current interventions insufficiently address the contextual influences on the processing of tailored healthful eating information and on the ability and motivations to make the recommended changes. Brug, Oenema, Kroeze, et al. (2005) suggest that categories of behavioral determinants that help people to act on their positive intentions should be better addressed. These suggestions are in line with propositions in behavioral literature, for instance that of implementing a concrete plan to perform certain behavior within a specific context. These plans are concrete if-then plans that create a mental link between a specified future situation and a particular goal-directed behavior. (De Nooijer, de Vet, Brug et al., 2006; Gollwitzer, 1999; Gollwitzer & Brandstatter, 1997). Implementation intentions effectively promote fruit and vegetable consumption, a low-fat diet, and healthful eating in general. Yet, up to now, implementation intention research has insufficiently considered the highly social nature of eating, although some evidence suggests that forming a plan to ignore unwanted social influence may have a beneficial influence on goal attainment (Webb & Sheeran, 2006, p. 337).

4.3 An everyday-life perspective on personalized nutrition advice

From an everyday perspective, several remarks can be made with regard to current personalized nutrition advice. Firstly, it specifies risks and benefits with respect to long-term physical health and thereby assumes that health is one of the focal concerns in consumers' lives. Studies show, however, that eating also involves other functions, such as taste, convenience, cost, and the maintenance of relationships (cf. Connors, Bisogni, Sobal et al., 2001; Sobal, Bisogni, Devine et al., 2006). Secondly, the recommended actions are based on research about the relationship between food and health. Box 1. summarizes the guidelines in Dutch nutrition promotion (DutchNutritionCenter).

Box 4.1. Nutrition promotion in the Netherlands*

Why to eat healthfully: benefits of healthful eating according to nutrition promotion

- healthful eating contributes to a healthful life
- it provides nutrients needed to maintain a healthful body
- eating according to the healthful eating chart is fundamental for a healthful body weight and, in combination with physical activity, reduces the risk of chronic illnesses such as coronary heart disease, diabetes, and some forms of cancer

How to eat healthfully: action rules according to nutrition promotion

- choose healthful, tasty, and safe food every day
- use common sense to make conscious choices
- use the five rules of the healthful eating chart:
  1. eat a variety of foods
  2. limit food intake and take exercise
  3. use less saturated fat
  4. eat a lot of vegetables, fruit, and bread
  5. handle food safely

* Based on www.voedingscentrum.nl (in Dutch)

The underlying assumption is that consumers are able to follow these recommendations, regardless of other everyday practices. These assumptions may not be in line with how consumers themselves give meaning to healthful eating in everyday life. If we look upon food choice from an ecological point of view, (un)healthful eating is not solely a matter of conscious personal choices for the benefit of maintaining or attaining physical health. Consumers do not live in isolation. They live in a social and physical environment that may facilitate of hinder certain choices. Healthful and unhealthful eating should therefore be considered as behavior that is learned and performed in a social context, in a context shaped not only by characteristics of the physical environment, but also by family, friends, colleagues, and other people (Koelen, 2007). Within this context, eating may have personal and social meanings that are not directly related to the *physical* side of health. Consumer studies confirm this viewpoint; for instance, that of Bisogni, Falk, Madore et al. (2007), which showed that personal, social, and structural dimensions interact with and shape food choice in everyday situations. Sobal et al. (2006) have developed a framework that entails the interacting dimensions of life course, influences, and personal systems that guide the food choice process. Within this framework, consumers are assumed to actively construct food choice based on cognitions and social negotiations.

Yet, although previous studies have identified contextual influences on food choice, they do not particularly focus on how consumers *themselves* give meaning to food choice and the factors that influence this choice. Our consumer study aims to give insight into how consumers make sense of healthful eating and the related opportunities and barriers in their everyday life. By taking the consumer and his or her everyday actions regarding food choice as the point of departure, we abandon the idea of acting on individuals and context disjointedly. In other words, we are interested in how consumers manage and create their context when they try to change. The study is part of a larger project that aims to define preconditions for personalized nutrition advice that is socially acceptable for consumers and for societal actors who play a role in nutrition communication (Bouwman, Hiddink, Koelen et al., 2005; Bouwman & te Molder, 2008)

We are aware of only a few other studies that have focused on how consumers themselves

give meaning to health-related behavior. In a recent study, Pajari, Jallinoja, and Absetz (2006) found that, besides the hegemonic value of health, other forces such as pleasure direct daily lifestyle choices and that participants deal with opposing values by striking a balance between extreme rigidity and carelessness. The notion of balance will also appear important in our own study, although with a slightly different emphasis.

4.4 Method

Participants

This qualitative study aimed to explore a broad variety of perspectives of Dutch consumers. For this purpose, 30 respondents were selected, according to their differentiation in age (18-25, 25-40, 40-65, 65 years and older), gender, social living situation (living alone, with partner/with children), education level, and geographical area (urban/city). Each participant received ten euros.

Data collection, transcription and translation

The interviews were conducted in Dutch by two trained interviewers, between November 2005 and February 2006, at the respondents' homes. The semi-structured interview guide was developed based on a literature study about food choice (Bisogni, Connors, Devine et al, 2002; Bisogni et al., 2007; Blake, Bisogni, Sobal et al, 2008; Connors et al., 2001; Furst, Connors, Bisogni et al., 1996) and started with questions about values in food choice and health in particular. Subsequently, respondents were asked to describe what they ate during a retrospective mealtime (breakfast, lunch, or dinner), setting (away from home, at home) and social situation (alone, with others), why, and how. We particularly focused on differences between intended practices and those occurring during the meal in question. Box 2 provides the key topics discussed during the interview. Each interview lasted about one to one and a half hours. The interviews were recorded on a digital voice recorder and manually transcribed to word level accuracy, including speech errors and long pauses. They were analyzed in Dutch. The fragments used in this paper were translated into English by a native speaker who is also expert in Dutch.

Box 4.2. Key topics discussed in the interview

- What do you value in food choice?
- What is the meaning of health in your food choice?
- Can you tell me what you have been eating recently during .....
  - specific eating time: breakfast, lunch or dinner
  - specific setting: away from home, at home
  - specific social situation: alone, with family, with friends
- Can you tell me what made you eat like that?
- Was the food you ate in line with what you value in food choice?

Analysis

This study uses a form of discourse analysis (DA) developed by Potter and Wetherell (Potter, 2004; Potter & Wetherell, 1987, 1994, 1995; Te Molder, 1999). This means that we do not aim to determine the truth-value of participants' way of making sense of healthful eating and contextual influences, but rather focus on what speakers try to accomplish by talking about it in a particular way. By selecting a particular version of reality, people may accomplish certain goals with their description (Potter & Wetherell, 1987, 1994, 1995).

They draw, for example, upon unavailability of healthful products in supermarkets, thus emphasizing that unhealthful eating results from external barriers rather than from a lack of individual willpower. This study therefore examines how participants make sense of both healthful and unhealthful eating and examines the interactional goals for which the different versions are deployed.

The transcripts were analyzed using Atlas.ti, a software package for qualitative analysis. The data were analyzed by the first author and a qualified research assistant independently and involved the following steps. Firstly, the Atlas.ti open coding tool was used to assign codes to relevant fragments according to two research questions: (1) how do participants make sense of healthful eating, and (2) what interactional goals are these versions designed to achieve? We used three analytic levers to identify the different so-called interpretative repertoires (see below under Results) by which participants made sense of healthful eating and the goals they accomplished by doing so:

- *Variability:* the use of different themes to talk about the same phenomenon is known to signal different interactional goals;
- *Rhetorical character of the talk:* the analyst inspects what version of reality the speaker does *not* select, as a way to understand for what goal the current version (consciously or not) is opted for;
- *Participants' uptake of interviewer's talk:* how are participants treating the interviewer's talk: what are they making relevant, and to what interactional ends? (see also Potter, 2004; Potter & Wetherell, 1995).

In line with the nature of qualitative research, no claims are made for sample representativeness. This study can, however, be considered a grounded indication of a research phenomenon that deserves further attention and therefore may inform further analysis over a larger data corpus.

4.5 Results

Introductory observations

We would like to note, first, that respondents did not make sense of healthful eating in one single way. There were several versions of healthful eating. The themes that speakers use to make sense of a phenomenon are known in DA as interpretative repertoires: "broadly discernable clusters of terms, descriptions and figures of speech often assembled around metaphors or vivid images" (Wetherell & Potter, 1992, p. 90). We found three interpretative repertoires that could be distinguished from the available material:

1. emphasizing self-evidence: healthful eating is ordinary and just a matter of routine;
2. emphasizing relaxed health and pleasure: eating healthfully and pleasurably should be uncomplicated;
3. emphasizing that health is under control: unhealthful eating can be easily compensated for.

The first theme was used by almost all participants and there was high conformity about health as a self-evident criterion in food choice. The other two repertoires do not contest the self-evidence of the health criterion, but exemplify how health allows for pleasure as well. The relax repertoire was used by all participants to present both health and pleasure as uncomplicated. The control repertoire was used by more than half of the most participants to signal that potential health damage can be easily repaired by means of compensatory products. The repertoires were all used to confirm the importance of

health, without being freaky about it. With respect to eating, freakiness would imply that one totally denies oneself pleasure. We discuss in more detail in the following sections the different interactional goals for which each repertoire was used.

Repertoires

Emphasizing the self-evidence of healthful eating: routinely eating healthily

In the routine repertoire, healthful eating is constructed as dependent on routine behavior alongside the food chain of buying, preparing and consuming food (see Box 3). This way of talking resonates with nutritional recommendations (see Box 1) that emphasize the use of common sense to consciously choose healthful food every day.

Box 4.3: Examples of routine healthful eating behavior as drawn upon by

Regularity:
• eating fruit and vegetables everyday (I-01 t/m 04; I-07 t/m 12; I-14 t/m 19; I-21 t/m 30)
• eating a full meal every day (I-01 t/m 03; I-05; I-17; I-25; I-27)
Adding:
• adding healthful products to meals, for instance a salad with every evening meal (I-12; I-16; I-17; I-23; I-25; I-26)
Elimination:
• avoid high fat or high energy products, such as butter, or meals, such as crisps or pizza (I-02; I-04; I-06, I-09 t/m 11; I-13; I-16; I-25; I-26; I-29; I-30)
Substitution:
• choose healthful
• products over less healthful ones, for instance whole grain bread and rice instead of the white versions (I-2; I-09; I-13; I-19; I-21; I-22; I-24; I-25, I-27; I-28)
• using cooking techniques such as boiling in stead of frying (I-04; I-10; I-28; I-29)
• prepare meals yourself instead of buy 'ready-cooked' meals (I-02, I-07; I-08; I-12 t/m 15; I-17; I-20; I-23; I-25)

Participants used the routine repertoire to exemplify the meaning of health when asked to do so by the interviewer. In their discourse, they confirmed the importance of health, but they did so in a particular way. They made the point that healthful eating is self-evident rather than difficult to deal with. The following extracts illustrate how they accomplished this goal.

Extract 01

[interv] And healthy, what does that make you think of?

[I-19] It makes me think of salad. *You know, just vegetables, fruit*. And some types of meat, but in moderation, not a whole lot.

Extract 02

[interv.] Questions about your eating habits. What do you think is important if we're talking about eating or food, what's important for you? [one line omitted]

[I-21] [two lines omitted] Enough fruit and vegetables, *I always watch out for that. Just the general things that you pay attention to.*

In these extracts, the participants make sense of healthful eating in terms of healthful foods (Extract 01 and 02) and moderation (Extract 01), yet they do so in a particular way. They display ease in coming up with examples by which to present healthful eating as common knowledge. In Extract 01, the speaker 'just' thinks of fruits and vegetables. In Extract 02, eating enough vegetables is 'just the general thing' you have in mind, suggesting that such eating is self-evident.

In the following extracts, participants elaborate on the meaning of health within everyday food choice. Both speakers emphasize the routine character by giving detailed descriptions of actions deployed along the food chain of buying (Extract 03), preparing or consuming (Extract 04) healthful food:

Extract 03

[interv.] Healthy, you just said that dishes can be either tasty and healthy or tasty and not healthy. How do you differentiate these?

[I-02] [1 line omitted] Whenever I'm in the supermarket, I usually buy unpolished rice if it's there. I just know, that's what my mother once said. [2 lines omitted] It's a quirk of mine, whenever I buy rice it's unpolished rice.

Extract 04

[interv.] You mention the different elements. Can you say why, for example, you choose to start with a glass of water and then an orange?

[I-29] Yeah, that, there's not really a reason for it. It's just that I think that's my fruit, I'll start with that and during the day I eat an apple and then in the evening before going to bed I have an orange. I've been doing that for years.

The 'scripted' descriptions that the speakers use to describe *when* (usually; whenever - Extract 03; start and end of the day - Extract 04) and *where* (in the supermarket - Extract 03; at home - Extract 04) they buy or eat healthful food portray these actions as routine rather than occasional. Edwards (1994, 1995) introduced the term 'script formulations' for descriptions or reports that categorize events as standard or exceptional. Script formulations offer predictable and recognizable patterns that reduce the need to provide an explanation. The non-reasoned character of the described actions underlines their 'scriptedness' (I just know; it's a quirk of mine – Extract 03; there's not really a reason for it; it's just that I think – Extract 04). The participants also draw upon their mother's influence (Extract 03) and on what they have been doing for years (Extract 04) as evidence that these are established routines, so as to further emphasize the self-evident nature of their actions.

Emphasizing relaxed choices on health and pleasure: the doing-being-uncomplicated repertoire

Besides the routine repertoire, all participants use a repertoire that presents eating as dependent on ordinary, everyday actions. This repertoire presents healthy eating as not restricting pleasure, in order to avoid the idea of health freakiness. Although this repertoire thereby underlines the importance of pleasure, it also resists the potential idea of overindulgence (hedonism). We illustrate step by step how participants present both health and pleasure as relaxed, thereby avoiding both health and pleasure freakiness.

Being an uncomplicated healthful person

In reaction to the interviewer's question about their purchase and preparation practices with respect to healthful eating, participants routinely emphasize the uncomplicated character of these practices, so as to avoid the idea that healthful eating is restraining, or the opposite of enjoying oneself. For example in the following extracts:

Extract 05

[I-05] Yes, and if we have nothing on in the evening, then we just eat, um, well and healthily, I think.

[interv.] Can you explain that in more detail?

[I-05] Well, you peel potatoes, you add a bit of meat. You add some fresh vegetables and you take your time over it. It doesn't matter if it's 8 o'clock before you sit down to eat.

Extract 06

[interv.] You said, healthy, vegetables, no chips, no pizza. That's what you mean by eating healthily. How did you show that in that meal yesterday?

[I-16] Healthy eating? Just cooking and seeing what's in the freezer. I don't really stop and think about it too much.

The speakers both emphasize the uncomplicatedness of planning (Extract 06) or preparing (Extract 05) a healthful meal, thereby resisting the idea that these actions take more than just throwing something together. They make the point that healthful eating is relaxed rather than complicated.

Being an uncomplicated pleasure person

Secondly, speakers explain the consumption of foods that, from a nutritionist's view, should not be eaten too often, for instance chocolate, ice-cream, crisps, snacks, cookies, sweets, luxury meals in restaurants, and take-away food. In their response, they emphasize the ordinariness of eating these foods, rather than its potentially negative influence on health. Thereby, they signal that such eating is important, and at the same time does not require complicated considerations with respect to its healthiness, so as to suggest that eating for pleasure is relaxed as well. The following extract shows how participants accomplish this goal:

Extract 07

[interv.] If you look at snacks, can you remember that you ate a snack yesterday?

[I-26] Yes, that's my big downfall.

[interv.] How come it's your big downfall?

[I-26] I've got a real sweet tooth, I love biscuits, sweets...

The response "that's my big downfall", indicates the food eaten is regarded by the speaker as unhealthful. Yet, rather than making a problem out of this, the speaker straightforwardly admits that he has a sweet tooth. This reaction highlights the uncomplicatedness of eating for pleasure rather than for health. Eating food for its tastiness is thereby constructed as inevitable, something that is simply innate in you as a person. You should not be worried about it, this is "who you are", suggesting that therefore you should be relaxed about it. The presentation of eating for pleasure as a matter of identity has also been found in other studies (Lupton, 1996; Peel, Parry, Douglas et al., 2005).

All participants used this second repertoire to signal that eating for pleasure rather than for health is uncomplicated. However, it was not only eating for taste that was constructed as something that one should be relaxed about. Participants also presented both personal and social practices in which buying, preparing, and consuming food is embedded as uncomplicated. In their descriptions about these practices, speakers expressed several kinds of pleasure, broadly defined, that involved more than taste alone:

1. enjoying a bag of cookies in ten minutes to get rid of irritation [I-20; I-23];
2. enjoying hot chocolate to keep you warm in cold weather [I-13];
3. eating chocolate to keep you awake in the car at night [I-25];
4. saving time and energy to expend on other actions by buying convenience foods [I-02 t/m 5; I10; I-14; I-16 t/m 18; I-21; I-23; I-25];
5. wanting to serve your children, partner, or friends foods they like [I-01; I-02; I-10; I-15; I-16; I-20; I-25; I-29; I-30] ;
6. eating what is available when you share food with friends, eat in a restaurant, on the road, or on holiday [I-04; I-07; I-08, I-10 t/m 12; I-14; I-17; I-24 t/m I-26; I-28; I-30];
7. celebrating cultural traditions and eating the food connected to it (e.g. a cake at birthday celebrations) [I-04, I-06, I-13; I-17;I-25; I-27; I-28; I-30].

The uncomplicated repertoire could be interpreted as used by participants to direct responsibility to forces that can be regarded as beyond individual control, for instance stress (1), cold weather (2), coming home late from work (3), the low convenience of healthful foods (4), the preferences of others (5), unavailability of healthful food (6) or established traditions (7). However, this was not what speakers highlighted. They rather emphasized the uncomplicatedness of it all, suggesting that this is how one deals with these practices in everyday life: one is relaxed. They presented both health and pleasure as distanced from the extremes of *always* eating healthfully on the one hand and *frequently* eating for pleasure and eating pleasure-food in *large* quantities on the other, as illustrated by the following extract:

Extract 08

[I-07]	I'm going to England soon, and I know that food in England won't be any good, very fatty, and you don't eat what you want, but that's not a problem, but you are at the mercy of what's dished up.
[interv.]	How do you cope with that?
[I-07]	Oh, it's not a problem for me. It sounds as though I'm very concerned about health, which is the case if I'm cooking myself, but I don't worry about it if I'm somewhere else and just once eat something different. That's all fine with me, not so strict.

In this extract, the speaker attributes eating fatty food to the unavailability of alternatives; however, it does not induce complicated considerations about healthiness. He emphasizes the difference between minding one's health very strictly and occasionally not doing so. Other participants similarly emphasized the difference between uncomplicated eating for health and pleasure, and freakiness, as for example:

- Yes, but as I already said, something greasy from time to time is also nice, once a week or so. But it's not really every day that I buy chips or go to MacDonalds, etc. [I-04];
- In the evening I do feel like something sweet, certainly after exercising. That could

be liquorice, or biscuits. I'm quite moderate about that. I don't finish the whole packet [I-09];
- When I can avoid it [eating fatty food], I do, but as I said, I won't say no to tasty food [I-11];
- But I don't let myself be tempted by something that, well, unless of course it's on special, then I grab it [I-20];
- I was given chocolates, but they're gone. I never buy them [I-27].

In sum, participants made sense of health and pleasure in the context of taking one's ease, and thereby resisted the idea that one is either too strict about health or too loose about pleasure.

Emphasizing health is under control: the easy-to-compensate repertoire

The third repertoire further elaborates on the notion of being relaxed about health as well as pleasure. It presents health as dependent on specific foods that compensate for eating outside the boundaries set in the second repertoire. Using the compensation repertoire, more than half of the participants present themselves as conscious eaters who carefully consider whether certain foods affect their health and, if needed, compensate for potential harm done. Participants make sense of compensation in a particular way however. They associate health with separate products or product characteristics, and position these as compensatory for unhealthful food choice, as illustrated in the following extracts:

Extract 09	
[I-04]	I thought, it's Christmas, I think, well, I can eat healthily again later in the week. It's the festive sea son, a celebration like this just comes once a year.
[interv.]	So then it's alright.
[I-04]	Yes, but then I do take my vitamin pill on time.
Extract 10	
[interv.]	And where was the healthy part?
[I-02]	Um, the healthy part, there was salad, sometimes I just buy, yeah, salad basically. [3 lines omitted]. And usually when I eat something, it sometimes happens that you eat pizza or something two days in a row, but the next day, or that same day, I always eat fruit, for instance. I feel that I'm making up for it.
Extract 11	
[I-08]	And with a pizza I often eat, I buy a cucumber. Then I think, it's all bread and salami, and fat etc. Then I want to have something fresh with it.

In the extracts, speakers reveal that they are aware of the potential harm of the food eaten at Christmas (Extract 09) or eating pizza (Extracts 10, 11), yet that this is compensated for by taking a vitamin pill (Extract 09), eating fruit (Extract 10), or cucumber (Extract 11). Other participants also associated health with eating separate products, for example fruit, vegetables, or a salad, or with product characteristics, for example a fresh taste or fresh products. By doing this, they suggest staying in control and cannot be accused of moving unconsciously into the risky zone.

It seems that participants have taken note of the idea of energy balance that is currently promoted in Dutch nutrition advice. The basic principle of this idea is that consumers learn to balance their caloric intake as a strategy to avoid an increase in their bodyweight.

This can be achieved by eating fewer calories *and* eating healthily so as to compensate for occasionally eating food that is unhealthful. However, if we compare this strategy with participants' understanding of compensation, there is an important difference, namely, that they associate compensation with separate products or product characteristics rather than with eating fewer calories and healthily. Their association may result from extensive exposure to findings of nutritional studies that report on associations found between the intake of nutrients and the risks or benefits for physical health. For instance, the consumption of fruit and vegetables has extensively been promoted because they contain nutrients that may benefit people's health.

4.6 Conclusion and Discussion

In this study we aimed to gain insight into how consumers give meaning to healthful eating and the opportunities for and barriers to healthful eating in their everyday life. We found that consumers use three repertoires to make sense of healthful eating:

1. the routinely healthful repertoire;
2. the doing-being-uncomplicated repertoire;
3. the easy-to-compensate repertoire.

The repertoires were used in combination by consumers to accomplish at least one goal: to confirm the importance of health, yet to distance themselves from health freakiness. They did so by associating healthful eating with common knowledge and scripted activities in the first repertoire, thereby suggesting that such eating is self-evident. The second repertoire presents eating for health and pleasure as uncomplicated, thereby emphasizing consumers' relaxed way of dealing with both in everyday practices. Consumers used the third repertoire to relate healthful eating to products and product characteristics that easily compensate for potential damage done by unhealthful eating practices.

The results of our study should be interpreted in the context of the limited number of participants who were all of Dutch origin. However, we believe that our findings are sufficiently important to be taken into consideration in nutrition promotion in general, as well as in the development process of personalized nutrition advice.

Our findings may be viewed in two ways: firstly, as reflections of consumers' requirements for uncomplicated, convenient healthful eating in everyday life. From this perspective, existing nutrition promotion efforts provide for these requirements to a large extent. The concept of personal relevance – the key in personalized nutrition advice - attempts to make the healthy choice the most obvious, logical, and convenient choice. In addition, extensive attention is paid to the idea of making the healthy choice the easy choice, so as to emphasize the need for the creation of an enabling and supportive environment. For instance, a growing variety of convenient, tasty, and healthful foods and meals are being made available and accessible to consumers. Also, special books offer solutions for dietary strategies, for instance to lose weight. And, if needed, consumers can buy functional foods, in the form of health-claim-carrying products or natural foods, that offer convenient, instant compensation for potential damage done to health (cf. Scrinis, 2008a). From this perspective, current efforts in nutrition promotion should continue to make healthful food choice more convenient for consumers' everyday lives.

We do not question the need for these efforts that motivate, enable, and support more

healthful eating practices but wish to warn of a potential consequence. The growing insights into the relation between food and health has increased the specificity, and thereby the complexity, of what to eat and what not to eat for the benefit of health. Nutrigenomics research aims at further increasing this specificity up to the level of gene-food-health interactions, which can lead to even more complex dietary recommendations (cf. Komduur, Korthals, & te Molder, 2008). Healthful eating requires a well-organized life, but many consumers are unable to achieve this. This complexity is partly taken care of by health promoters, policy makers, the food industry, and other experts in nutrition communication who facilitate convenient, healthful eating. This may, however, lead to the idea that critical thinking by individuals on how to organize healthful eating in everyday life can be handed over to experts. As a consequence, consumers themselves may regard healthful eating as unproblematic, as not requiring thoughtful consideration, because someone else is already taking care of it.

However, if structural changes are required, as is the case with the rising trends in obesity and other diet-related illnesses, the strategy of making healthful eating more convenient may be insufficient. We therefore wish to emphasize the importance of a second aspect of our findings, namely, that they reflect important social interactional requirements. In everyday life, consumers have to persist in their intentions to eat healthfully within social practices. Our findings indicate that, within these practices, consumers present themselves as uncomplicated, in order to distance themselves from being perceived as someone who is very rigid about what to buy, prepare, or consume. They aim to avoid health freakiness. This finding is similar to the finding from a study among vegans, who also offered uncomplicatedness as the normatively preferred option for dealing with a vegan diet, as the opposite of being a picky and 'non-ordinary' eater (Sneijder & te Molder, submitted for publication). In participants' normative orientations, being uncomplicated was thus equated with being ordinary and normal.

In a Finnish study on healthful lifestyles more generally, participants emphasized the importance of a balance between health and pleasure (Pajari et al., 2006). Our study also showed avoiding rigidity as an important participants' concern. But it was overall relaxedness rather than the balance towards moderation that acted as the point of reference. Notions of the 'good life' equaled with 'not-being-difficult' on either side of the health-pleasure spectrum.

The finding that being someone who makes great efforts in relation to healthful eating practices is a disfavored image leads us to conclude that, if structural change is to be achieved, this image needs to change. By this we mean that thoughtfully considering and discussing the wish to eat healthfully should become a new standard rather than freaky. The core task of nutrition promotion then would be to enable the achievement of this standard.

If, however, such a change is to be accomplished, several points should be noted. Firstly, nutrition advice should allow more flexibility to better match with consumers' complicated everyday life in which health is not a focal concern, just one of several ambitions. A starting point could be to reconsider the nutrition promotion idea that "who knows better will do better". This idea drives the developments in personalized nutrition advice, but resembles that of healthism. This term was introduced by Crawford (1980) to describe a new form of health consciousness that refers to a preoccupation with personal health as the primary focus for the achievement of health and well-being. Healthful behavior thereby became the paradigm for good living. The focus on attaining health in personalized nutrition advice can be viewed as a social expression of healthism. Scrinis (2008b), as well as others (for example Pollan, 2008), argue that the narrow

focus on bio-medical health, in the realm of food called nutritionism, may have limited value, especially if we look at its meaning in everyday life.

Secondly, consumers could be stimulated to thoughtfully consider and actively discuss the self-evidence and uncomplicatedness of healthful eating in their everyday life. They may find out that healthful eating is not that self-evident after all. The debate should not so much be on the *importance* of health - there seems to be no disagreement here - but on its actual and desired appearance in people's everyday life.

Thirdly, it should be questioned whether consumers' uptake of the concept of compensation is desirable. Nutrition research may need to find ways that more appropriately address consumers' need for compensatory strategies, and nutrition promoters may need to revise their messages on compensatory strategies. Such an exercise also needs to include a critical reflection on the nutrient-by-nutrient strategies that are fostered by food producers and experts in their research and promotion and appear difficult to translate to people's own daily lives.

5

'Getting things done': the Action Approach towards bridging the gap between intentions and practices in health behavior

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5.1 Introduction

Many interventions in health promotion start from the assumption that the client has to be moved in a more healthy direction. Therefore, a number of determinants are selected and manipulated: within the clients, their knowledge or attitudes, and outside, the social and physical contexts that help or hinder desirable behavior. These approaches offer valuable ways to organize health promotion activities, often have a sound scientific base and are structured according to a carefully developed working plan, such as the Precede Proceed model (Green & Kreuter, 2005 p. 372). New initiatives such as intervention mapping (Bartholomew, Parcel, Kok et al., 2001; Brug, Oenema, & Ferreira, 2005) enrich the quality of these attempts.

Notwithstanding these approaches, a lot still has to be done. We are faced with a number of serious health problems, such as alcohol and drugs abuse, risky sexual behavior, or unbalanced eating habits, that call for fresh ideas to combat them. One such idea could be to abandon the notion of acting on the client and the system in which he/she lives, and take the client and his/her behavior as the point of departure. By this we mean that a client should be active in promoting his/her own behavior. The basic strategy is then to support the client in what he/she is already willing to do, but experiences that this is not that easy

The idea of refraining from trying to change the client him/herself stems from an old proposition of Lemert (1981), in which he introduces the term 'mobilizing information', referring to the ability of mass media to deliver any information that allows people to act on attitudes they already have. This mobilizing information could relate to the place or time of an activity, so-called 'located information', or to names and contact information for people or groups, so-called 'identification information'. Of particular interest, however, is a third category of information, relating to the effectiveness of behavior in a certain situation, so-called 'tactical information'.

The concept of mobilizing information is applied to the general field of mass communication, especially in the political realm. Recently, the concept has been used to gain insight into how citizens in their everyday interactions via the Internet get to know how to participate effectively in the legislative process (Hoffman, 2006). Some research has been undertaken in the field of health (Hoffman-Goetz, Shannon, & Clarke, 2003; McDonald & Hoffman-Goetz, 2001), but this research, like Lemert's, is strongly linked to mass media activities. We propose to use this concept in a more general sense: helping people to design and perform the activities on the base of attitudes that they already hold.

Informing people about how to take action is again not a new idea, either in general or in health communication. For instance, it could form part of the efficacy of the recommended preventive behavior (the perceived response efficacy) in Rogers' (Rogers, 1983) protection motivation theory. If individuals know exactly what they can do to overcome a risk, they are more willing to take action. However, we propose to problematize precisely this point, by questioning what it means to change behavior in a certain social context. For this is where our approach differs from many others. On the one hand, we take an optimistic stance in assuming that many people have positive attitudes toward a more healthful behavior and that they have the essential knowledge about the risks of an unhealthful lifestyle, together with the essential knowledge about what has to be changed; but, on the other hand, we are very much concerned about the task at hand: to really *change* unhealthful behavior implies a lot more than is often considered.

This concern lies in the heart of the 'Action Approach'. We start by explaining what it means to change health-related actions. Firstly, we dwell on the principle that much health-related behavior is not one activity, but a *chain of activities*. Secondly, we show that these activities are mostly *embedded in social practices*, that relate to more than health concerns. And thirdly, we try to explore what individuals have to do to act as a change agent in their own situation. Then, we look at the possibilities to develop interventions, if that is still the right term, on the basis of these principles, referring to ongoing research in which we are involved. We give some examples that are illustrative of the Action Approach. Subsequently, we address the question of why the Action Approach, until now, is far from mainstream. Related to this, we have to consider a difficult subject in this context, namely the necessity to be accountable. How usable is an approach that starts from the myriad and multi-faceted world of the client and is therefore as diverse as reality itself?

As we have said, we do not aim to position this approach as the alternative for those approaches that tackle the determinants of unhealthful behavior by informative or persuasive messages, or by altering the context. We just propose to add a new strategy that could be worth considering in those cases where there is no lack of medical or health information, no hampering attitude, and no physical or institutional context prohibiting healthful behavior. Thus, our approach may contribute to a better explanation of the differences quite often found between good intentions and bad behavior (cf. Amireault, Godin, Vohl et al., 2008; Sheeran, 2002; Webb & Sheeran, 2006) and to new practical ideas about how to cope with this difference. For instance, it could lead to better implementation intentions, more suited to the situation at hand (Ajzen, 1992; Gollwitzer, 1999; Gollwitzer & Brandstatter, 1997), or to more concrete proposals to raise self-efficacy (Bandura, 1997).

5.2 Changing behavior to improve one's health

Before clients consider behavior change, the following is required:

- problem awareness: clients must be convinced that an imbalance exists between goals and the current situation, on the basis of which they can develop readiness for action;
- behavioral objectives: clients must have a keen idea about the behavior that has ideally to be installed, to prevent illness or to improve quality of life;
- a process orientation: clients must have a view about the way this healthful behavior could be organized in their own situation.

In the Action Approach, the focus is on the third prerequisite, on the process of finding and executing a new route to desirable outcomes. The first and second prerequisites are seen as important or even crucial, but not as sufficient. Many clients know the basics about health problems and what has to be achieved behaviorally. However, they are utterly incompetent in achieving this. The assumption is that we can gain a lot by concentrating particularly on this process of 'getting things done'. Therefore, we have to consider three principles that form the basis of the Action Approach:

1. healthful behavior consists of a chain of activities, routines that are
2. embedded in social practices,
3. and deserve therefore individually induced social change, including the required discursive work.

We now discuss these principles.

Ad 1: Healthful behavior consists of routines
Much unhealthful behavior is not restricted to one specific, clearly distinguishable action, but is related to routines, more specifically: to a routinized sequence of related actions, repetitive and habitual (Bennett, Murphy, Carrol et al., 1995b). For instance, the act of eating is linked to a chain of activities and decisions made at different points in time: making a plan to purchase food (or not), making a selection in the supermarket, planning when and what to eat in which proportions, selecting ways of preparing the meal and deciding to finish your plate (or not). People do not make conscious decisions along this chain every day or week, but rather rely on routines in these activity chains. Changing an eating habit means therefore changing the routines of planning, purchasing, selecting, preparing and enjoying.

In the same way, increasing physical activities can be viewed as a collection of body movements leading to a behavioral pattern, linked to certain repetitive situations rather than only a simple, discrete action such as fifteen minutes on an exercise bike at the sports centre. Changing physical activity relates to going to and returning from work, gardening, shopping, spending one's free time, of which sports can be part. In this case also, we see routines during which a lot of physical energy is spent or spared. Therefore, becoming more physically active means changing these routines. The norm of 30 minutes of exercise has to be translated into these routines in order to be effective.

Ad 2: Healthful behavior is a social practice
Health-related behavior is the concept used to indicate that health behavior cannot encompass all the relevant activities that are at stake in promoting health. The health aspect generally forms part of a motivationally complex whole, serving a lot of other functions. The fact that this health-related behavior is socially inspired adds to the dilemmas about how to organize change in order to improve one's health.

Here, we are confronted with what we call 'social practices'. The term 'social context' is more common, but this is linked to a more deterministic approach, being just a 'set of mediating variables explaining individual choice' (Poland, Frohlich, Haines et al., 2006, p. 62). What we wish to envisage is an *acting* group of people.

In those social practices, health can be more or less of an issue, depending on many other concerns. For instance, eating is not simply a behavior of the individual to maintain metabolism but has many subsidiary functions that often take precedence over nutrition

(McQueen, 1996). Enjoying tasty food together in the family is one of these functions. In the case of eating, drinking or smoking, it seems clear that social practices model (health-related) behavior; but, in physical activity, stress management, having enough sleep and solving relational problems, the social part is also evident. Therefore, changing behavior to improve one's health means changing the social system in which one lives, changing a shared lifestyle or changing the dominant values or existing norms.

Ad 3. Individually induced social change
An individual who intends to work on his/her health has to change his/her routines and practices and often those of others as well. The question is how to do so. We stress an important part of the change process that is at stake here: the discursive work that has to be accomplished in order to achieve new standards of health behavior. For instance in the case of changing eating habits, a number of concrete actions may be required. Those who are responsible for buying food, so-called 'nutritional gatekeepers' (Wansink, 2006) have to be convinced that the usual selection has to be altered. The cook has to be persuaded to use less fat. In social gatherings, one has to learn to refuse snacks or drinks. The practice of sharing a bag of potato crisps and a bottle of cola while watching television has to be questioned. The same holds true for the custom in primary schools that every child brings in sweets to their schoolmates to celebrate birthdays. It all entails discursive work, and one's discursive competence decides the result.

So, we look at the process of changing routines and practices from the viewpoint of an individual with an intention, who is often uncertain about how others will react, uncertain about the procedure, about how to 'get this done' and uncertain about the outcome. These uncertainties differ from medical uncertainties for which formal assessment procedures are available. Yet, these uncertainties play a big role in promoting health from the perspective of everyday-life activities.

It is especially here that the Action Approach is likely to contribute, by helping to reduce these uncertainties. Clients can be informed about problems and behavioral solutions, and may be motivated to change their behavior. However, they have to be equipped with the social tools to organize the new situations needed to improve their health situation. Of course, these tools cannot be produced from behind a desk, aiming at standard solutions, because they have to fit the specific context of use. In a sense, every individual has to shape his/her own means to act in his/her own situation. Nevertheless, help from outside can help, as we now try to show.

5.3 The action approach

Before giving some examples to illustrate the Action Approach, we make some preliminary remarks, taking into account the three principles sketched above.

The *first* is that the answers to supporting effective client's strategies can be found in classical theory about social change. From as far back as the nineteen fifties, a research tradition has been devoted to the question of how individuals influence others in a given social setting. For instance, Katz and Lazarsfeld's (1955) classic book, subtitled *The part played by people in the flow of mass communication*, stresses the importance of interpersonal influence in social change. Kadushkin (2006) sees this book as one of the foremost landmarks of a 'theory of action'. This influence can take the form of advice but can also attempt to change the norms of a group, where one individual acts as the change agent of the group as a whole. In The Netherlands, Brouwer (1967) has presented his 'miceleum-model', suggesting that mushrooms are not represented

properly by the shape seen above the ground, but by the totality of thin threads below the surface, contrary to the common imagination. In the same way, the dynamics of mass communication systems are better described by looking at the informal interactions between people than by the more visible exponents: television, newspapers and so on. We can translate this picture to health. Healthcare is more than 90 percent concerned with what happens between people (within families, between friends, in neighborhoods), and health communication is predominantly communication about health-related issues not with, but *between* clients. The effects of professional health communication depends on this word-of-mouth. Again, this idea is not new at all, but is more than a century old. At the end of the 19th century, Tarde wrote: 'without people's conversation, the journals would be useless' (Clark, 1969 p. 307). They would be like a vibrating string of which factors might influence this unhealthful behavior, without a sounding board (Van der Vorst *et al.*, 2005). The consequence of this idea is that the messages produced by health professionals resonate more clearly if they are recognized as socially relevant, resembling the talk of people in their own circles. If people feel supported in their own attempts to install better, healthier conditions in their own lives, they will listen carefully.

The *second* remark is that empirical research should be directed at the repertoire of strategies that are used to improve health in a social context. How do people engage to organize this? Are these different strategies available, what are they, and why do some people choose one alternative and not another? Instead of directly trying to influence the social system in which clients live by using models of attitude and behavioral change, we could try to use empirical research on what people already do and mirror these strategies to a wider audience. An example may clarify this approach. In many countries, including The Netherlands, heavy drinking among youngsters is a big problem. We could look at where this unhealthy behavior is located (Van Laar, Cruts, Gageldonk et al., 2007), which factors influence this behavior (Van der Vorst, Engels, Meeuws et al., 2005), or what can be done to influence this behavior (De Nooijer & de Vries, 2007). Another approach, however, would be to look at the way youngsters manage to control their common drinking culture. Apparently, some groups are able to stop binge drinking when it begins, whereas other groups go all the way. How do they do that? What are the discursive actions that youngsters use to prevent this risky habit? Which strategies are available here? What can be known about their effectiveness? We could then use the knowledge produced as a result of trial and failure in the concrete world of interacting youngsters, and contextually robust, that is, resistant to the temptations that an enticing night out can offer. Once gathered, this knowledge could be conveyed to others in a way that is attractive and informative. Instead of looking at the determinants that create the problem, we might look at the mechanisms that form part of the solution.

A *third* remark is that this beneficial behavior could be the object of in-depth research as to what is going on here. One of the promising research traditions in this realm is labeled as discursive psychology (Edwards & Potter, 2005). The basic idea is that an utterance by an individual is not just a presentation of a particular idea or opinion, but meant to achieve something, interactionally. In this way, researchers are able to link what people say to the division of responsibility or their attempt to gain credibility. For instance, as has been found in the analysis of an Internet discussion forum for and by depressed persons, clients try to present themselves as highly affected by this disease (they are 'really depressed') but still quite competent to handle their life. In this manner, they also show their ability to help each other (they are not only victims) with information and (emotional) support (Lamerichs & Te Molder, 2003). These findings show the embeddedness of health-related behavior in the total social situation, not only in the

sense indicated earlier (eating is not only nourishing healthily; it is also enjoyment, a reason to come together, etc.) but also communicatively. If we talk about health, we (also) perform actions linked to our relationships with others. Our identity as a healthy person (or as a person that does not care) is discursively produced vis-à-vis the others in ongoing interactions.

This discursive psychological approach is by no means the only way to get a deeper insight into the mechanisms of informal health behavior. We present it as a clear example of a different style of doing research, starting from the client-in-action perspective. Another interesting research tradition is the ethnographic approach. This approach is used by anthropologists, mainly to study health behavior in third-world settings (Kitsao & Waudo, 2002) but more and more also in Western countries, often in specific 'scenes', (e.g. drugs-users, see Moore & Maher, 2003). Other quantitative research strategies are also worth considering (cf. Smith, 2004).

5.4 The Action Approach towards intervention development

What kinds of interventions are imaginable, if we take the strategies of clients in everyday-life situations as a point of departure? These interventions have to be supportive of clients in the sense that they show how to effectuate healthy behavior in social settings. We present three projects that may illustrate different aspects of the Action Approach.

The first is a project based on the entertainment-education strategy, with the stress on transitional role models that show how change can be achieved practically. The second is a project that tries to develop tailored health information, not only about risk and remedies but also on the process of getting things done in a social setting, where clients are invited to help clients. The third is a way to engage youngsters in reflecting on the way they interact on health-related issues.

1. The Entertainment-Education strategy

The entertainment-education (E&E) strategy oriented to health campaigns via the mass media, mainly television, posits that the model of a rational decision-making process is not the most suitable representation of how people usually deal with health issues. One of the reasons for this is that in much health-related behavior no direct risk is involved (such as unhealthful eating, excessive drinking or smoking). Therefore, the initial interest of many receivers is restricted. Another reason is that many clients in the low-education categories (usually with a more risky lifestyle) are not accustomed to, or experienced in, dealing with the ins and outs of health messages (Bouman, Maas, & Kok, 1998).

The alternative is an approach in which the cognitive route to persuasion is abandoned and exchanged for a strategy directed towards empowering the client to control his/her health behavior. Instead of cognitive processing of information, we see in this case forms of incidental learning through role models and plots – all in an attractive, inviting form.

A popular E&E strategy format is the (television) soap, in which transition personages are chosen to visualize for viewers how they can change their own behavior in their own social circumstances. These personages can reflect the dilemmas with which viewers themselves are confronted. If they succeed in solving them, they can act as role models and make imitation more probable.

The fact that soaps are viewed in groups of family members or friends creates another effect: viewers can talk about the process and outcome and link these subjects with their own situation. By doing so, they can create new conditions for healthier practices.

A television program based on the E&E philosophy is not automatically successful.

Quantitative and qualitative research on the effects of a Dutch series, meant to address the problem of overweight, showed mixed, yet promising, results (Mutsaers, Renes, & Van Woerkum, 2007). At this moment, we are involved in evaluation research regarding an E&E program on addiction, to get a better insight into the factors that help or hinder the effectiveness of such a series. One of the critical aspects, we think, is the perceived realism in the way the role models play out their part. Can viewers identify with them and are the actions of the role models recognizable and informative for viewers' situations?

2. The My Food project

Another project is called *My Food*. The idea behind this project is to enable clients to choose individually tailored nutritional advice, with the help of specific input from the clients themselves about their nutritional intake and other health-related conditions (their risk profile). Individually tailored advice is greatly stimulated by two independent developments; firstly, the availability of new medical insights about the effects of nutritional behavior. Interesting in this respect is the prospect in the (nearer or more distant) future of more advanced risk profiling based on one's genetic make-up and accordingly more perfected personalized advice. Secondly, the technical possibilities of the Internet and the experience of clients in the use of this medium may add considerably to the effectiveness of *My Food* as a new tool for nutritional advice.

At this moment, we are trying to expand the capacity of *My Food* in the direction of the Action Approach, mainly by constructing the prototype of an additional site where clients can help each other achieve their desirable behavior in the relevant social context. For instance, parents may be concerned about getting their children to eat vegetables daily. They know that this is not necessarily an easy task and want to be informed about strategies that suit their situation, their style of parenting and their eating habits. In this way, they learn to deal with the peculiarities involved (Bouwman & Van Woerkum, forthcoming).

The site can consist of success stories, written by clients who managed to improve their health situation (experiential knowledge), or of posted questions and matching reactions, with the possibility of a more general discussion about the subject. There are already promising initiatives in this field that indicate how informational (and support) needs can be fulfilled, where these cannot be met easily through conventional professional healthcare (Ziebland *et al.*, 2004). Another possibility is to incorporate small videos in such a site showing the (discursive) work that has to be done.

3. The Discursive Action Method

The discursive action method (DAM) is meant to stimulate clients to develop their own health-related activities (Lamerichs & Te Molder, under review). It is grounded in the discursive psychology tradition (see above). The DAM aims to invite participants to reflect on their way of dealing with everyday-life dilemmas in health-related issues, using their own conversational material.

The method has been developed and used in a participatory health project called LIFE21. In this project, youngsters in three secondary school in The Netherlands were asked to tape their own informal conversations over a five-month period, using a digital voice recorder. An assumption was that naturally occurring conversations could elicit the many dilemmas related to health. Eleven hours of conversation were collected. Parts of these conversations were, in transcribed form, returned to the youngsters for closer attention and reflection. With this, the researchers tried to make them aware of the social function of language and to have them discuss what they would do in a similar case. Such a critical

examination, based on real material, could give them an extended repertoire about how to address health issues, with a deeper insight into the functions and consequences of certain discursive strategies.

The DAM is not directed at the problem of what has to be finally achieved to improve one's health, but at the interactional problem that corresponds with health-related behavioral change. For instance, an individual who wants to influence a nutritional gatekeeper, by saying that he has to buy A instead of the usual B, must deal with the problem that this question can be seen as an accusation ('you always buy the wrong thing, B') or as a comment on the agreements about who is responsible for what.

What is essential in this method is that participants, in using real-life taped discussion material, take the perspective of an observer, looking carefully at what speakers do, and to what effect on the other, instead of making inferences about intentions or what the speaker really thinks. From this observer perspective, they can move to the allocation of discursive strategies and to an evaluation of these strategies for themselves.

These interventions, which fit our Action Approach, may illustrate its use and applicability in quite different situations. Of course, the approach is not entirely new. Elements of it can be found in the community approach (the importance of informal social networks) (Bracht, 1998) or in the empowerment approach, mainly that part of it that concentrates on one's capacity to control one's own life (Rissel, 1994), stressing the point that the client has the responsibility as an entrepreneur to foster his/her own social life. We can clearly see here also the additional value of those related approaches, covering the direct institutional context of clients' actions (as in the community approach) or the wider psychological notion of being in control (as in the individual empowerment tradition). Our approach is also linked to a guiding or supporting style in health communication, away from mere informing or persuasion (Rollnick, Butler, Mc Cambridge et al., 2005). The Action Approach is special, however, in eliciting in detail the process of changing one's life in a given social context.

The question arises as to why the Action Approach is not already a clear-cut strategy in health promotion. There are some explanations for this.

5.5 Why not? Some critical considerations

The reasons for the relative neglect of the principles of the Action Approach may be found in the bonds between health promotion and mainstream social psychology. With its preference for statistically sophisticated laboratory experiments, social psychology resembles, more than any other social science, the way evidence is created by medical sciences, making it a preferred supplier for intervention strategies in health promotion.

Social psychology has much to offer, and we certainly do not wish to deny its huge relevance for better informed practice. However, it can have certain drawbacks. One of these drawbacks is the inclination in many studies, especially in the persuasive tradition, to see the receiver as a passive object. Instead, in the words of Ajzen (1992, p. 7), 'they usually act on the information that is available, integrating it, constructing interpretations of their own, and going in many ways beyond the information given'. In other words, some investigators may think according to a rather mechanistic stimulus response model, underrating the constructional activities of receivers (who are in a sense not receivers at all, but add their own images and associations to the messages in the construction process).

More relevant for our Action Approach is the tendency of social psychologists to stick to the cognitive perspective of the individual, including in the domain of health promotion. In the words of (social psychologist) Fischer (2006, p.372): 'Studies on traditional social psychological topics like attitudes, person memory, impression formation, cognitive dissonance, attribution, and stereotyping have been typically conducted without taking into account in which social or cultural setting this opinion or evaluation was formed or would be expressed. In the typical social psychological experiment the manipulated independent variable is intended to gain insight into the individual cognitive or motivational processes underlying these phenomena, such as the striving for mastery, the need for consistency, self-esteem maintenance, or one's pro-social motivation. The social setting and one's engagement with others in this social setting are not manipulated, as these are seen as relatively unimportant to the phenomena under study'. In her eyes, the cognitive revolution in social psychology has shifted the focus of attention to the social world from within, as *perceived* by the individual.

We can find this tendency, for instance, in the famous theory of planned behavior, where the social context is conceptualized in the subjective norm, meaning a) the beliefs about the expectations of others and b) the motivation to comply (with the attitude towards behavior and the perceived behavioral control as alternative factors) (Ajzen & Madden, 1986). This model can be extremely useful in setting up health promotion programs but does not stimulate a strong process orientation: how to cope with the social environment effectively for better and healthier conditions. For this, another social scientific perspective is needed.

Another, but related reason why the Action Approach has not so far received that much attention is the inability to be accountable for the effects that have to be achieved. If we stress the complexity of health behavior, the embeddednes in social life and the manifold strategies of clients in organizing healthier conditions in their different situations, we consequently have to be modest about any predictable results of our supportive actions. A reliable prediction is after all dependent on the knowability of the concrete situation, overseeing the main mechanisms and their relation. However, this pretention is utterly unrealistic, as out earlier description will have shown.

Many health-behavior models in the cognitive tradition do have, on the contrary, an 'if-then' character. Although empirical research, for instance the relationship between attitudes or intentions and behavior, often shows mixed results (Armitage & Christian, 2004), it seems to suggest that basically this is the preferred route to an evidence-based practice. Getting funds for intervention programs is remarkably easier if you can present your arguments in an 'if-then' mode.

Being modest on predictability of course does not mean that one is unwilling to develop useful programs, just as we do not refrain from raising children because of the huge uncertainties about the exact outcome. We argue in favor of an alternative model for accountability, by delivering theoretical as well as empirical information about the arguments for a specific method, following the Action Approach, including a clear overview of formative research to optimalize the steps to be taken and based upon elaborated planning strategy, which will include processual planning (step-by-step) and systemic planning (in collaboration with the actors involved) (Stacey, Griffin, & Shaw, 2000; Whittington, 2001). These arguments have to be approved by a group of well-chosen experts who can judge the theoretical base as well as its applicability in a given context. Evaluation research may offer insights into the process and may explain the outcomes, as a stepping-stone in the development of effective strategies. In this way, the Action Approach can assemble a body of knowledge to guide further applications.

5.6 Implications for practice

Practitioners are often confronted with clients, who say they intent to eat less, exercise more or quit smoking, however do not pursue their intentions in everyday life. Health program developers aim to combat this gap between intentions and behavior, through interventions that target clients' motivations or their social and physical context. However, although some of those interventions show promising results, we are still faced with a number of serious health problems.

The Action Approach offers a new idea to health professionals, who aim to combat those problems. In this article, we have discussed the implications of taking this approach for both research and the development of interventions.

For practitioners, the Action Approach offers a new approach that can be applied in those cases, where clients have positive intentions, but experience that changing behavior is difficult in everyday life. Practitioners who want to use this approach, might need to shift from their current approach of acting on clients and context disjointedly, towards the starting point of their clients' everyday life. Their main task will consist of supporting their client in what he/she is already willing to do, but experiences difficulties in 'how to get things done'.

6

Placing healthy eating in the everyday context: towards an action approach of gene-based personalized nutrition advice

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6.1 Introduction

Incidence of diet-related diseases, likely associated with energy-dense and nutrient-poor diets, is increasing rapidly. (cf. Kreijl, Knaap, van Raaij et al., 2006; WHO, 2004). Nutrition advice aims to inform and motivate healthier eating behavior. In this chapter, we introduce an approach to dietary counseling that incorporates nutrigenomics information. Our focus is on discussing the use of individual, genetic information about susceptibilities to diet-related diseases to develop personalized nutrition advice.

Nutrigenomics is an innovative field that studies the interaction between food, genes and health at the molecular level. A genetic test for vulnerability to diet-related illnesses such as cardiovascular disease could be added to a personal risk assessment, one that is currently comprised of indicators such as body mass index and blood cholesterol. Results of such tests could be used to increase individual awareness about healthy eating and to develop individually tailored dietary advice (DeBusk & Joffe, 2006). Yet nutrigenomics raises questions, mainly regarding how this advice can be embedded in a broader approach in which not only the nutritional evidence is personalized, but so, too, is the way people learn to adjust their daily life behavior in light of the advice. This is the starting point for this chapter: Aiming at an integrated strategy that takes into account new biomedical innovation as well as recent insights about how people change their behavior.

Motivating change through a personalized approach

Personalized nutritional interventions differ from other health promotion approaches in two ways: first, the messages or strategies are intended for one particular person rather than for a group of people; and, second, those messages or strategies are based on individual assessments. The provision of personalized nutrition advice is no longer the sole domain of dieticians. The rapid developments in interactive computer technology (ICT) applications, particularly the internet, allow for tailored interventions with large reach at relatively low cost (cf. Brug, Oenema, Kroeze et al., 2005; Eng, 2004). The interventions use computer programs to collect data about an individual's dietary intake, health indicators such as body mass index, and psychosocial factors. Users receive personalized feedback about their current risk of developing diet-related illnesses and

advice about how to reduce this risk by modifying their eating practices to accord with healthy eating guidelines.

Studies have shown that such personalized advice is more effective than generic messages in motivating individuals to adopt healthier eating behavior. Personalized interventions have been used to induce changes in smoking, diet and physical activity (Brug, Glanz, van Assema et al., 1998; Curry, Grothaus, Wagner et al., 2005; Kreuter & Stretcher, 1996). In a systematic review of studies on computer-tailored nutrition and physical activity advice, Kroeze, Werkman, Brug et al (2006) found strong evidence for the effectiveness of computer-based, personalized interventions, especially in motivating reductions in dietary fat intake. Another review was less enthusiastic, concluding that current evidence is insufficient to conclude that computer-tailored interventions are superior to other interventions (De Nooijer, Oenema, Kloek et al., 2005).

We will evaluate the innovations of nutrigenomics and computer-tailored dietary advice within the context of behavior change theories. Based on this evaluation, we will elaborate on a new approach towards motivating healthy eating. This approach may provide answers to questions about why current personalized interventions are not always successful, and it may support the development of alternative ways of designing these interventions.

6.2 The theoretical basis for individual behavior change

Nutrition interventions are most likely to succeed if they are based on a clear understanding of eating behavior. Theories of health behavior are important to explain and understand healthy eating objectives and to indicate ways to achieve behavior change. Theories that aim to explain and predict individual eating behavior identify intrapersonal factors such as knowledge, attitudes, beliefs, motivation, self-efficacy and skills. All these factors are subject to change. For instance, the health belief model (Janz & Becker, 1984), which concerns individual perceptions about risks of unhealthy eating and the effectiveness of healthy eating advice, is frequently used to develop messages to persuade individuals to adopt healthier eating practices. Other valuable theories address the processes by which people take in and use information in their decision making, such as Weinstein's Precaution Adoption Model (Weinstein, 1988). This model combines concepts from adoption processes of new behavior with concepts from the health belief model and protection motivation theory. It identifies different stages in the individual appraisal of health messages:

1. People must *realize* that unhealthy eating causes illnesses.
2. People must *acknowledge* that this relationship is significant and that many people suffer from diet-related diseases.
3. People must recognize that they are *personally vulnerable* to this risk.

▼ ▼

4. Decided not to act

5. Decided to act
6. Acting
7. Maintenance

We will discuss the opportunities and barriers that the innovative approaches to personalized advice provide for each stage of the behavior change process.

Stage 1: Realizing that food influences health

In the first stage, individuals start from a position of being unaware of the health risks of poor food choices. This can be either because the risks are generally unknown or because of *personal ignorance*. When people first learn about the relationship between food intake and health, they are obviously no longer unaware. But although most people are exposed to numerous messages about healthy eating every day, exposure and awareness do not always elicit attention. Through the process of *selective perception* (Sears & Freedman, 1971), people tend to select information that is consistent with their personal attitudes or opinions. Through *cognitive dissonance* (Festinger, 1957), people often ignore information that contradicts their existing beliefs or opinions.

At present, growing internet use allows for larger access to computer-tailored dietary interventions. However, De Nooijer et al. (2005) note the difficulties in motivating consumers to actually use such interventions, both in 'real world' and study situations. The inclusion of genetic knowledge into personalized nutrition interventions might attract consumer interest. In a recent US market survey, 42 percent of respondents had heard or read about using individual genetic information for nutrition and diet-related recommendations (Schmidt, White, Reinhard-Kapsak et al., 2007). Goddard, Moore, Ottman et al. (2007) found a much smaller percentage: only 14 percent of respondents in the national HealthStyle survey were aware of the availability of nutrigenetic tests offered directly to consumers. Although some people have heard of the availability of tests, this does not indicate their interest in obtaining nutrigenetic testing or their beliefs in the value of such testing. It could be argued that cognitive dissonance can occur among people who hold deterministic beliefs about genes. Schmidt et al. found that more people believed that family history plays a role in health in 2005 (90 percent) than in 1998 (85 percent). They argue that this indicates a growing awareness about the interaction between food, genes and health. Yet this awareness does not necessarily lead to an individual motivation to undergo genetic testing and follow nutrition advice personalized to one's genome.

Stage 2: Realizing the significance of healthy eating

In the second stage, people must acknowledge that unhealthy eating impacts health (Ajzen & Madden, 1986; Janz & Becker, 1984; Rogers, 1983), both in physical and social consequences of ill health. In nutrition messages, consequences of conditions like diabetes and cardiovascular disease are most often only explained in terms of *physical* consequences for the individual with the disease. Yet, the social consequences could also substantially impact their everyday life. For instance, the strict medication adherence that is required in diabetes care might interfere with joining sports events or an evening out with friends. But such social consequences are rarely integrated in health messages.

Providing concrete messages about the severity of physical consequences of unhealthy eating is complicated by uncertainties inherent in studying the complex interactions between food and human health, often resulting in equivocal messages why (not) to eat specific foods. For instance, people are confronted with messages that promote the cardiovascular health benefits of olive oil and, at the same time, they are told to reduce their caloric intake because they risk becoming obese.

New knowledge from nutrigenomics research could support development of more concrete messages for healthy eating. Until recently, only genetic diseases such as phenylketonuria and familial hyper-cholesterolaemia have been treated directly through specific dietary intervention, combined with medication in the latter case. But it is likely that nutrigenomics research will lead to more concrete generic messages with respect

to complex, common diseases; for instance, that a high intake of omega-3 fatty acids *decreases* the risk of heart disease instead of current messages that omega-3 fatty acids *might lower* the development of heart disease.

Stage 3: Recognizing personal vulnerability

Some currently available nutrition interventions induce awareness of the existence and significance of unhealthy eating (cf. Van Dillen et al., 2004). But people will only consider behavior change if they also recognize that the information is personally relevant, which means acknowledging that their food intake is not consistent with healthy eating guidelines and makes them vulnerable to diet-related illnesses.

Two issues interfere with recognizing personal vulnerability. First, many people do not know exactly what they eat in comparison to healthy eating guidelines (cf. Lechner, Bolman, & Van Dijke, 2006; Lechner, Brug, de Vries et al., 1998; Oenema & Brug, 2003). One study of Glanz, Brug & van Assema (1997) showed that a substantial portion of adults in the Netherlands and in the United States lacked accurate awareness about their fat consumption. Those people, who inaccurately perceived their own food choice as healthy, will have no motivation to change behavior. Second, people use diverse strategies to cope with information about their personal health risk:

Defence motivation

A health threat can induce two coping strategies: it either induces intensive information processing or it induces *defense motivation* (Gleicher & Petty, 1992; Liberman & Chaiken, 1992). The latter is likely to occur when a threat is both severe and challenges personal beliefs. With a defensive motivation, people aim to confirm the validity of their own attitude ('I am eating healthily'), and to disconfirm the validity of others ('Your food choices place you at risk'). *Individual biases about personal risk* also influence the perceived threat of unhealthy eating . People tend to overestimate small probabilities with a dramatic impact, such as an airplane crash, and underestimate large probabilities with a more long-term and less dramatic impact, such as heart disease (cf. Koelen & Lyklema, 2004).

Unrealistic optimism:

Although people are aware of relative risks of specific behavior, they can have an *unrealistic optimism* towards personal risk (Weinstein, 1980). For instance, people who smoke know that smoking is associated with cancer, but they do not believe they are personally at risk. Van der Pligt (1996) describes several causes underlying unrealistic optimism:

1. risks that are perceived as *under personal control* induce feelings of optimism;
2. people generally know more about their own protective behavior than about others' behavior; this *egocentric bias* leads to optimism such that people focus more on their own risk-reducing behavior than their risk-inducing behavior;
3. people can have a relatively extreme image of high-risks groups, a *stereo- or prototypical judgment* that does not fit their self-image, leading to optimism;
4. people can have a *self-esteem maintenance* mechanism; they generally rate their own actions, lifestyle and personality as better than that of others;
5. denial of personal vulnerability is a coping strategy people use to reduce emotional distress, but it undermines the likelihood of preventive actions.

People may use all these mechanisms when confronted with messages about the consequences of unhealthy eating. Their feelings of invulnerability attenuate the perceived personal relevance of the information.

Personalized nutrition interventions aim to tackle the issue of inaccurate perceptions of food choice by providing feedback on current food behavior compared to healthy eating guidelines (cf. Brug, Oenema & Campbell, 2003). Results of this kind of self-test could also 'correct' users' unrealistic bias about their personal vulnerability by blocking most of the strategies that allow a 'way out.'

Genetic test results can be added to feedback given to people, and can serve as a *cue to action*, jointly with the other indicators of personal risk, that is required to become fully aware of one's eating habits. Some research has shown that genetic tests offering great certainty of result, with available treatment and prevention options, are more readily undertaken (Marteau & Croyle, 1998). In contrast, nutrigenomics tests assess the *probability* of developing diet-related illnesses. It is not known whether test results induce defense mechanisms. Given the common perception that genetic risks are immutable, it can be argued that test results induce feelings of fatalism: "it's in my genes, so what can I do?" (Bouwman, Koelen, Hiddink et al., 2007).

Stage 4 or 5. Deciding (not) to act

When people consider healthy eating as relevant to them – for example, after they receive personalized nutrition advice from a dietician or an internet resource - they will consider following recommended nutritional advice. According to Sutton's (1982) extensive review, people evaluate whether the advice will reduce their health risks and the likely physical, mental, social and economic consequences of following healthy eating recommendations. People also take into account whether they are capable of carrying out the advice in their eating practices. This is known as perceived self-efficacy, and originates from Bandura's (1982) social learning theory (later called 'social cognitive theory'). Several processes influence self-efficacy, including direct experience, anticipation of consequences and goal-setting. Self-efficacy is the perception of one's own capacity to successfully organize and implement healthy eating largely based on experience with similar actions and situations encountered or observed in the past.

ICT-based personalized interventions aim to influence this decision process by providing feedback tailored to individual characteristics, psychosocial factors, educational level and information needs, making the feedback more personally relevant. First, a user's cognitive state of mind towards changing their food choice is mapped. This is done by means of questionnaires or rating scales that assess psychosocial factors such as attitude, beliefs and perceived self-efficacy towards healthy eating. Second, algorithms are used to find corresponding feedback that facilitates the desired change of those factors. For example, a user with a low perceived efficacy towards healthy cooking will receive easy recipes with step-by-step cooking instructions. Or, a user who believes healthy eating will seriously diminish the taste of meals will receive narratives from a professional cook who talks about healthy, tasty food. The assumption is that this personalized feedback will turn 'barriers' (low perceived self-efficacy) into opportunities (high perceived self-efficacy) and lead to healthy eating.

The influence of genetic test results on decisions to adopt healthy eating advice is scarcely explored. Marteau, Senior, Humphries et al. (2004) found that people who received information about the risk of familial heart disease, including genetic test results, were more likely to perceive their condition as being caused by genes. That perception lowered the expectation that a behavioral means (e.g. eating a low fat diet) would mitigate

disease risk and increased the expectation that a biological means (e.g. taking lipid lowering medication) would be effective. Considering that perceived consequences and perceived self-efficacy strongly influence decisions to act, genetic test results may influence decisions to act in one of two ways: beliefs about the ability to impact health through food choice could be weakened by a deterministic view towards genes and health, *or* beliefs about ability to influence one's own health could be strengthened because the advice is more concrete in terms of its effect on reducing disease risk. At present, it is not known how people will use genetic information and whether it will influence behavior change beyond the information currently supplied, which may take family disease history into account (Haga, Khoury, Burke et al., 2003; Marteau & Weinman, 2006).

Stages 6 and 7. Healthy eating

People who consider healthy eating important tend to actively search for information about healthy eating as the topic becomes more salient to them. They also more frequently discuss the topic with family, friends and health professionals and perhaps already try to cook and eat healthier meals (Blalock & DeVellis, 1998; Lambert & Loiselle, 2007). These activities facilitate people's search for guidance to help them adopt healthier eating routines. Guidance that is specifically tailored to the context of everyday food choice is most likely to aid such behavioral change (Ayala, 2006; Brug et al., 2003).

But changing eating behavior is difficult. Although consumer surveys show that an increasing number of people say they intend to make healthier food choices (Eurobarometer, 2006), a recent food consumption study shows that Dutch people eat too many products that contain saturated and trans fatty acids, while the consumption of fish, fruit and vegetables is too low (Ocke & Hulshof, 2006). US surveys reveal that a majority of the population does not meet national recommendations for vegetable and fruit consumption (Centers for Disease Control and Prevention, 2007). On a global level, the World Health Organization (2004) indicated that people consume too many energy dense, nutrient poor foods that are high in fat, sugar and salt and that people consume too little fruit, vegetables, whole grains and nuts. Increasing rates of obesity and Type 2 diabetes highlights this gap between the intention to eat a healthy diet and actual behavior.

Behavioral scientists and anthropologists have argued this gap is caused by a lack of attention to the social and cultural context of food choice (cf. Brug et al., 2005; Kreuter, Oswald et al., 2000; Lupton, 1996; Smith, 2004). The dominant 'nutritionist' perspective focuses on attaining physical health by selecting food products based on their fat, sugar or vitamin content, and this perspective guides both research and most nutritional interventions (cf. Scrinis, 2008b). Furthermore, a parallel can be drawn between nutritional research and behavioral food research, the research areas that provide the scientific basis for personalized nutrition interventions. Both research areas study how interactions between humans and their social and cultural contexts impact physical health. The areas also share the difficulties involved in exploring contextual variables that often cannot be controlled in research studies (cf. Ajzen, 1992; Fischer, 2006).

If humans are studied without considering contextual influences, the validity of the research results for everyday life situations is limited. This applies to nutritional research, where issues about contextual influences are threefold: (1) limitations of studying single nutrients while people consume food products; (2) studying specific food products while people consume diets composed of many foods; and (3) studying diets without considering the other lifestyle components. As journalist Michael Pollan (2008)

suggests, this perspective causes a gap between healthy eating recommendations (e.g. eat polyunsaturated fats and avoid sugar and saturated fat) and concrete action rules for real life eating practices.

Behavioral research acknowledges that contextual influences, such as the availability and affordability of healthy foods, influence healthy eating. But little is known about the dynamics between an individual's healthy eating intentions and those contextual influences. In the next section, we elaborate on a new approach that takes account of contextual influences to address reasons why many current nutrition interventions are not very successful in inducing healthy eating practices.

6.3 The action approach towards healthy eating

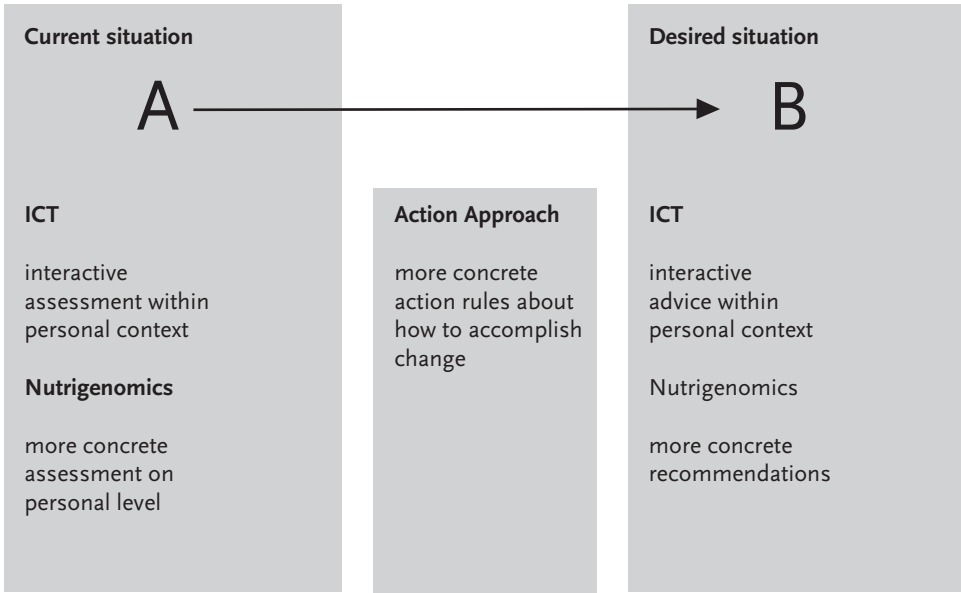
The action approach starts from a few considerations. First, it assumes that the context of nutrition behavior is not a set of static factors, but a dynamic situation in which individuals act and react to changing influences. Second, nutrition behavior has two components: it occurs alongside practices of buying food, preparing meals and consuming meals and it is also a discursive practice. People talk with each other about what to buy in the supermarket, what and how meals have to be prepared and how meals are organized, in time and individually and socially. Third, this practice is interwoven with other practices, including child-rearing, work and recreation activities that all interact with one another. For instance, attempting to persuade children to eat vegetables is unavoidably influenced by a certain style in which one attempts to influence their habits generally. To take another case, the way meals are enjoyed on a regular basis (or not) depends on time spent engaged in other activities, such as viewing television, working or sports and other hobbies. Consequently, changing eating habits usually means changing other habits as well, and often involves a considerable amount of discursive work. A person who wishes to change eating habits may have to convince others in a family to change food purchasing and consumption choices and has to negotiate eating in social situations where cultural practices often dictate behavior around offering and consuming food. A person may also have to convince themselves to control eating practices (e.g. eating only when truly hungry).

To summarize, the action approach does not only address the assessment of the health problem (A), nor the desirable solution, in terms of healthier behavior (B) but concentrates particularly on the trajectory from A to B, taking into account the whole situation in which the behavior is embedded and what is needed to change practices in a desirable direction. Consequently, the action approach envisages the process of creating healthier choices, encompassing all the relevant aspects of the situation.

6.4 The action approach applied to innovative personalized nutrition interventions

The innovative approaches of using ICT and integrating genetic knowledge can facilitate personalized nutrition interventions. But, as discussed, those innovations do not fully address the challenges people face when they intend to eat healthily in the context of daily life. Those contextual challenges can be addressed by integrating the action approach in the design of personalized interventions, as illustrated by Figure 6.1. In this section, we elaborate on the application of the action approach to ICT-based personalized interventions that incorporate genetic information about disease susceptibilities.

Figure 6.1: The contribution of innovative approaches to personalized nutrition advice

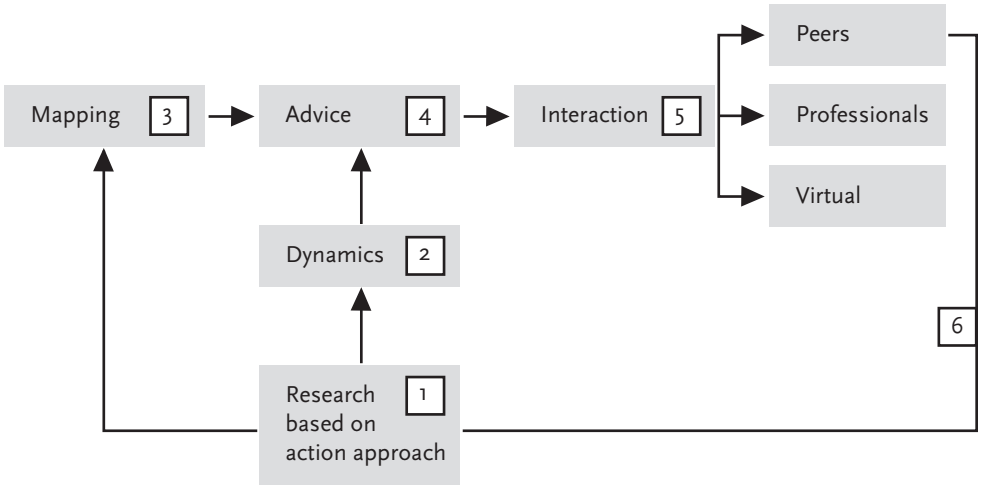


A = current situation: food behavior not in accord with healthy eating recommendations
B = desired situation: food behavior accords with healthy eating recommendations

ICT based personalized nutrition intervention

The assumptions of the action approach have several implications for the development of personalized interventions, illustrated in Figure 6.2. First, research must explore the dynamics of healthy eating intentions in practical activities such as buying, preparing and consuming meals, and in discursive practices around eating and in other daily life practices [Figure 6.2 ⇒ 1]. The dynamics will shed light on the challenges and opportunities that people have to deal with when they try to pursue their intentions in daily life situations [Figure 6.2 ⇒ 2]. At present, little is known about these dynamics. In our consumer study, we found that healthy eating intentions were not only undermined by easy accessibility of less healthy choices, but also by cultural norms about how to behave as a dinner guest and the desire to establish oneself as a social person (Bouwman & Van Woerkum, forthcoming). ICT applications such as virtual reality games that mimic eating practices could be used in research to explore dynamics among large study groups. The study results can be used for the development of assessment tools that map the current situation of the user [Figure 6.2 ⇒ 3] as well as for the development of action rules or guidelines that people can apply in daily life situations [Figure 6.2 ⇒ 4].

Figure 6.2: The co-creation of personalized healthy eating advice, a reflective learning process



The second implication of the action approach is that the multifaceted nature of food choice complicates the assessment of all dynamics that occur in daily life. Personalized action rules therefore have to be accompanied by interactive tools that mimic those dynamics [Figure 6.2 ⇒ 5]. For instance, discussion forums with people who received similar or opposing advice, or with health professionals, can facilitate a reflective learning process about how to change eating practices. In addition, interactive, virtual reality applications can prepare people for the dynamics of real-life practices (Bouwman, Hiddink, Koelen et al., 2005). The additional insights that are derived from those interactions can be added to the available knowledge about dynamics of healthy eating [Figure 6.2 ⇒ 6]. The third implication of the action approach is that this approach can also be used to attract people's attention. As discussed in section 2, messages have to be consistent with personal beliefs or opinions. Because the action approach studies beliefs in daily life practices, it is likely that messages based on those insights attract more attention than current messages reinforcing 'nutritionism.'

The fourth implication also relates to the impact. Next to reaching a sufficient number of people, interventions have to be effective in changing behavior. At present, most interventions are evaluated based on their effect on actual food intake (e.g., a reduction in fat intake) and on psychosocial factors (e.g. intention to eat a healthy diet). Consistent with the action approach, an evaluation that measures the effect of action rules on the management of challenges in diverse eating practices should be added.

Using genetic knowledge in personalized nutrition interventions

The suggested design of personalized interventions can also be used in researching the integration of genetic information in interventions. It is important to note that such research should not explore whether people will change their behavior based on genetic knowledge, but should focus on the representation of this knowledge in the dynamics of eating practices and the challenges and opportunities people face when they use this knowledge in eating practices. We are not aware of the existence of such studies. But it is likely that people will face specific challenges while buying, preparing and consuming

meals according to their own gene-based dietary requirements. People will also face specific challenges in discursive practices such as discussing their test results with their family doctor or other health care provider, especially because recent research indicates that health professionals have a skeptical attitude towards such testing (Bouwman & te Molder, 2008). Discussing a gene-based diet with a friend who has a deterministic view about the role of genes in maintaining health could further complicate the trajectory from current to desired eating practices.

6.5 Final considerations

Innovative personalization approaches in nutritional and behavioral science have the potential to significantly improve the impact of nutrition advice. First, developments in interactive computer technology allow for a sophisticated, personalized assessment of biomedical and behavioral food choice indicators in tailored interventions. Second, nutrigenomics research will allow for advice about nutritional requirements on a more specific level compared to current, generic recommendations. But although promising, those developments will only lead to healthier eating practices if accompanied by the action approach. By taking this approach, people will not only receive personal advice on what they need to change to eat a healthier diet, but also advice on how to accomplish these changes in the context of daily eating practices.

7

About evidence based and beyond: a disourse-analytic study of stakeholders' talk on involvement in the early development of personalized nutrition

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7.1 Introduction

Innovations in personalized nutrition

The growing rate of diet-related diseases has further encouraged calls for innovative health promotion (HP) approaches that motivate people to eat healthily (cf. Ministry of Health, Welfare and Sports, 2004; WHO, 2004). Personalization of nutrition advice is often depicted as one of the most promising approaches (Brug et al., 2003). Recent reviews of health intervention methods (Contento, Back, Bronner et al., 1995; Kroeze, Werkman, Brug et al., 2006) and research on the effect of personalization (Brug, Oenema & Campbell, 1998; Curry, Grothaus, Wagner et al., 2005; Kreuter, Farrel, Levith et al., 1999) share this enthusiasm with some reservations. They show information targeted to an individual's physical constitution, lifestyle, and environmental situation to be more effective in influencing that person's health behavior than general information. However, it has also been argued that personalized nutrition advice does not sufficiently match with the social and cultural contextual influences that occur during the purchase, preparation and consumption of food (Brug, Oenema, Kroeze et al., 2005; De Bourdeaudhuij & Brug, 2000; Kreuter, Oswald, Bull et al., 2000). Dieticians already apply personalized nutrition interventions based on lifestyle, social, cultural and economic assessments and on physical parameters such as body mass index (BMI), blood pressure and cholesterol levels. With interactive computer technology (ICT) such as the Internet, personalized advice can be made available to a larger audience at relatively low costs. Also, added value is often said to lie in the high processing capacity and user control on place and time ("on demand") of ICT mediated interventions (cf. Bouwman, Hiddink, Koelen et al., 2005).

Another application in the personalization of nutrition advice has been developed by the newest discipline in nutrition science: nutritional genomics (a.k.a. nutrigenomics). Nutrigenomics examines the response of individuals to food compounds using post-genomics and related technology (e.g. genomics, transcriptomics, proteomics, metabolomics, etc.) (NuGO, 2008). It can be characterized as "the study of how nutrients in food interact with our genes at the molecular and cellular levels, and the impacts these

reactions have on our health" (Castle, Cline, Daar et al., 2007, p.3). There are promises and expectations that the currently used physical parameters for assessing personal physical vulnerability to diet-related disease can be extended with information about an individual's genetic make-up [read Box 1. for more information].

Personalized nutrition emerges at the junction of different disciplines and technologies, and, as with many projected innovations that may directly influence people's lives, potential public concern "lurks in the background" (Fisher, Majahan & Mitchan et al., 2006, p. 485). This situation makes personalized nutrition candidate for the study of early involvement of stakeholders such as health professionals and –educators and the food industry, not so much to smoothen the introduction of the technology as to improve socio-technical decision making more generally (cf.Wilsdon & Willis, 2004). Recent work of Ronteltap van Trijp & Renes (2007) showed that there is not yet consensus among Dutch experts from diverse stakeholder groups about the demarcation of nutrigenomics, its development over time and the factors that will determine market success or failure.

Box 7.1. Innovative personalized nutrition

People in the Netherlands have an increasing access to devices that assess their personal risk to diet-related disease. For instance digital devices that measure blood pressure and calculate BMI are not only sold in pharmacies but also available in some supermarkets. But next to this increased access, it is expected that in the future, DNA-test results can be added to the existing physical indicators to measure individual vulnerability to diet-related illnesses such as cardiovascular disease (Ordovas & Corrella, 2007). Whether DNA-test results will influence how people perceive healthy eating messages is not yet known. Theoretically, test results can indicate personal vulnerability and hence serve as a cue to action to become fully aware of the need to eat healthily. But an adverse reaction is also possible. Given the common perception that genetic risks are immutable, test results might allow for feelings of fatalism and decrease perceived self-efficacy: it's in my genes, so what can I do (Bouwman, Koelen & Hiddink, 2007)?

In this study, we focus on the contribution of stakeholders who are potentially concerned with implementing personal nutrition trajectories. A technological development trajectory encompasses the decisional stages of authorization, implementation and adoption of the technology (Fisher et al., 2006). In principle, including a broader set of public and other voices co-shaping the development of the technology is possible in each of these stages. The stakeholder respondents in this study can be located somewhere between the 'insiders', such as scientists and technologists who try to realize a new technology, and the relative 'outsiders' of an innovation trajectory, such as societal groups who mainly compare the technology offered with possible or available alternatives (Garud & Ahlstrom, 1997). This position may allow for bridging activities between different sorts of actors. Before turning to our actual study, we first discuss some insights about stakeholder involvement from both a health promotion (HP) and a science and technology perspective.

7.2 Health promotion and the need for collaborative interaction

Research and experience show that development processes benefit not only from the exchange of expertise, experiences, and access to networks and resources, but also from the generation of involvement resulting in more commitment to initiating and maintaining HP activities. From a moral perspective also, as Green and Kreuter (2005, p. 20) point out, stakeholders should participate in the development process of innovations

that will influence their working and living conditions. Although principles about whom to involve, and at what stage, diverge, important preconditions for working together are shared:

- a shared problem and a known goal so as to effectively address challenges such as unhealthy eating;
- the existence of a shared social responsibility to make this happen (cf. Granner & Sharpe, 2004; Green & Kreuter, 2005; Kreuter, Lezin et al., 2000; Roussos & Fawcett, 2000);
- the recognition of mutual dependency (cf. Butterfoss, Goodman, & Wandersman, 1993; Kreuter, Lezin et al., 2000)

These preconditions are challenged by the variety of views that stakeholders bring to the table, as identified in recent reviews:

- although the ultimate goal (healthful behavior) is clear, the road towards this goal is complicated by conflicting political, cultural, and economic interests of participants representing different sectors;
- social responsibility for "making healthy choices easy choices" (Milio, 1989) may be endorsed by all sectors, but it does not necessarily supersede other responsibilities in some sectors such as industry;
- the recognition of mutual dependency is challenged by participants' needs for individual power or position protection, conflicting roles, responsibilities and interests, and a negative history on collaboration (cf. Butterfoss, 2006; Granner & Sharpe, 2004; Israel, Schulz, Parker et al., 1998; Kegler, Steckler, McLeroy et al., 1998; Roussos & Fawcett, 2000).

Science and technology studies and the role of early stakeholder involvement

Within science and technology studies, the assumption that innovation is a linear process in which scientists invent, businesses apply and consumers buy, has been replaced by the notion of innovation as a co-evolutionary product of science, technology, and society (for example Rip, 2002). Different forms of stakeholder participation more generally, and public upstream engagement in particular (Wilsdon & Willis, 2004), have received considerable attention as important ways to bring a wider range of social and ethical issues into technological decision making, and to turn co-evolution into a more reflexive process. In the policy context, early stakeholder involvement has now become almost a prerequisite for innovation development processes (cf. Fisher et al., 2006).

Different methods and strategies have been developed to facilitate early collaborative interactions among stakeholders, not only in relation to policy formation, such as various forms of technology assessment, but also with respect to technological design itself, such as Constructive Technology Assessment (Schot & Rip, 1997). Some focus specifically on including organizations in public and private sector, others on end-users, and again others on both. For the purpose of this article, we identify two assumptions in relation to stakeholder involvement and collaboration that differ at least in emphasis from those in HP studies:

- In contrast to collaborative processes as understood in HP studies, where healthy eating as the ultimate goal is not contested, science and technology and related methods such as constructive technology assessment, do not conceptualize the innovation at hand as *a priori* relevant or useful. Science and technology scholars have been especially critical of involving stakeholders *merely* to avoid immediate conflict and to

help forestall adverse effects of a particular technology (see for example Macnaghten, Kearnes, & Wynne, 2005; Rip, 2006).
- In science and technology studies more emphasis is put on changing roles and responsibilities because the negotiation of technical options between stakeholders is considered to be inextricably bound up with the restructuring and redistribution of current roles (Callon, 1995; Rip & Van den Belt, 1988). More than in HP, science and technology studies underline the conflictive nature of most learning processes involving multiple stakeholders.

A discursive perspective on early stakeholder involvement and collaboration

Despite extensive research in health promotion on a range of factors that help or hinder collaboration between stakeholders, high early failure rates suggest that more work needs to be done to better understand the way collaborative interactions do or do not work. Although science and technology studies have shown the value of, and need for, engaging a wider range of actors before innovation processes become locked, they have not focused on innovations within a health promotion context, in which different sets of issues and interests may be at stake. Overall, little attention has been paid to how potential participants of collaborative initiatives *themselves* handle issues of responsibility and initiative in relation to early technology development and collaborative interactions. Therefore, a research method is needed that moves from an analyst's to a participants' perspective, with a focus on how collaborative talk is constructed in particular settings and how it is oriented to responsibilities and initiative. The form of discourse analysis used in this study can be regarded as such a method. Discourse analysis in general aims to make visible the ways in which discourse is central to action (goals), the way it is used to constitute events, settings, identities, and the various discursive resources that are drawn on to build plausible descriptions (Potter, 2004). In this exploratory study, we draw on DA methods to analyze how Dutch stakeholders in health education, health care, health insurance, social science, the food industry, and the media make sense of innovations in the field of personalized nutrition, and their own role and significance in an early stage of technology development.

7.3 Method

This study uses a form of discourse analysis developed by Potter and Wetherell (Potter, 2004; Potter & Wetherell, 1987, 1994, 1995; Te Molder, 1999). The focus is on the discursive resources that stakeholders use to construct the nature of, and need for, innovations in personalized nutrition and collaborations, and the responsibilities that are at stake. Rather than determining the truth-value of what people report – by looking at what a person really wants, thinks or feels, or what the world really looks like - discourse analysis focuses on the interactional business performed with these reports. As discourse analysts have pointed out, speakers construct different, and sometimes contradictory, versions of reality to accomplish a range of goals such as blaming someone, building facts, and managing their own accountability (Potter & Wetherell, 1987, 1994, 1995). This study therefore examines not only a set of interpretative resources but also the interactional goals for which these resources are deployed.

Participants
The study is based on thirteen interviews with interviewees representative of sectors that, according to literature about collaborative initiatives (Koelen & Van den Ban, 2004 p.138-140) play an important role in nutrition communication (table 7.1). They were selected based on their specific expertise and interest in personalized nutrition interventions in the Netherlands. All selected stakeholders agreed to participate with exception of the representative of the Dutch Ministry of Health.

Table 7.1: Participants

Health Care	1 family doctor 1 representative from the family doctors' organization 1 dietician
Health Education	1 representative from a national health organization 1 representative from a departmental health education organization
Health Insurance	one representative from a health insurance company
Social Science	2 behavioral scientists 1 applied philosopher with a special interest in nutrigenomics
Food Industry	1 representative from an industry-representing organization 2 representatives of food companies responsible for health/ communication policies
Media	one journalist with a special interest in science and technology

As indicated earlier, the interviewees are not insiders involved in the technology itself, but neither are they distant outsiders (Rip, 2006) like spokespersons for societal groups that have no external control over the technology other than voicing support or concern. As actors who implement and/or communicate about personalized nutrition on the basis of their profession, they can be considered as positioned somewhere in between, and in that sense form an interesting and largely neglected site for co-governance of innovation processes. For reasons of anonymity, the extracts used in this article only identify for the sector that the respondents represent.

Data collection, transcription and translation
The interviews were held by the first author. She is a social scientist who has also been trained in nutritional science. The interviews were held between December 2004 and March 2005 and took approximately one to one and a half hours each. The data were collected through open-ended, individual interviews about relative advantages and disadvantages of innovations in personalization of nutrition advice, and factors motivating, enabling, facilitating, hindering and reinforcing collaborative interactions, following a key-topic list (Box 2) that was developed on the basis of a literature study (Bouwman et al., 2005). From a DA point of view, interviews are forms of interaction in their own right. This involves the researcher educing and appreciating not only the contribution of the interviewee but also that of the interviewer, both in transcript and analysis. Because of this analytic focus, it is not necessarily desirable for the interviewer to remain passive throughout the conversation (Lawes, 1999; Potter & Wetherell, 1995); for an extended discussion of using interviews in social science research see Potter and Hepburn (2005). All interviews were taped with a digital voice recorder. The interviews

were transcribed to world level accuracy and included speech errors and long pauses. They were analyzed in Dutch. Fragments were subsequently translated into English with the help of a native speaker. Like transcription, translation is not a mere technical matter but already a form of analysis. In that sense, the translations must be considered as free translations.

Box 7. 2. Interview key topic list

Product orientation related to the innovations • relative (dis)advantages: effectiveness, accessibility, usability; • integration in working practice: complexity and compatibility.
Social-ethical issues of the innovations • collective issues/impact on society: e.g. responsibilities for health, societal values and norms, misuse, trust in health sector; • individual issues/impact on individuals: e.g. responsibilities for health, social-cultural habits, values and norms.
Preconditions for collaborative interactions • history of collaborative interactions: experience; • motivating factors: e.g. common goal, power-relations, mutual dependency; • limiting factors: e.g. distrust, insecurity about collaboration; • facilitating factors: e.g. participant's characteristics, number of participants, power- relations, leadership.

Analysis

The transcripts were analyzed using ATLAS.ti, a software package for qualitative analysis. The analysis involved a lengthy process of reading and re-reading the data and coding the fragments according to two research questions: Which roles and responsibilities with respect to the innovation trajectory of personalized nutrition are being constructed, and what objectives are these descriptions designed to achieve? Three analytic levers were used to identify the different so-called interpretative repertoires (see below under Results) that participants deployed in their accounts of the innovation trajectory:

- *Variability:* the use of different versions of the same phenomenon is known to signal different interactional goals;
- *Rhetorical character of the talk:* the analyst inspects what version of reality is being denied or resisted by the present version as a way of understanding for what purposes the current description has been selected by the speaker;
- *Participants' uptake of interviewer's talk:* how are participants treating the interviewer's talk: what are they making relevant, and to what interactional ends? (see also Potter, 2004; Potter & Wetherell, 1995).

In line with the nature of qualitative research, no claims are made for sample representativeness. This study can, however, be considered a grounded indication of a research phenomenon that deserves further attention, and therefore may inform further analysis over a larger data corpus.

7.4 Results

Introductory observations

It is important to note first that the stakeholders did not offer one single version of their role, and of their responsibilities in innovations and collaborative interactions. Rather, they drew on three different sets of accounts. All accounts except one were used to create distance between the innovation and the respondent's own role and responsibilities, rather than constructing engagement in this stage of development as an opportunity to take action. The sets of resources that speakers used to construct the different versions are known in DA as interpretative repertoires: "broadly discernable clusters of terms, descriptions and figures of speech often assembled around metaphors or vivid images" (Wetherell & Potter, 1992, p. 90). We distinguished three interpretative repertoires:

The repertoires were used to accomplish six different goals [Box 3] that we will discuss in more detail in the following sections.

Box 7.3. Interactional goals accomplished by respondents

1a. From practice to science: deliver better evidence 1b. From behavioral science to practice: do not rush things
2a. Protecting the public against innovation 2b. Pushing innovation because people want it
3a. You know, it's not up to me 3b. You see, it's up to them

Repertoires

Repertoire 1: Waiting for certainty

The first repertoire that respondents used presents personalized nutrition as not yet evidence-based, and therefore not meeting the standards for intervention in practice. This account is in line with what can be termed the golden working standard in HP. HP experts are nowadays expected to demand evidence so as to safeguard optimal effectiveness of interventions (cf. Cochrane, 2007; WHO, 2005). Speakers constructed the innovations as not yet evidence-based so as to account for a cautious, wait-and-see policy without compromising their expert identity. This repertoire counters potential accusations of just being uninterested, or resistant to innovation. It formulates respondents' attitudes as not so much being about unwillingness but about 'not being able to': they first have to wait for certainty. The repertoire also provides the respondents with a relatively safe position in yet another sense. It prevents potential accusations of being unprofessional by supporting innovations before evidence is available.

This repertoire was used in response to questions about innovations in relation to the effectiveness of nutrition interventions. By laying emphasis on the need for evidence, speakers suggest that, if the uncertainties were eliminated, their role and responsibilities would become more substantial. The 'waiting for certainty' repertoire was used to accomplish two goals. In the first version, *scientists* were constructed as not yet able to provide the evidence needed. In the second version, *practice* (health educators, industry) was constructed as being too hasty, not allowing enough time to provide evidence about the innovations. Both versions will be discussed separately.

Goal 1a. From practice to science: first deliver better evidence

All speakers, except of one respondent from industry, constructed innovations in personalized nutrition advice as not yet evidence-based, allowing for a wait-and-see policy while safeguarding their expert identity. The respondents drew upon uncertainties about the relation between nutrition and health on a personal level, about the effectiveness and social impact of using the Internet, and the utility of information about genes to create a distance between the innovations on the one hand and their current usefulness in nutrition interventions on the other. The following extracts are illustrative of how they accomplished this goal:

Extract 01

[interv.-269] In genetic diagnostics, there are so many uncertainties that the contribution towards people changing their behavior is not very big. [270-286 omitted]

[IND-287] I think that solely individual advice could play a role if there's a very direct relationship between findings and outcome, preferably one to one.

Extract 02

[interv.-271] We still have five seconds for what you'd like to say about nutrigenomics.

[HE-274] I'm actually very skeptical, and the most recent European nutrition conferences have confirmed my views on this. I suddenly noticed that people were talking quite realistically about genomics, whereas before that they talked as if everything were possible.

In extract 01, the interviewee builds on the interviewer's remark about uncertainties in genetic diagnostics by stating that no advice should be given without clear evidence. Similarly, extract 02 shows a waiting attitude attributed to a lack of convincing evidence. The respondent underlines the legitimacy of his doubts by referring to the fact that the scientists themselves have become more modest. The skepticism fits the attitude of a critical expert who does not support just any innovation. It is not that the speaker does *not want* to play a more active role, it is because he *cannot* at this moment – he needs to let science find out first. In the next extract, the speaker not only distances himself from the innovations on the basis of evidence-based standards, but also underlines the relevance of these standards with respect to general nutrition advice.

Extract 03

[interv.-765] What's the story with nutrigenomics?

[ME-768] That's a hard one, things will have to be developed a lot more before that happens. I'd almost say, for example, current advice on nutrition. Someone has argued for, and I support it, they say, actually you should submit nutrition advice to the same regime as new medicines, the same test.

The speaker's account that nutrition advice fails to meet evidence-based standards and his demand for "the same regime as new medicines" [Extract 03-768] portray him as someone strict about scientific standards, i.e. not easily convinced by the promise of an early innovation. The extract defines the provision of evidence as the main problem faced by the field of nutrition advice. Evidence comes first, and before that no actions can or should be taken. The use of the repertoire implies that, in an early stage of

development, apart from asking for more scientific evidence, this group of stakeholders defines its *own* role in co-shaping the innovations towards consumers' needs and aspirations as very limited, or rather, as non-existent. (This is not to say that evidence-based working is not a valid approach; however, we want to point to some of the, often unnoticed, limitations of such an approach – see also Conclusion and Discussion.) Note that this is also true for an allegedly critical outsider, a journalist [Media]. Whereas this might be the phase in which the black box of technology can be opened up to wider public scrutiny (cf. Macnaghten et al., 2005), and not only with respect to its efficacy and benefits, stakeholders restrict their involvement to questions of evidence that others should resolve.

Goal 1b: From behavioral science to practice: do not rush things.
Besides the first version, two behavioral scientists used another version of the waiting-for-certainty repertoire. As in the first version, they constructed the innovations in personalization as not (yet) evidence-based. The difference between the two versions arises in relation to who is to blame for not living up to the respondents' evidence-based standard. This version constructs stakeholders in practice, who already apply new personalized interventions or heavily invest in future gene-based applications, as the ones who should not yet be pressing for action. In relation to the validity of advice on a personal level, scientists are asked for more evidence (Extract 04). In relation to the uncertainties about the social impact of the innovations, these stakeholders refer to their own role as behavioral scientists (Extract 05).

Extract 04

[interv.-251] But from your point of view, from that of Personalized Diets through IT, are there already issues there that you identify?

[SC-254] Well, I've said that comes down to a different level. You're talking about risks, about extrapolating that epidemiological data to individuals, as I've said. You know that it applies to a population, you don't know if it applies to an individual. That is one of the major fallacies that we apply. [254-264 omitted] And that is a great dilemma. Because if you say 'you' then people say that must be important. But in actual fact you're giving false information.

[interv.-270] Have you taken that into account?

[SC-271] Yes, we've had a fight about that with [organization]. Because [organization] wanted to include it and I tried to dissuade them.

The speaker constructs the lack of evidence as "fallacies" that lead to providing "false information" [Extract 04-254] while simultaneously (after being invited by the interviewer) managing his own responsibility: "I tried to dissuade them" [Extract 04-271]. The responsibility for pushing applications that are not yet evidence-based is attributed to organizations working in the field, suggesting that they should not be so impatient and give the scientists time and space to eliminate the uncertainties.

Extract 05

[interv. -292] The government, they invest a great deal in nutrigenomics. They see that it might limit the costs of lifestyle-related disorders.

[SC-295] I've still got to see that, that's been known for a long time. Prevention measures and promoting a healthy lifestyle, to be sure, are not yet completely broken down into specific risk groups, but we've known that for a long time. [296-346 omitted]

[interv.-347] The government and scientists claim: this will lead to better prevention of diseases of affluence. That only happens if people change their behavior.

[SC-350] That's a strange rationale, because you first need to invest more in developing behavior change interventions. But apparently it appeals more to the government to invest money in that, if you look at what goes into prevention research.

In Extract 05, the innovation is constructed as not evidence-based because of the lack of certainty with regard to its behavioral impact. Why invest in dubious innovations when other evidence-based opportunities to address health exist? The desire for more behavioral research is accounted for in terms of making the innovation more effective, thereby also avoiding the accusation that calling for such research would produce a job for themselves.

In both uses of the repertoires (1a and 1b) the call for evidence makes available a robust explanation as to why the stakeholders avoid collaborative interactions. Rather than engaging the public and/or reflecting upon the innovation with other stakeholders, they are waiting for certainty to arrive. The respondents present other parties as overly hasty, and wanting to push them, whereas there is no basis on which to do so.

Repertoire 2: Gatekeepers of innovation

In the second precondition that stakeholders drew upon, they sought to construct the innovations as not yet providing a reason for them to initiate collaborative interactions related to the public (clients, patients or consumers). In this repertoire, speakers established themselves as gatekeepers or controllers of the innovation trajectory by drawing upon experiential knowledge about the public. This repertoire was used for two contradictory goals: 2a) to create distance between the innovation and their own role and responsibilities, while preserving their expert identity, and 2b) to allow for a pro-active role in applying the innovations before uncertainties are eliminated, without compromising their expert identity. It is characteristic of both versions that respondents placed responsibility for the innovation process on the public, rather than making their own role and responsibilities explicit. Also, they constructed a homogeneous public that was in need of protection against, or demanding, innovations in personalization.

Goal 2a: Protecting the public against innovation.
All stakeholders used the first version of the gatekeeper repertoire. It appeared in combination with the first repertoire about uncertainties in response to how the innovations could play a role in nutrition interventions. Speakers drew on their experiential knowledge about public needs to construct the innovations as not meeting societal preconditions, such as accessibility and simplicity. This experiential knowledge entitled them to establish themselves as gatekeepers who have to consider their public (cf. Padmos, Te Molder, & Mazeland, 2006). In this case, the public needs to be protected against current applications of innovations in personalization, thereby allowing for a – now reasonable - request to slow down the innovation process on behalf of the public. The wait-and-see policy that could already be achieved with the first repertoire is thereby further elaborated. Possible accusations of just being uninterested, lazy obstructionists, a luddite or a laggard in innovation can also be successfully managed: these stakeholders rationalize that "it's not that I do not want to be involved, it's because the public needs

my protection". The responsibility for moving the innovation process forward, or not, is thereby assigned to the public rather than to themselves. In this version, respondents often draw upon the complexity of handling risk information. Especially in relation to information about genes, they treat the public as not capable of dealing with the uncertainties, as illustrated by Extract 06:

Extract 06

[interv.-238] How do you regard the nutrigenomics story?

[SC-241] I think that people who hear, 'you have an abnormal profile': on the one hand that can be seen as terrifying information and people are not at all prepared to deal with that.

[interv.-244] Drop the whole test?

[SC-247] That would also be possible. It is very important for there to be effective communication about this, so that people can interpret something like that properly. That's already a problem. Then you don't know how it will turn out. Some people will think: 'oh no, I won't do that, after all, I can't do anything about it, so just leave it.' People who get a test result with a favorable profile: you don't have to be so concerned. They also don't have to stick with anything. Those are the negative consequences that this sort of thing can have.

The speaker draws upon experiential knowledge to construct the innovations as leading to "terrifying information" [Extract 06-241] and people who cannot deal with test data. Members of the public are constructed as homogeneous: their reaction is negative in relation to health behavior change, being either "I won't do that" or "don't have to stick with anything" [Extract 06-247]. Extract 7 shows how a public demand for zero-uncertainty is being constructed:

Extract 07

[interv.-133] Do you think that genetic predisposition plays a role somewhere? If your father dies of a heart attack?

[SC-136] I think that plays an enormous role. I think, and I can't say that I've noticed it specifically, that ordinary people can do very little with genetic risk. The same with presenting it properly in scientific terms. It quickly becomes a kind of one-to-one relationship: you have a genetic predisposition, so you'll fall ill.

This respondent constructs zero-uncertainty as the thing that people want, as well as representing the way in which science must communicate it to the public in the form of scenarios. Without this kind of gross simplification, the public cannot deal with the information about food, genes, and health. The innovation itself is thereby formulated as more technology-pushed than wanted. Note that we do not aim to treat these accounts ironically or expose them as untrue. We seek to show that these deficit accounts of the public (cf. Wilsdon & Willis, 2004 about deficit models of public understanding) work to establish the almost complete absence of a role for the stakeholder. Speaking on behalf of the public is a discursive resource for presenting the innovation (trajectory) as something the public cannot deal with, rather than as something in and for which the stakeholder claims his/her own role.

Goal 2b: Pushing innovation because people want it.
The gatekeeper repertoire was used to construct the innovations not only as not meeting societal desires but also, conversely, as being pushed by the public's needs and desires. All speakers, with the exception of two respondents from health care and the journalist, built their argument by displaying experiential knowledge about the public wanting the innovation The difference between this and the first version resides in how the public is depicted. In the first version, the preconditions (for an effective innovation) of accessibility and simplicity are based on a public in need of protection. This version designates the public as autonomous, capable of making their own decisions, decisions that gatekeepers need to consider. Enthusiastic reactions of the public to personalized interventions were drawn upon to allow for a facilitating gatekeepers' role. This version was put forward in the context of current applications of personalized nutrition, as also in relation to speakers' own initiatives therein in this field. In line with the prior gatekeeper version, responsibility for the pace of innovation lies not with the respondent but with the public:

Extract 08

[interv.-262] What happens now with the people who stand on them? (= personal assessment devices in the supermarket, see Box 1) [265 omitted]

[HC-266] There's a lot of interest. I thought that no-one would stand on them. But people just go and stand on them, right in the middle of the shop. After all, there are lots of people who want to look into it themselves. Without anyone else getting involved.

Extract 09

[IND-149] People really do like to find out their 'real age' [website and television program that calculates someone's 'real age' based on physical and lifestyle risk indicators].

[interv.-152] And there are lots of comments about it too.

[IND-155] Yes, but that's us here, the scientists. Is that correct, those six years and such. But I find that doesn't matter, they have lots of visitors.

This version enabled respondents to account for their own pro-innovation attitude on the basis of what people want. Note that the distance between the people and their own professional role is carefully protected, either by emphasizing that the people want it themselves without someone pushing them (Extract 08), or by distinguishing a scientific assessment from what people think (Extract 09). This version also protects their expert status from being harmed by appearing to contradict evidence-based standards. They used their gatekeeper's identity to manage possible accusations of not being critical, being pro-innovation before uncertainties are eliminated, suggesting that it is their role as gatekeeper to consider public wants. In line with the first version of this repertoire, responsibility for the pace of the innovation process is thereby assigned to the public.

Repertoire 3: Fixed roles

A third repertoire attributed the potential success (or lack of it) of the innovation to the flexibility, or rigidity of roles and responsibilities. All participants except the philosopher used this repertoire. This repertoire was evoked so as to (re-)assign responsibility for flexibility in innovation trajectories to others. It was deployed in response to questions about integration of innovations in society as well as about the effectiveness of collaborative

efforts. We distinguished a clear difference between making sense of one's *own* role and appreciating the role of *others* in collaborative interactions. Considerations about their own role were formulated as self-evident truths such as having a commercial stake, thereby presenting their (alleged) tasks in relatively fixed terms. In contrast, evaluations of other stakeholders' roles were presented as based on the experience that they change over time, suggesting that these roles are subjective, situational and changeable. This repertoire was used to accomplish two goals, namely: 3a) to allow for a limited professional role in the innovation trajectory because that is how things work and what people expect of one, and 3b) to allow for a limited role because other stakeholders do not facilitate innovations and should change first. The difference between the repertoires lies in what respondents construct as the cause of not being able to change. In 3a, changing one's own role is constructed as beyond personal influence because it does not fit professional codes of what to expect from the different players in the field including one's own, whereas in 3b the focus is on other stakeholders' roles that do not facilitate and support their willingness to change.

Goal 3a: You know, it's not up to me.
Participants drew upon characteristics of their own job in response to questions about effectiveness of nutrition interventions and their own role in collaborative interactions. They constructed a fixed role by building their arguments on the basis of normative assumptions about how things (should) work such as "industry has to make profit" and "doctors work curatively" (re-actively rather than pro-actively). This is illustrated by Extracts 10 and 11:

Extract 10

[interv.-145] So is an active role [in directing patients to health websites] for the GP all the same, and unsolicited?

[HC-148] That remains to be seen, I do that for myself. I don't see it as the GP's job to actively direct patients to all kinds of authorized health sites. That's going too far. They come into the picture when someone's ill. That's when you get the most benefit from them. All that preventive business, you support it as a GP. There's always the idea that if intermediaries don't support such a step, it'll come to nothing. But the active role starts when people are sick.

Extract 11

[interv.-147] But what is the biggest problem if you want to have people working together? What are the conditions?

[IND-150] A company's commercial interests always play a role. It's really not a matter of the greater good, oh look, we want to make all Dutch people healthy. That doesn't fit with a commercial company.

In Extract 10, the description of the GP's role as mainly curative (for example: saying "they come into the picture when someone's ill") while simultaneously underlining his own active role enables the speaker to account for a relatively passive role on the part of GPs with respect to innovations, without endangering his own preparedness. In Extract 11, the speaker admits industry's potential stake and thereby turns it into a fact of life, not something to be changed easily. The normative character of the accounts, i.e. in terms of what we can and cannot expect from GPs and industry, is helpful to counter possible accusations of not wanting to join early initiatives in co-influencing the innovation. Their

roles are not subject to personal influence, suggesting that this is about *inability*, rather than *unwillingness*.

Goal 3b: You see, it's up to them.
In the second version of this repertoire, speakers drew upon their history of collaboration with other stakeholders to play up their willingness to change, and other stakeholders' lack of facilitation of such change:

Extract 12

[interv.-052] How do we in the Netherlands deal with this knowledge? [about determinants of behavior as known from literature]

[SC-055] Hardly at all. By the bodies promoting health, still hardly at all. [056 omitted] We now know step 1, what the problem is and also the determinants. But how you now deal with determinants of behavior, you have to use feedback, you have to use behavioral skills training, there's still very little happening on that front.

[interv.-061] Why is that?

[SC-064] Because it takes a lot of time. And that's frequently not available. And the expertise is certainly not properly organized.

Extract 13

[interv.-153] How do you see that, a collaborative project?

[HE-158] We're still rather reticent in that respect [participation in a collaborative project initiated by a local health organization] because we first want to know, okay, what exactly is going to happen, everything has to be done from the basic grant, VWS [Dutch Ministry of Health] has no money for it. Well, we can scarcely get by on our grant so before we launch into that, we've said, first we want to see and hear everything.

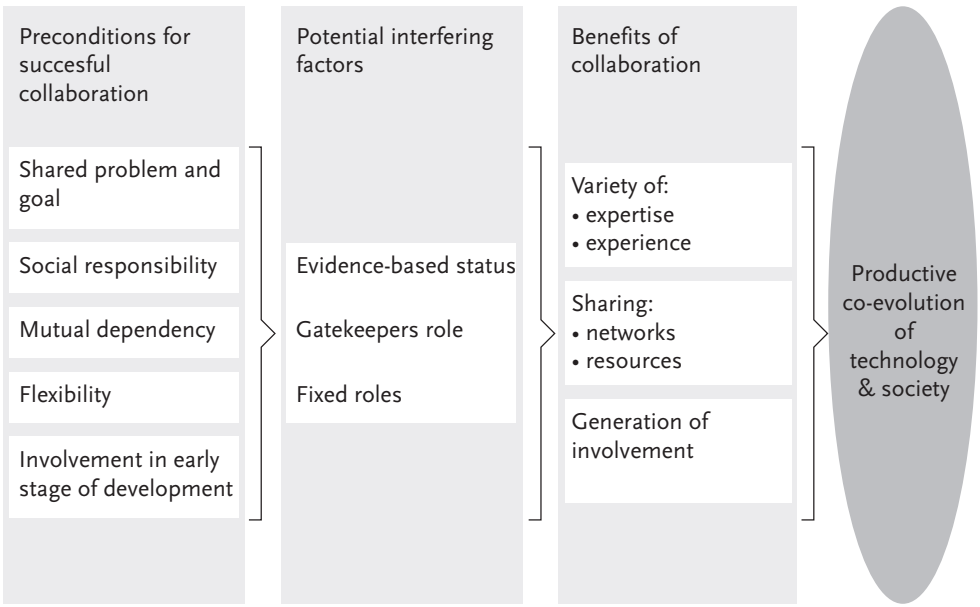
This version was used in response to questions about effective nutrition interventions and about successful collaborative interactions, current initiatives, and who should be involved. Speakers constructed their own fixed role based on other stakeholders' practical restrictions such as a lack of time and money, but also a lack of expertise and prioritization of health promotion interventions. Thereby, they characterized their own role in the development of more effective interventions as currently fixed; they depend on other (unwilling or incompetent) stakeholders that need to change their role and responsibility first. The role of these stakeholders is, in contrast to the first version, dependent on change: it is up to others to change first.

7.5 Conclusion and discussion

We identified three sets of repertoires by which actors constructed personalized nutrition as an innovation that is largely beyond their current responsibilities. The repertoires were organized around three related themes, namely: 1) the status of evidence, 2) the position of the public, and 3) the flexibility of roles. All repertoires were used for at least one purpose, i.e. to account for a wait-and-see policy concerning the innovation under development. This leads us to conclude that the stakeholders did not construct their own position in the innovation trajectory, or their relation with the public, as providing opportunities for the co-shaping of an innovation that contributes to more effective nutrition interventions. On the contrary, personalized nutrition was conceptualized as an innovation that was

not yet evidence-based, a construction that allowed actors to build up and maintain their expert status. We are not claiming that personalized nutrition is a technology that should be accepted at face value. Our argument is that if one seeks to engage stakeholders in the early stages of innovation trajectories, one of the preconditions is that stakeholders *themselves* treat these stages as an opportunity for co-shaping technologies (Note that co-shaping does not presuppose facilitating the introduction of the technology; it may also include resistance). We will discuss this in more detail in the following sections (see also Figure 7.1).

Figure 7.1 : Early involvement and potential interfering factors in collaborative efforts



Uncertainties treated as a barrier to action: about evidence-based expertise.
This study has shown that stakeholders treated uncertainties as *barriers to action*. Dealing with uncertainties as an opportunity for action and one's credibility as an actor in the innovation process were constructed as mutually exclusive. The status of HP experts was built around evidence and therefore did not allow for uncertainties as a basis for action. As mentioned, evidence-based work has become an important principle in health promotion. It is therefore not remarkable that these standards play such an important role in the stakeholders' accounting practices. However, one important consequence of limiting oneself to evidence-based work, and legitimizing one's attempts accordingly, is that taking collaborative or any other initiative is not an accountable act as long as uncertainties cannot be excluded. As innovation processes are particularly larded with uncertainties, this is a hard dilemma to resolve.

The more general dilemma about early involvement in times of uncertainty, and thereby bringing in a wider range of social and ethical issues into technological decision making, is known in the literature as the Collingridge dilemma: "in order to minimize any negative impacts of a technology, it is in theory most effective to influence the technology early

on in the development process; once a technology has been designed, there is little left for stakeholders in society to do except either approve or reject it" (Collingridge, 1980, p. 1). It is important to notice that influencing the technology encompasses more than modifications as to meet the consumer's needs and wants, but also refers to more radical shifts in the definition of the problem that the technology claims to solve, or the risks that are involved (see also Macnaghten et al., 2005; Marris, Wynne, Simmons et al., 2001).

There may be an additional reason as to why early stakeholder involvement and collaboration is treated as problematic: from a stakeholders' perspective, taking action can be viewed as acknowledging the *a priori* relevance and usefulness of the innovation. In contrast, this is not an issue in other collaborative HP interactions, where the relevance of promoting healthy eating and the benefits of doing this jointly are treated (at least theoretically) as a fact. Here, the debate is not so much about the shared problem and goal but about the road towards accomplishing the goal. Innovations, on the other hand, may be subject to fierce debate, especially at a later stage of development. In this respect, it is important to note that collaborative initiatives, either towards members of the public, or a broader circle of stakeholders, do not need to be restricted to matters of efficacy and efficiency, and/or focus on attempts to avoid public controversy. Early stakeholder involvement may, and in many cases should, also involve a much more critical perspective, such as revealing the tacit assumptions of technology development and opening them up to public scrutiny (see also Macnaghten et al., 2005 and below).

Homogenizing the public: gatekeepers of innovation.

For stakeholders themselves, the gatekeeper role provides a neat distance between innovation processes on the one hand, and current roles and responsibilities on the other. However, the construction of the public as a homogeneous group, either in need of protection or depicted as driving the innovation, also challenges the added value of diversification in expertise and experience in collaborative efforts. Deficit models of public understanding (cf. Wilsdon & Willis, 2004) designed to explain a lack of acceptance of technologies were only possible on the basis of a singularized view of members of the public. A second and related implication of defining a uniform public (see also Rip, 2006) is that the public is denied a more active role. Although the value of public participation is widely recognized in health promotion and innovation literature (Butterfoss, 2006; WHO, 2005; Wilsdon & Willis, 2004), most stakeholders in this study treat the public as in need of gatekeepers, not able to voice their own ideas and concerns. In doing so, they do not have to question their own role and responsibilities in the process, or the validity of their construction of the public, while conceding only little attention to the possible value of participation by the public (for similar criticism Te Molder & Gutteling, 2003). The stakeholders also constructed a public that is not capable of handling uncertainties, as shown by the first version of the gatekeeper repertoire. Biotechnology experts were shown to use similar arguments about how lay people react to uncertainties in risk information, such as in their construction of the public as "needing zero risk" and in stating that "the most important problem is ignorance of the public on scientific facts" (Frewer, Hunt, Brennan et al., 2003; Marris et al., 2001). Our results add to these findings by showing that stakeholders themselves actively use these arguments to create a distance between innovations and their own role and responsibilities. Uncertainties are drawn upon by actors themselves to construct barriers before collaborative interaction even takes place.

Fixed roles: about immovable positions and responsibilities.
In our study, the roles and responsibilities of stakeholders were more or less conceptualized as fixed. Such resistance to change is also known from attempts to include preventive actions, even evidence-based prevention, in the family doctor's practice. These were hindered by the doctors' curative paradigm (Mirand, Beehler, Kuo et al., 2002, 2003), an argument that was also found in this research (Extract 10). Technological innovation processes require even more flexibility, but the prescribed roles that stakeholders have been shown to construct seem to limit such possibilities. In the 'it's-not-up-to-me' repertoire, they externalize their role as a phenomenon "out-there", with the strong normative implication that most change is not subject to personal influence. Change is directed to other stakeholders in the second version of the fixed role repertoire, again excluding flexibility of their own job. The sense of mutual dependency needed for successful collaborative interactions is clearly challenged by the use of this repertoire.

Reflecting earlier findings about collaborative initiatives, our findings support the known challenges in relation to the preconditions for accomplishing more than could be done alone: setting clear goals, taking social responsibility for HP activities, and mutual dependency. What we have added is insight into the issues of (un)certainty, selective usage of experiential knowledge, and fixed job descriptions, or professional roles, that may interfere with collaborative initiatives among stakeholders (see also Table 2).
Also, the focus of stakeholders on evidence suggests that the relevance and usefulness of a technology is mainly determined by the availability of scientific proof. Critical reflection beyond evidence is thereby more or less blocked, limiting the multidimensional view needed to address issues such as (un)healthy eating and the complexity of settings in which efforts to influence unhealthy eating would be practiced. Questions such as: Is this the way we want to go in nutrition interventions?, are hardly touched upon. Macnaghten et al. (2005) argue that the construction of technology as black-boxed limits the framing of social questions to impacts or risk issues, to be handled downstream in the innovation process. Political questions about purposes, ownership, and responsibilities in early stages of the development process are largely ignored. Attention to the ways in which these kinds of social and ethical considerations can be built into the technical and scientific agendas at an early stage will become even more urgent as the development of such agendas becomes more privatized.

The findings of this exploratory study need to be interpreted in the context of the limited number of participants that were all of Dutch origin and working in the Dutch context. However, we believe that our findings are sufficiently important and generalisable to other settings and health innovations to be taken into consideration when collaborative initiatives are pursued. They show some of the discursive resources that stakeholders use to account for their participation, or lack of it, and place the known challenges in a new perspective. More research is needed among a larger group of stakeholders with specific focus on how evidence, the public, and fixed roles are treated with respect to stakeholders' role, responsibilities, and initiative in early phases of technology development. Repertoires, and their usages, may differ among different sorts of stakeholders, for example between immediate and distanced outsiders (cf. Rip, 2006). Greater reflexive awareness among stakeholders about their own discursive practices is needed before any change can take place. In this respect, it would be interesting to initiate action-oriented research by integration of our preliminary findings into existing needs assessment tools.

Although we cannot, and do not want to, predict how and whether personalized nutrition innovations will develop into actual advice and products, visions of the future can be beneficial for stimulating learning processes about possible impacts and future actions.

Table 7.2: Summary of findings and implications for preconditions for collaboration

Repertoire	Issue	Potential impact on collaboration	Precondition challenged
Evidence-based status	Construction of evidence-based expert status	Uncertainties do not allow for action	Shared problem and goal Social responsibility Involvement in early stages
Gatekeeper role	Construction of a homogeneous public Construction of a public demand for zero uncertainty	Making the public responsible for either pushing or blocking innovation Ignoring more productive forms of public engagement	Variety of expertise and experience Involvement in early stages
Fixed roles	Construction of one's own role as fixed Construction of dependency on incompetent or unwilling others	Presented inflexibility limits one's own role and responsibility	Social responsibility Mutual dependency Flexibility of roles

8

Patients, evidence and genes; An exploration of GPs' perspectives on gene-based personalized nutrition advice

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8.1 Introduction

A patient with a family history of early death from heart attack comes to the dieticians office to obtain nutrition and lifestyle advice. As well as collecting family and diet histories, and making physical and blood chemistry measurements, she also scans their electronic genome card. From this information, she develops a selection of targeted recommendations for diet and exercise, and drug regimens depending on their preferred lifestyle. Is this entertaining fiction or a glance into the future of personal nutrition advice? (DeBusk, Fogerty, Ordovas et al., 2005) And what about general practitioners' perspectives towards such innovative developments?

Innovative nutrition advice

Diet-related diseases are increasing (cf. WHO, 2004). Although this is a complex issue, one could safely say that a considerable part of this increase is due to unhealthy eating behavior, (Kreijl, Knaap, van Raaij et al., 2006; WHO, 2004). This growing rate has further encouraged calls for innovative approaches that motivate people to eat healthfully (cf. Ministry of Health, Welfare and Sports, 2004; WHO, 2004). Personalization of nutrition advice is often proposed as one of the most promising approaches (Brug, Oenema & Campbell, 2003). Recent reviews of health intervention methods (Contento, Bach, Bronner et al., 1995; Kroeze, Werkman & Brug, 2006) and research on the effect of personalization (Brug, Glanz, van Assema et al., 1998; Curry, Grothaus, Wagner et al., 2005; Kreuter, Farrel, Levith et al., 1999) show that advice targeted to an individual's physical parameters, lifestyle and environmental situation is more effective in influencing their health behavior than general information.

Such personalized nutrition advice is not the domain of dieticians only. Rapid developments in interactive computer technology applications such as the Internet allow for interventions that provide a large number of people with access to personalized advice at relatively low cost (Brug et al., 1999, 1998, 1996; De Bourdeaudhuij & Brug, 2000; Eng, 2004; Kreuter & Stretcher, 1996). Computer assisted devices are used to collect data about someone's current dietary intake, lifestyle, socio-economic situation

and indicators of diet-related risk such as BMI and blood cholesterol. Also, rating scales or questionnaires are used to measure behavioral variables, for instance attitudes and perceived self-efficacy towards healthy eating. Such interventions have induced changes in smoking, diet and physical activity (Brug et al., 1998; Curry et al., 2005; Kreuter & Stretcher, 1996). In a recent review Kroeze et al (2006) concluded that the evidence for the effectiveness of computer-tailored interventions is quite strong and most consistent for reducing dietary fat.

In this article, we will emphasize an innovation that is expected to add a new dimension to personalized nutrition advice: knowledge about the interaction between nutrients or food components and the genome. These diet-gene interactions comprise the impact of nutrients or food components on gene expression (nutrigenomics) and the impact of genetic variations on the response to nutrients or food components (nutrigenetics). *Nutrigenomics* studies the relationship of what we eat and how our genes, proteins and metabolism function to affect our long term health. The aim of nutrigenomics studies is to achieve so-called 'personalized nutrition': recommendations of food and/or supplements based on a person's entire genetic profile. This genetic profile can be assessed through genetic testing at birth or later in life. Nutrigenomics is expected to influence prevention and treatment of diet-related illnesses. *Nutrigenetics* studies single gene – single food components where possession of a particular genotype may confer a disadvantage that can be addressed through dietary modification. Nutrigenetics may allow individualized recommendations of specific foods or supplements based on a person's genotype. This genotype can be assessed through genetic testing (NuGO, 2008).

Involvement of general practitioners

There are several important issues to consider in both nutrigenetics and nutrigenomics that are relevant to general practitioners (GPs). Up to now the complexity of researching diet-gene interactions has limited the translation of research findings into practical applications of personalized nutrition advice (Ordovas & Shyong Tai, 2009). However, even without scientific consensus about the validity of the tests, companies already offer DNA-tests that indicate someone's vulnerability, to for instance type II diabetes, osteoporosis or heart disease. In their recent report, the US Government Accountability Office (GAO) concludes that "such tests mislead consumers by making predictions that are medically unproven and so ambiguous that they do not provide meaningful information to consumers" (GAO, 2006). Because most companies offer those tests through the Internet, some tests are even available without the advice of health professionals, so it is likely that GPs will be confronted with patients questions. Additionally, people have been confronted with an increasing amount of attention to the developments in gene-based nutrition advice in the popular press since 2004 (Bubela & Taylor, 2008). A recent market survey showed that 42% of US consumers had heard or read about using individual genetic information in the context of nutrition and diet-related recommendations. Also the percentage of consumers that believe family history plays a moderate to great role in maintaining or improving health increased from 85% in 1998 to 90% in 2005, indicating a growing awareness of the interaction between food, genes and health (Schmidt, White, Reinhardt,-Kapsak et al., 2007). Little of such awareness research has been performed in Europe. However, among a community sample of British adults, 80% expressed interest in being tested for genetic susceptibility to heart disease (Sanderson & Wardle, 2008).

The next issue is that the inclusion of genetic knowledge in nutrition advice has ethical and social implications that may directly influence people's lives and thereby GPs practices. Görman (2006) applies the four-principles-theory for biomedical ethics

constructed by Beauchamp and Childress (2001) for this particular innovation. He states that the principle of autonomy raises questions about individual rights and integrity when a personalized nutrition application is used. Such usage should also contribute to a good life in line with the values of each person, to assure beneficence, avoid or minimize harm and be fairly distributed among populations (justice).

Studies show that consumers consider GPs as gatekeepers of health (Canadian Food Information Council, 2004; Van Dillen, Hiddink, Koelen et al., 2004), therefore, they are expected to become important actors who implement and/or communicate about personalized nutrition based on genetic information on the basis of their profession. Their specific role in providing genetic information was highlighted in a US consumer survey that showed that 80% of the respondents vested confidence in their general practitioners for guidance through the stages of the DNA-testing process (Baruch, Kaufman, & Hudson, 2007).

The above issues support the necessity of early involvement of general practitioners in the innovation process. Their involvement is not so much to smoothen the introduction of the technology as to improve socio-technical decision making more generally (Wilsdon & Willis, 2004). Within science and technology studies, the assumption that innovation is a linear process in which scientists invent, businesses apply and consumer buy, has been replaced by the notion of innovation as a co-evolutionary product of science, technology and society (for example Rip, 2002). Different forms of stakeholder participation have received considerable attention as important ways to bring a wider range of social and ethical issues into technological decision making and to turn co-evolution into a more reflexive process.

Although uncertainties can complicate discussions about practical relevance in such an early stage of the innovation process, postponing involvement might leave no room for dealing with questions such as 'is this the way we want to go with nutrition advice in GPs practices? This dilemma is known in literature as the Collingridge dilemma: 'in order to minimize any negative impacts of a technology, it is in theory most effective to influence the technology early on in the development process; once a technology has been designed, there is little left for stakeholders in society to do except either approve or reject it' (Collingridge, 1980).

However, although the need for an interdisciplinary approach, in which science, health professions and industry exchange expertise and opinions, is emphasized in publications in health promotion (Green & Kreuter, 2005) science and technology (Fisher et al., 2006) and nutrigenomics (Burke et al., 2006), high early failure rates of such collaborative efforts suggest that a better understanding is needed about the way such efforts do or do not work. According to health promotion literature, a shared problem and goal to effectively address challenges such as unhealthy eating, the existence of a shared social responsibility to make this happen and the recognition of mutual dependency are preconditions for working together (Granner & Sharpe, 2004; Kreuter, Lezin et al., 2000). From the literature it is also apparent that those preconditions are often challenged by the variety of views that participants bring to the table.

A first challenge to involvement of GPs, in the literature, is the lack of attention that is paid to nutrition and to genetics in their education. A study among US medical school graduate students found that over half of the respondents rated the time devoted to nutrition as inadequate (AAMC, 2005). Farrel (2009) concludes that the same applies to Canada. In a recent longitudinal study, Visser et al (2008) found that, although Dutch general practitioners were more interested in the impact of nutrition on health compared to 1992, the participants provided less nutrition counseling in their practices. According

to the participants', this was mainly due to of patient's lack of motivation to change dietary habits and doctors lack of time.
With respect to genetics, studies among medical genetic trainees in several European countries showed that non-genetics specialist physicians lacked awareness of genetic features, made few referrals for genetic counseling and had little awareness of benefits and harms to family members (Harris, Challen, Benjamin et al., 2006).

We are not aware of any study that aimed to explore the barriers and opportunities perceived by general practitioners towards nutrition advice based on genetic knowledge. We report here the findings of our study about the arguments general practitioners use to evaluate such health advice. The study aimed to explore the issues that facilitate or hinder the involvement of GPs in an early stage of the development process of innovative, personalized nutrition advice.

This study was part of a larger study that explored the views of health professionals towards innovative diet and health advice, initiated by members of The European Nutrigenomics Organization, NuGO. This EU-funded Network of Excellence aims to develop and integrate genomic technologies for the benefit of European nutritional science and to facilitate applications of these technologies in nutritional research world-wide (NuGO, 2008).

8.2 Method

Interview guideline and interviewers

We used semi-structured in-depth interviews that combine a structured guideline with the opportunity to ask additional questions (Johnson, 2002). The interview guideline was developed based on literature research on innovations and involvement in innovation processes (Bouwman, Hiddink, Koelen et al., 2005; Bouwman & te Molder, 2008) and the findings of our previous study about this topic (Bouwman & te Molder, 2008).

In table 8.1, the key topics of the interviews are shown. Firstly, the respondents were asked for their awareness of and perceptions about (dis)advantages and complexity of the innovation, compatibility with health care practice and social-ethical issues. Secondly, participants' were specifically asked for their perspectives towards scientific evidence of nutrition advice and towards the needs of their patients. These topics were shown to be important in our previous study, in which we found that Dutch stakeholders in health care, - education, social science, industry, the media and health insurance treated uncertainties in scientific evidence and the needs of their patients as barriers towards involvement in innovative personalized nutrition advice (Bouwman & te Molder, 2008). Lastly, the respondents were asked for their perspective towards involvement in the development process of innovative personalized nutrition advice, with specific attention to their own and other potential members' roles.

The interviews were performed by two interviewers: the first author, who is a social scientist with education in nutrition science and an experienced interviewer, and a nutrition scientist with education and experience in interviewing.

Table 8.1. Guideline GPs interviews

Nutrigenomics-based personalized nutrition advice	
Nutrition advice based on genetic information	awareness relative disadvantages: scientific evidence compatibility with health-care system complexity of use in practice – patients'needs social-ethical issues – patients' needs
Collaborative efforts	experience with collaborative efforts personal and collective goals of collaborative efforts: own role other participants who have to be involved: others roles

Data collection and transcription

In August 2006, the European conference of the World Organization of National Colleges, Academies and Academic Associations of General Practitioners (WONCA) provided the opportunity to interview GPs from diverse countries. The conference did not have a theme that was related to nutrition, although this topic was addressed in a small number of sessions. Before the conference, three GPs with specific roles in initiatives to stimulate nutrition advice in general practice were asked for their participation. They all agreed. Also, five GPs with a leading position in the World Organization of National Colleges, Academies and Academic Associations of General Practitioners (WONCA) were selected, of which three agreed to participate. We aimed to recruit another ten GPs during the conference, from countries in which (future) collaborating partners of the European Nutrigenomics Organisation operate. However, many GPs refused to participate, due to expected language-problems or out of disinterest in the topic. Eleven GPs, who worked in Denmark, Ireland (2), Netherlands, Slovenia, Spain (2), Sweden, Switzerland and Australia (2) participated. The interview with one of the Spanish GPs was not finished because of language problems and therefore not used in the analysis.

Each interview lasted about one hour and was recorded with a digital voice recorder.

Analysis

The interviews were fully transcribed and analyzed with use of Atlas.ti, as software package for qualitative analysis. The qualitative analysis involved a process of selecting and coding text fragments according to the research question: 'What barriers and opportunities do GPs perceive with respect to the development process of gene-based nutrition advice?'.

8.3 Results

General results

Although the term genomics was known by most respondents, only one participant had heard of nutrigenomics and nutrigenetics. He perceived the innovation as relevant to nutritionists and the industry but not to general practice. The other participants based their perception of the innovation on the explanation provided by the interviewers.

The main topic of the interviews was about the use of genetic knowledge in nutrition advice. However, we found that participants often related their arguments about this topic to barriers and opportunities of nutritional research as such. Despite the natural limitations of research into (perspectives about) future situations, these arguments are relevant because gene-based advice will be embedded in and start from current practices

in nutrition advice more generally. The participants held a mostly critical view towards both. Nevertheless, some participants argued that general practitioners should become more involved in nutritional studies.

With respect to this specific analysis, we did not find substantial differences between the participants who were involved in stimulating nutrition advice, WONCA leaders and the other GPs. This finding suggests that participants argued mainly from the perspective of being a GP working in general practice, other roles seemed to have been of secondary importance. Differences in arguments were also to be expected, due to the different nationalities and therefore, cultural backgrounds of the participants, however, such differences were not found.

In the following section, we present the participants' arguments about personalized nutrition advice in general practice. The barriers related to the status of scientific evidence about the relation between nutrition and health and the consequences for their patients. The opportunities related to the GPs expertise about their patients. Table 8.2 provides a summary of the arguments.

Barriers towards GPs' involvement: factors that relate to evidence

All participants, except one, contested the results of most nutritional studies. Three different arguments were found:

1. Results of nutritional studies often lack relevance for general practice because they are not based on the needs of patients in general practice; research often studies hospital patients, illustrated by extract 1:

Extract 1

If you look at cardiology and you see a patient with heart disease and you look at prevalence of a certain gene in a hospital, this prevalence will be much bigger than the prevalence in general practice. So the advice based on this evidence to a general practitioner would be much stricter, much more aggressive treatment than could be useful [I-02]

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2. Nutrition is more about using common sense than about findings of research studies, as illustrated with extract 2:

Extract 2

But I think all we can do is what one of the other lecturers [RE: during conference] stated that really use our education and our long years of experience in general practice, our feel for our patients and you know it comes down to a lot of common sense and just good practical advice [I-5]

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3. Nutritional studies often do not meet the criteria of biomedical (drugs-health) research, illustrated by extract 3:

Extract 3

In principle when you have randomized controlled trials and meta-analysis such kind of reviews you are right to put evidence into practice [1 line omitted] Especially for lifestyle advices it is difficult to find good evidence on that, so that is why many people [RE: general practitioners] are reluctant to put such evidence into practice because they think that this evidence is not very good and is not robust enough compared to other evidence that comes from clinical trials with drugs and so on [I-01]

Barriers towards GPs involvement: factors with respect to patients
The participants all mentioned barriers relating to different sorts of concerns about their patients, that were related to three topics:

1. A DNA test does not provide insight in other influences on health such as social-economic circumstances; general practitioners have to consider those influences because they have a more holistic view towards their patients. Extract 4 and 5 illustrate this type of argument:

Extract 4
That's the thing with any kind of innovation, like you know going into genes, people are, you know, it's very biological and I guess people [Re: GP] try to be more holistic than that [I-6].

Extract 5
I change because I have a person in front of me. I haven't an organ, a gene, I have a person, the culture, the tradition [I-3]

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2. If study results are based on populations in hospitals or people with serious illnesses, such advice could be picked up wrongly or create unneeded anxiety, illustrated with extract 6 in which the participants argues about nutrigenomics studies:

Extract 6
I think it is a combination of exciting, because there is huge potential in better understanding how to improve health. But it is also scary because of the ethical issues that will come with it. [1 line omitted] . I have been very interested in prevention for a long time, in labeling people and the negative impact, the potentially negative impact of saying to somebody, well your blood sugar is slightly elevated. So you are a diabetic and the negative impact of doing that. So that makes me very worried about testing somebody's genetics and saying well you know you are at risk for a change of the breast, this, that or the other thing [I-9].

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3. Respondents argued that results of nutritional studies are not useful for their practice because patients do not ask for nutrition advice themselves.

Facilitating GPs' involvement: factors that relate to patients
In reaction to questions about involvement of general practitioners in the development process, participants presented arguments that could facilitate such involvement. The arguments related to their expertise about patients. As experts on the subject of their patients health status and needs, GPs could contribute to the nutritional studies by selecting and monitoring patients, illustrated by extract 7 and 8:

Extract 7
We can get the right persons who can benefit from the research, we see so many people, we can get the right persons [I-15]

Extract 8
General practitioners have a very important role in research, you know to identify people having a potential interest for research or people that fulfil certain criteria or people are a potential risk in developing chronic illness. General practitioners are very good messengers, very good agents in identifying those people. And, at the same time, in researching, the general practitioners are potentially important in following

patients and describing clearly the so called natural causes of disease which provide valid information to researchers from other disciplines [I-10]

Some participants argued that general practitioners could also provide nutrition *advice* in practice because their special relation with patients allows for the provision of regular, recurrent advice.

Table 8.2. General practitioners' arguments about barriers and chances with respect to genetic based nutrition advice

Topic	Arguments
Awareness	little knowledge about nutritional genomics
Evidence	Barriers different populations in studies and practice nutrition is more about common sense than about research nutritional studies do not meet criteria for biomedical (drugs) research
Patients	Barriers general practitioners hold a more holistic perspective towards their patient's health than only their 'genes' results create unnecessary patient anxiety patients do not ask for nutrition advice themselves Chances general practitioners can select and monitor patients for research studies general practitioners can provide nutrition advice on a regular, repetitive basis

8.4 Discussion

The findings of this study need to be interpreted in the context of the limited number of participants and the fact that they attended an international conference. However, we believe that our findings reflect issues that have to be taken into consideration when the involvement of general practitioners in development processes of innovations in nutritional research is pursued. But such collaborative efforts can only be successful if all potential participants acknowledge that their involvement is relevant for successful integration of the innovation (which should not be equated with straightforward acceptance of the technology). Previous research of Bouwman and te Molder on this topic showed that Dutch stakeholders in health care and -education, health insurance, social science, food industry and the media did not treat early involvement as an opportunity to co-shape the innovation. They rather drew upon uncertainties in scientific knowledge, the 'wants' and 'needs' of consumers and fixed roles and responsibilities to account for a wait-and-see policy concerning innovations in personalized nutrition advice (Bouwman & Te Molder, 2008).

It seems obvious to us that general practitioners, as gatekeepers of health and experts about their patient health status, should become involved in an early stage of the development process of gene-based nutrition advice. Not so much as to arrange for general practitioners to provide the nutritional advice, but to exchange perspectives about social, ethical and practical consequences for patients and practices, and the implications these insights could and should have for the development of this health innovation.

8.5 Conclusion

Early involvement of general practitioners in the development process of gene-based nutrition advice is needed to allow for the integration of their practical, social and ethical considerations in the technical and scientific agendas. However, factors underlying their current, critical views towards gene-based nutrition advice, and nutrition advice more in general, should be further explored. Initiatives that create opportunities for general practitioners to exchange their perspectives with other stakeholders should be undertaken. The different sorts of barriers and chances that GPs perceive, and the possible implications of these perceptions for their (non-) involvement in the innovative development process could be addressed here.

9

Conclusion and Discussion

9.1 Introduction

In this thesis, we present an everyday-life perspective on personalized nutrition advice. Generally, this innovative approach is regarded as promising, because users may perceive it as more personally relevant than general advice. Rapid developments in interactive computer technology (ICT) and nutrigenomics science are the main drivers in this area. Although indicated as promising, the limited impact of personalized advice on eating practices signals a mismatch with consumers' everyday life (Chapter 2). The aim of our studies was to define preconditions for socially acceptable personalized nutrition advice.

To accomplish this goal, we started from two perspectives. Firstly, we studied consumers' understanding of healthful eating in everyday life, in order to indicate potential mismatches with how such eating is addressed in personalized advice. We used several approaches. The literature on health behavior change and health communication was examined (Chapters 3 and 5). In addition, we used discourse analysis to consider how Dutch consumers make sense of healthful eating in everyday life (Chapter 4). Furthermore, we examined the consequences that result from integrating the innovative drivers in personalized nutrition advice (Chapters 3 and 6).

For the second perspective, we studied the understanding of societal actors in nutrition communication about innovative personalized nutrition advice. In theory, there is an overall willingness among actors to engage in joint activities to promote healthful eating. However, many such initiatives fail in practice, signaling a mismatch with actors' everyday working life (Chapter 2). We examined how involvement in joint activities is currently understood in health promotion and science and technology literature, and compared this with actors' own understanding in two qualitative studies. Firstly, we used discourse analysis to examine how Dutch actors in health education, health care, health insurance, social science, the food industry and the media make sense of innovative personalized nutrition advice, and their own role and significance in an early stage of the development process (Chapter 7). Secondly, the perspectives of general practitioners from diverse countries on their involvement in innovative personalized nutrition advice were examined in a qualitative study.

In this chapter, we integrate and discuss our findings and the implications for practice and future research.

9.2 Conclusions and recommendations: social preconditions for personalized nutrition advice

In our studies, we found several mismatches between personalized nutrition advice and consumers' everyday life. Firstly, in personalized advice the emphasis is on a specification of risk and benefits with respect to long-term physical health. This focus is based on the assumption that health is a focal concern in consumers' everyday life. The specificity is expected to be further increased by innovative developments in interactive computer technology and nutrigenomics. A second mismatch relates to the provision of advice based

on food-health relationship studies. However if we look at the way decisions and actions regarding food habits are organized in chains and how these habits are embedded in social practices, and need a lot of discursive action to change them, we must be skeptical about the possibility to adopt these recommendations easily. The growing insights into the relation between food and health has increased the specificity, and thereby the complexity, of what to eat and what not to eat for the benefit of health. Nutrigenomics research aims at further increasing this specificity up to the level of gene-food-health interactions; this can lead to even more complex personalized dietary recommendations. As a consequence, healthful eating requires a well-organized life.

The findings of the qualitative consumer study among Dutch consumers (chapter 4) show that, from the consumer perspective, healthful eating is based on routines, should be uncomplicated, convenient and flexibly combined with eating for pleasure in everyday life. In addition, strategies should be available that easily compensate for potential damage done by unhealthful eating practices, which are unavoidable. It seems that they have taken note of the idea of energy balance that is currently promoted in Dutch nutrition advice. The basic principle of this idea is that consumers learn to balance their caloric intake as a strategy to avoid an increase in body weight, which can be achieved by eating fewer calories and eating healthily. Consumers however associate compensation with separate products or product characteristics, such as freshness.

These findings also reflect a social interactional requirement with respect to the pursuance of healthful eating intentions. In everyday life, consumers have to persist in their intentions to eat healthfully vis-a-vis relevant others. In our study, consumers presented themselves with respect to their food habits as uncomplicated, so as to distance themselves from being perceived as someone who is very rigid about what to buy, prepare or consume. They aim to avoid the image of health freakiness. The finding that being someone who makes a great effort in relation to healthful eating practices is a disfavored image leads us to conclude that, if structural change is to be achieved, this image needs to change. By this we mean that nutrition advice should enable and support the healthy choice as the practically, as well as the socially, 'easy' choice.

Personalized nutrition advice should contribute to this goal by promoting a new standard of thoughtfully considering and discussing the wish to eat healthfully. However, if such a goal is to be attained, we conclude that several social preconditions should be noted:

1. nutrition advice should allow for more flexibility, to better match with consumers' complicated everyday life in which health is not a focal concern, just one of several ambitions, including social ones;
2. at the same time, interventions should stimulate a process of critical reflection on the self-evidence and uncomplicatedness of healthful eating in everyday life;
3. besides advice on practices alongside the food chain, advice should address the inter-linkage with other everyday actions, including discursive ones;
4. because consumers are the experts on these actions and the issues that arise in everyday life, they should be co-designers of personalized advice; if consumers are actively involved, issues and solutions can be exchanged among consumers and experts, and new ways to address the problem of unhealthful eating may be devised;
5. everyday life requires compensatory strategies, so as to balance healthful and unhealthful eating; however, the desirability of accepting consumers' own translation of the balancing concept should be questioned; the messages promoted in nutrition advice may need to be revised to appropriately address this need;

On the basis of these preconditions, we propose the use of an 'Action Approach', so as to better match personalized nutrition advice with consumers' everyday life. The basic idea of this approach is that, besides being well-informed and motivated, consumers need to become actively involved in eating for health. By this we mean, that they are able, in their everyday life, to practically and socially organize their eating practices in order to ensure health benefits. Interactive computer applications, such as virtual reality games, could mimic everyday-life dynamics, so as to indicate practical and discursive issues that require attention. Discussion forums can facilitate the exchange of these issues as well as possible solutions among large groups and, within this process, enable the development of a healthful eating standard. Our proposal has at its core a reflective learning process in which consumers, health promoters and other societal actors in nutrition communication collaboratively design personalized nutrition advice.

The role of societal actors in enabling and supporting healthful eating practices, and the benefits of joining forces, are evident. The involvement of societal actors in the innovative personalized nutrition advice development process is crucial, so as to allow for the integration, into the scientific agenda, of diversity in expertise and experience on social, ethical and practical requirements. We found, however, that Dutch actors in health education, health care, health insurance, social science, the food industry and the media were reluctant to engage in this innovation process. Societal actors have to work in an evidence-based way, and therefore scientific knowledge should support the impact of such advice on health. The uncertainties that exist in early stages of innovation processes block more pro-active involvement. Another of our findings is that innovative advice, in their eyes should be relevant and useful for the public. Societal actors' expertise on public needs and wants did not provide a reason for more active involvement but called for a request to slow down, on the part of the public. Everyday working life does not allow either for the change in roles and responsibilities that may be needed to fully participate in the innovation process, aimed at the successful integration of innovative nutrition advice in practices, and professional job requirements may not be amenable to personal change.

General practitioners (GPs) are usually regarded as gatekeepers of health. However, we found that they hold rather critical views on nutrition advice, and certainly also on new strategies regarding gene-based personalized nutrition. Nutritional studies were perceived as lacking robustness, not based on patients' needs and often equivocal. Because innovative advice will be embedded in and start from current practices in nutrition advice more generally, this may hinder GP involvement.

We conclude that the social acceptability of personalized nutrition advice requires a co-evolutionary process, in which societal actors treat early involvement as an opportunity to co-shape the innovations and find new solutions to address the problem of unhealthful eating. However, an invitation to join an innovation process does not of necessity elicit pro-active involvement. In order to make this happen, the expertise and requirements of societal actors should be acknowledged and acted upon; this involves several social preconditions:

1. uncertainties are inherent in innovation processes, but uncertainty leads societal actors to refrain from pro-active involvement in early stages because the proposed innovation mismatches with the current professional evidence-based working standard;
2. critical reflection is required on potential consequences of postponing participation because in a later stage, the development process may lack flexibility to integrate

the perspectives of societal actors;
3. this exercise should also aim at finding solutions, so as to overcome the block about involvement and explore the meaning of 'sufficient' evidence from the perspective of different societal actors;
4. reflection is also required on what constitutes 'evidence' in the personalized nutrition advice development process, so as to allow for the integration of social actors' everyday-life issues in the current discussion, which mainly concern (a lack of) scientific food-health evidence;
5. everyday-life expertise is held by societal actors in nutrition communication as well as by the public; this requires reflection on who decides what issues and solutions should be addressed in order to provide socially acceptable personalized nutrition advice, keeping in mind the increasing role of the public itself in the design of personalized nutrition advice

In sum, we conclude that the alignment of personalized nutrition advice with societal preconditions is possible if the development evolves as a participatory process, in which all societal actors are allowed to contribute to this search for new, socially acceptable ways to promote healthful eating.

9.3 Discussion

In this thesis, an ecological orientation formed the basis of our research. Although the importance of this orientation is widely acknowledged in health promotion, one of its key elements is often ignored in research and interventions, namely, the interaction between the individual and the environment. Treating both as separate determinants of health, as is generally the case, leads to a failure to address everyday-life social interactional requirements. Little attention has been paid to the idea that orientating everyday practices towards health requires individually induced social change, including the required discursive work. This can be viewed as rather surprising. Theoretical concepts, as for instance Bandura's (1997) concept of self-efficacy, include one's ability to negotiate change within social interactions. Yet, this element is not incorporated in personalized nutrition advice. Findings of consumer studies also support the influence of supportive social networks and social norms on consumers' capacity to eat more healthfully (Devine, 2005; Emmons, Barbeau, Gutheil et al., 2007; Falk, Bisogni & Sobal, 2000; Kelsey, Kirkley, DeVellis et al., 1996; Kristal, Henderson, Patterson et al., 2001; Sorensen, Stoddard, Dubowitz et al., 2007; Van Exel, de Graaf & Brouwer, 2006). However, Noar, Chabot and Zimmerman's (2008) meta-analytic review of tailored health communication found that, although social support is associated with positive effects, this is rarely considered in intervention studies. The role of social context is also differently viewed in the idea of implementation intentions (Sheeran, 2002). Rather than teaching consumers how to effectively deal with barriers within their social interactions, this concept aims to establish new ways to resist or ignore social influences.

The lack of attention to supporting consumers in 'getting things done' within everyday social interactions has been noted in relation to other health-related practices. For instance, Koelen (1988) suggested that smoking cessation programs should teach consumers how to effectively deal with their social context, rather than making them 'resistant' towards potentially negative influence of others. The scant attention paid in the dominant, cognitive perspective on health behavior to the social or cultural circumstances in which attitudes or intentions are formed is widely addressed in literature (cf. Fisher,

2006; Green, 2006). This debate is fueled by the inability of most existing methods to effectively resolve complex public health issues.

An important reason for the relative neglect of the social nature of health-related issues is that the complexity of health-related behavior, the embedding in social life and the multiple strategies used by consumers limit the predictability of intervention impact. This is particularly an issue with respect to fund raising, which is remarkably easier if positive outcomes can be related to the proposed intervention. It should, however, be questioned whether such 'if-then' relations with respect to consumers' everyday practices are realistic.

The co-design of personalized nutrition advice

In this thesis, we proposed an Action Approach to personalized nutrition advice which is similar to the proposal of Rimer and Kreuter (2006), who state that computer technology should be used to allow for the design of tailored interventions in which experts and users integrate their expertise about challenges to health-related behavior. We did not study how societal actors view becoming involved in this type of intervention. Reports on previous participatory initiatives indicate that ascribing an expert role to consumers rather than to 'official experts' such as scientists may block the success of joint efforts (Koelen, Vaandrager & Wagemakers, 2008). Future research could start from our findings and further explore the everyday barriers and opportunities in different settings and among different actors.

The application of an Action Approach in personalized nutrition advice requires further exploration of consumers' understanding in other settings or target groups – for instance among consumers who need special support because they are diagnosed with high cholesterol or obesity and need support in their search for new ways to orientate eating practices towards health. Another suggestion is to focus on youngsters or on consumers with a low socio-economic status. Those groups are often said to ignore or reject healthful eating advice (cf. RVZ, 2002).

Starting from an everyday-life perspective

The everyday-life perspective centralizes the ambitions of consumers themselves. This resembles that of other perspectives in health promotion – for instance, Antonovsky's salutogenic approach, which also assumes health-related practices as resources for living rather than a central goal of life (Antonovsky, 1987, 1996; Koelen & Lindstrom, 2005; Lindstrom & Eriksson, 2006). According to this approach, consumers should be supported in their efforts to secure health benefits, rather than merely to prevent illnesses. Salutogenesis could offer a valuable basis for aligning nutrition advice with consumers' everyday-life requirements.

The community approach also centralizes consumers' own everyday ambitions, rather than efforts to secure physical health. This approach starts from the needs of the community rather than the objectives predefined by health promoters (Goodman, Wandersman, Chinman et al., 1996; Green & Kreuter, 2005; Kreuter, Lezin & Young, 2000).

The attempts to address multiple health-related behavior in one intervention are relatively new (Johnson, Paira, Cummins et al., 2008; Noar et al., 2008; Smeets, Kremers, de Vries et al., 2007). It would be of interest to study this concept from a consumer perspective and explore their understanding of healthful behavior in everyday life, applying advice on challenges that occur when they aim to combine efforts in everyday life.

Nutrigenomics and personalized nutrition advice

The need to incorporate societal perspectives in the personalized nutrition advice development process is generally acknowledged in the field of nutrigenomics (Burke, Khoury, Stwewart et al., 2006; DeBusk, Fogarty, Ordovas et al, 2005; Kaput, Ordovas, Ferguson et al., 2005; McBride, 2005). Studies have collected information about awareness, knowledge and expectations about genetic testing for individual vulnerability to diet-related illnesses both from the public (Sanderson, Wardle, Jarvis et al., 2004; Schmidt, White, Reinhardt-Kapsak et al., 2007) and from other societal actors (Bouwman & Astley, 2006; Jahari, 2008; Whelan, McCarthy & Pufulete, 2007). In addition, social science has studied whether and how the results of genetic test results may influence consumers' motivation for changing eating practices (Frosh, Mello & Lerman, 2005; Segal, Polansky & Sankar, 2007) . Besides this, considerable attention has been paid to social-ethical issues that may arise as a result from the growing access to genetic tests (Castle & Ries, 2007; Foods Ethics Council, 2006).

To gain full insight into societal requirements, however, a pro-active involvement of all actors is needed, but, as our studies show, the common practice of inviting actors to participate in the innovation process may not elicit active participation, despite the shared goal of finding new ways to effectively combat diet-related illnesses. A successful participation process requires critical reflection on participants' actual and desired roles in the development process, the alignment of societal and scientific perspectives on issues such as evidence, involvement of the public and the division of expert roles.

The literature currently emphasizes the improvement of health professionals' knowledge, so as to prepare them for the future use of gene-based nutrition advice in their practices (Harris et al., 2006; Keku &Rakhra, 2003; Vogel, DeBusk & Ryan-Harsman, 2009). Attention should be paid not only to the indication of knowledge gaps however, but also to the barriers that block more pro-active involvement of societal actors in the development process of gene-based nutrition advice. Such an attempt should include actors in other sectors besides health care.

In consumer research on the potential impact of gene-based personalized advice, the strategy of better specifying *why* consumers should eat healthfully, and *what* (not) to eat, should be accompanied by an Action Approach. Up to now, we are aware of only one study that investigates the everyday-life implications of genetic testing (Meulenkamp, Tibben, Mollema et al., 2008). Future studies should not explore whether consumers will change their behavior based on genetic knowledge, but focus on the representation of such knowledge in everyday-life interactions and the challenges and opportunities which occur when consumers use this knowledge in eating practices. Although this research may be problematic because genetic tests are still unavailable to most consumers, we suggest that studies can start by gaining more insight into how related topics, such as family history, or heredity, are represented in everyday-life social interactions. Gradually this type of research can be broadened, keeping up with new opportunities in the innovation process.

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Summary

This thesis presents societal preconditions for personalized nutrition advice that result from an everyday-life perspective on this innovative approach to promote healthful eating. Generally, personalized nutrition advice is regarded as promising, because it provides users with highly specific information on individual health risks and benefits of eating habits and the desirable changes, which may induce a high sense of personal relevance. Rapid developments in interactive computer technology (ICT) and nutrigenomics science are the innovative drivers in this area. Nutrigenomics is an innovative field of nutritional science that studies the interaction between food, genes and health at the molecular level.

Although indicated as promising, up to now the impact of personalized nutrition advice on eating practices has been limited, signaling a mismatch with consumers' everyday life (chapter 1, 2). In this thesis, we study how an everyday-life perspective can be used in personalized nutrition advice. The overall aim is to contribute to the search for new ways to motivate healthful eating on a personal level, as a strategy to combat the growing number of diet-related illnesses.

Healthful eating in everyday-life

The mismatches identified in this thesis concern, firstly, the emphasis in personalized advice on a specification of risk and benefits with respect to long-term physical health. This assumes that consumers have a focal concern on health. Based on our review of the literature on health behavior change and health communication, we conclude that besides health, consumers also hold other ambitions in everyday-life. A second mismatch relates to the provision of recommendations based on studies on the relation between food and health. The literature study shows that decisions and actions regarding food habits are organized in chains and embedded in social practices, and therefore need a lot of discursive action to change them. Based on this insight, we must be skeptical about the possibility to adopt these recommendations easily (chapter 3).

The results of our consumer study confirm these mismatches. In a qualitative study, using discourse analysis, we considered how Dutch consumers themselves make sense of healthful eating and contextual opportunities and barriers in everyday life. We showed how they use three so-called repertoires to confirm the importance of health, while at the same time distancing themselves from health 'freakiness'. The first repertoire associates healthful eating with common knowledge and 'scripted' actions, thereby suggesting that such eating is self-evident. The second repertoire constructs eating for health and pleasure as uncomplicated, by emphasizing consumers' relaxed way of dealing with both. The third repertoire constructs potential damage to health by unhealthful eating practices as easily compensated for. Our findings reflect existing social interactional requirements with respect to the pursuance of healthful eating intentions. In everyday life, consumers have to persist in their intentions to eat healthfully vis-a-vis relevant others. In our study, consumers presented themselves with respect to their food practices as uncomplicated, so as to distance themselves from being perceived as someone who is very rigid about what to buy, prepare or consume. They aim to avoid the image of health freakiness. The finding that being someone who makes a great effort in relation to healthful eating practices is a disfavored image leads us to conclude that, if structural change is to be achieved, this image needs to change. This means that the healthy choice should become a 'practically and socially easy choice' (chapter 4).

An Action Approach towards personalized nutrition advice

Personalized nutrition advice should contribute to this goal by promoting a new standard of thoughtfully considering and discussing the wish to eat healthfully. This thesis proposes the 'Action Approach' which can be used to better match personalized nutrition advice with consumers' everyday life (chapter 5, 6). The basic idea of this approach is that, besides being well-informed and motivated, consumers need to become actively involved in eating for health. By this we mean, that they are able to practically and socially organize their eating practices in order to ensure health benefits. However, if such a goal is to be attained, several social preconditions should be noted:

1. nutrition advice should allow for more flexibility, to better match with consumers' complicated everyday life in which health is not a focal concern, just one of several ambitions, including social ones;
2. at the same time, interventions should stimulate a process of critical reflection on the self-evidence and uncomplicatedness of healthful eating in everyday life;
3. besides advice on practices alongside the food chain, advice should address the inter-linkage with other everyday actions, including discursive ones;
4. because consumers are the experts on these actions and the issues that arise in everyday life, they should be co-designers of personalized advice. If consumers are actively involved, issues and solutions can be exchanged among consumers and experts, and new ways to address the problem of unhealthful eating may be devised;
5. everyday life requires compensatory strategies, so as to balance healthful and unhealthful eating; however, the desirability of consumers' own translation of the balancing concept should be questioned; the messages promoted in nutrition advice may need to be revised to appropriately address this need;

Based on these preconditions, personalized nutrition advice would result from a reflective learning process in which consumers, health promoters and other societal actors in nutrition communication co-design the advice (chapter 9).

Involvement of societal actors in nutrition communication

The second part of this thesis focuses on the role of societal actors in the development process of innovative personalized nutrition advice. Based on our literature study on joint efforts in health promotion and science and technology studies, we conclude that the role of societal actors in enabling and supporting healthful eating practices, and the benefits of joining forces, are evident. The involvement of societal actors in the development process of ICT and gene-based personalized nutrition advice is crucial, so as to allow for the integration, into the scientific agenda, of diversity in expertise and experience on social, ethical and practical requirements. In our qualitative study, using discourse analysis, we found that Dutch actors in health education, health care, health insurance, social science, the food industry and the media were reluctant to engage in the development process of innovative personalized nutrition advice, especially with respect to the use of genetic knowledge. Societal actors have to work in an evidence-based way, and therefore scientific knowledge should support the impact of such advice on health. The uncertainties which exist in early stages of innovation processes block more pro-active involvement. Another requirement is that innovative advice, in their eyes, should be relevant and useful for the public. The study showed that societal actors' expertise on public needs and wants did not provide a reason for more active involvement but was used for a request to slow down, on the part of the public. Everyday working life was

presented as not allowing for much change in roles and responsibilities either; but such change is needed to successfully integrate innovative nutrition advice in the working practices of societal actors (chapter 7).

General practitioners (GPs) are usually regarded as gatekeepers of health. Our qualitative study among GPs from diverse countries revealed that they hold rather critical views on nutrition advice, and certainly also on new strategies regarding gene-based personalized nutrition advice. Nutritional studies were perceived as lacking robustness, not based on patients' needs and often equivocal. Because innovative advice will be embedded in and start from current practices in nutrition advice more generally, this may hinder GP involvement (chapter 8).

A participatory approach towards personalized nutrition advice

The social acceptability of personalized nutrition advice requires a participatory process, in which societal actors treat early involvement as an opportunity to co-shape the innovations and find new solutions to address the problem of unhealthful eating. However, an invitation to join an innovation process does not of necessity elicit pro-active involvement. In order to make this happen, societal actors' expertise and requirements should be acknowledged and acted upon; this involves several social preconditions:

1. uncertainties are inherent in innovation processes, but uncertainty can be used by societal actors to refrain from pro-active involvement in early stages because the proposed innovation mismatches with the current professional evidence-based working standard;
2. critical reflection is required on potential consequences of postponing participation because in a later stage, the development process may lack flexibility to integrate the perspectives of societal actors;
3. this exercise should also aim at finding solutions, so as to overcome the block about involvement and explore the meaning of 'sufficient' evidence from the perspective of different societal actors;
4. reflection is also required on what constitutes 'evidence' in the personalized nutrition advice development process, so as to broaden the view from the current emphasis on scientific food-health knowledge and allow for 'practical' everyday-life evidence as well;
5. everyday-life expertise is held by societal actors in nutrition communication as well as by the public; this requires reflection on who decides what issues and solutions should be addressed in order to provide socially acceptable personalized nutrition advice, keeping in mind the increasing role of the public itself in the design of personalized nutrition advice;

In sum, we conclude that the alignment of PNA with societal preconditions is possible if the development process evolves as a participatory process, in which all societal actors are convinced about the valuable contribution their experience and expertise offers to this search for new ways to effectively promote healthful eating (chapter 9).

Samenvatting

In dit proefschrift is geïndividualiseerd voedingsadvies onderzocht vanuit het perspectief van het leven van alledag. Het doel is bij te dragen aan de zoektocht naar effectieve strategieën om gezond eten te bevorderen. Nieuwe strategieën zijn nodig om een verdere stijging van het aantal mensen met voedingsgerelateerde ziekten tegen te gaan.

In het algemeen wordt geïndividualiseerd advies beschouwd als een veelbelovende methode voor het bevorderen van gezond eten. Dit, omdat het door consumenten wordt ervaren als persoonlijk relevanter in vergelijking met algemeen advies. Snelle ontwikkelingen in de interactieve computertechnologie en het voedingsgenomicsonderzoek maken het naar verwachting mogelijk voedingsadvies op individueel niveau verder te specificeren. De invloed van huidige toepassingen van geïndividualiseerd voedingsadvies op de dagelijkse eetgewoonten van consumenten is beperkt. Dit wijst erop dat het advies onvoldoende aansluit bij het dagelijkse leven van consumenten. Op basis van de studies in dit proefschrift zijn voorwaarden voor sociaal acceptabel geïndividualiseerd voedingsadvies geformuleerd.

Aansluiting bij het alledaagse leven

In dit proefschrift staan twee kwesties centraal.

Ten eerste, in geïndividualiseerd advies wordt de nadruk gelegd op een specificatie van risico's en voordelen voor de fysieke gezondheid op lange termijn, wat een centrale focus op gezondheid bij consumenten veronderstelt. Uit onze studie van de literatuur over gedragsverandering en gezondheidscommunicatie blijkt dat consumenten in het alledaagse leven naast gezondheid, echter ook andere ambities nastreven.

De tweede kwestie betreft de aanbevelingen voor gezond eten die gebaseerd zijn op resultaten van onderzoek naar de relatie tussen voeding en gezondheid. Geïndividualiseerd voedingsadvies veronderstelt dat consumenten deze aanbevelingen toe kunnen passen, losstaand van andere alledaagse bezigheden. Op basis van onze literatuurstudie zijn we sceptisch over de toepasbaarheid van deze aanbevelingen in het dagelijkse leven van consumenten. Eetgewoonten zijn onderdeel van series van dagelijkse acties die voortkomen uit sociale interactie. Deze acties staan niet op zichzelf maar zijn ingebed in andere dagelijkse activiteiten. Verandering van eetgewoonten vereist daarom inzet op praktisch en discursief vlak. Dit laatste is nodig omdat consumenten hun wens om gezond te eten staande moeten houden ten overstaan van andere mensen in hun omgeving.

Consumenten en gezond eten

In kwalitatief onderzoek hebben wij onderzocht hoe Nederlandse consumenten zelf omgaan met gezond eten en met kansen en barrières in het leven van alledag. Uit de discursieve analyse van de interviews blijkt dat drie repertoires gebruikt worden om het belang van gezond eten te bevestigen, terwijl tegelijkertijd afstand wordt genomen van het extreem bezig zijn met de gezondheid.

Het eerste repertoire associeert gezond eten met algemene kennis, waarbij de suggestie wordt gewekt dat deze manier van eten vanzelfsprekend is. Het tweede repertoire construeert eten omwille van de gezondheid en omwille van genieten als ongecompliceerd, door de relaxte manier van omgaan met beide te benadrukken. Het derde repertoire construeert mogelijke schadelijke effecten van ongezond eten als eenvoudig te compenseren. Consumenten lijken het energiebalansconcept, dat in Nederlands voedingsadvies

wordt bevorderd, te hebben opgepakt. Het basisprincipe van dit concept is dat consumenten leren hun calorie-inname en –verbruik in evenwicht te houden ter voorkoming van overgewicht. Dit, door overmatig eten te laten volgen door de consumptie van minder calorieën èn gezond te eten. In ons onderzoek echter, associëren consumenten het concept met losstaande producten of producteigenschappen, zoals versheid. Consumenten positioneren dit als zijnde compensatie voor ongezond eten.

Deze bevindingen weerspiegelen de sociaal interactionele eisen die de dagelijkse praktijk stelt aan gezond eten. Consumenten moeten hun intentie om gezond te eten verantwoorden tegenover andere personen in hun sociale omgeving. In onze studie presenteerden zij zich met betrekking tot hun eetgewoonten als ongecompliceerd, zij gaan er relaxed mee om. Dit om te voorkomen dat zij gezien worden als personen die heel strikt omgaan met het kopen, bereiden en eten van gezond voedsel. De bevinding dat veel investeren in gezond eten een negatief imago heeft, leidt tot de conclusie dat voor een structurele wijziging van eetgewoonten, dit imago moet veranderen. Dit houdt in dat voedingsadvies zich moet richten op het bevorderen van gezond eten als de meest praktische èn sociaal makkelijkste keuze.

De "Acie Aanpak" voor geïndividualiseerd voedingsadvies

De methode van geïndividualiseerd voedingsadvies kan aan dit doel bijdragen door het bevorderen van een nieuwe standaard van actief nadenken en discussiëren over gezond eten. Dit proefschrift introduceert hiervoor de "Actie Aanpak" die gebruikt kan worden om geïndividualiseerd voedingsadvies beter te laten aansluiten bij het alledaagse leven van consumenten. Het basisprincipe van deze aanpak is dat, naast goed geïnformeerd en gemotiveerd zijn, consumenten actief betrokken moeten raken bij gezond eten. Hiermee wordt bedoeld, dat zij in staat zijn gezonde eetgewoonten praktisch en sociaal goed te organiseren. Echter, voor dit doel kan worden nagestreefd, moet eerst aan een aantal sociale voorwaarden worden voldaan.

1. Om beter aan te sluiten bij het gecompliceerde leven van alledag, waarbij consumenten naast gezondheid ook andere ambities nastreven, moeten aanbevelingen voor gezond eten meer flexibiliteit toelaten.
2. Tegelijkertijd moet geïndividualiseerd advies een kritische reflectie stimuleren over de vanzelfsprekendheid en ongecompliceerdheid van gezond eten in het dagelijkse leven.
3. Adviezen dienen niet alleen betrekking te hebben op het kopen, bereiden en consumeren van gezond eten, maar ook op andere dagelijkse activiteiten, inclusief de discursieve.
4. Omdat zij zelf experts zijn op het gebied van alledaagse activiteiten, dienen consumenten meer betrokken te worden bij de vormgeving van geïndividualiseerd advies. Hun actieve betrokkenheid bevordert de uitwisseling van expertise tussen consumenten en professionals die nodig is om te komen tot een nieuwe aanpak tegen ongezond eten.
5. Compensatiestrategieën zijn van belang in het alledaagse leven om gezond en ongezond eten in balans te houden. Echter, er moeten vraagtekens worden gezet bij de manier waarop consumenten het concept van energiebalans vertalen naar de dagelijkse praktijk De boodschap in voedingsadvies dient wellicht te worden aangepast.

Betrokkenheid van maatschappelijke actoren in de voedingscommunicatie

Het tweede deel van dit proefschrift heeft betrekking op de rol van maatschappelijke actoren in het innovatieproces van geïndividualiseerd voedingsadvies waarbij interactieve computertechnologie en voedingsgenomics worden toegepast. Uit onze literatuurstudie op het gebied van gezondheidsbevordering blijkt dat de rol die actoren spelen bij het bevorderen van gezond eten en de voordelen van een bundeling van krachten, evident is. De literatuur over wetenschap en technologie voegt hieraan toe dat een vroege betrokkenheid van actoren bij het innovatieproces noodzakelijk is om hun expertise en ervaring op het gebied van sociale, ethische en praktische voorwaarden in de wetenschappelijke agenda te waarborgen.

Uit onze kwalitatieve studie, waarbij discursieve analyse werd gebruikt, bleek dat Nederlandse actoren in de gezondheidsvoorlichting, gezondheidszorg, ziektekos-tenverzekeringen, sociale wetenschap, de voedingsindustrie en de media terughoudend waren ten opzichte van betrokkenheid bij innovatief geïndividualiseerd voedingsadvies. De onzekerheden die in een vroeg stadium van het innovatieproces bestaan over de invloed van dergelijk advies op de gezondheid, blokkeren een meer actieve betrokkenheid. Dit, omdat actoren in de dagelijkse praktijk hun expertstatus verlenen aan het "bewijsgebaseerd" ("evidence-based") werken, waardoor de beschikbaarheid van voldoende wetenschappelijk bewijs een vereiste is. Een tweede vereiste is dat innovatief advies in hun ogen relevant en bruikbaar moet zijn voor het publiek. De expertise van de maatschappelijke actoren in de studie over de behoeften en wensen van het publiek gaf geen reden tot meer actieve betrokkenheid, maar tot een verzoek het rustig aan te doen, uit naam van het publiek. De alledaagse werkpraktijk laat tevens weinig ruimte voor verandering van rollen en verantwoordelijkheden. Echter, de integratie van innovatief geïndividualiseerd voedingsadvies zal wel degelijk een verandering van de werkpraktijk van actoren vereisen.

Huisartsen worden veelal gezien als de poortwachters van de gezondheid. Uit onze kwalitatieve studie bij huisartsen, werkzaam in diverse landen, blijkt dat zij kritisch staan tegenover voedingsadvies en zeker tegenover innovatief geïndividualiseerd advies dat gebruik maakt van informatie over genen. Voedingsonderzoek werd gezien als weinig robuust, niet gebaseerd op de behoeften van patiënten en vaak voor meerdere interpretaties vatbaar. Omdat de huidige werkpraktijk van voedingsadvies het startpunt zal zijn voor innovatief geïndividualiseerd advies, kan deze perceptie de betrokkenheid van huisartsen in de weg staan.

De sociale acceptatie van geïndividualiseerd voedingsadvies vereist een gezamenlijk ontwikkelingsproces, waarbij maatschappelijke actoren vroege betrokkenheid beschouwen als een kans om mede vorm te geven aan de innovaties, en om nieuwe oplossingen te zoeken die de problemen rondom ongezond eten adresseren. Maar, een uitnodiging om deel te nemen aan een innovatieproces is geen garantie voor actieve betrokkenheid. Hiervoor is het nodig dat de eisen van maatschappelijke actoren worden erkend, en dat er gevolg wordt gegeven aan deze eisen, waarbij de volgende sociale voorwaarden van belang zijn.

1. Onzekerheden zijn inherent aan innovatieprocessen, maar deze onzekerheden hebben tot gevolg dat maatschappelijke actoren terughoudend staan tegenover actieve betrokkenheid in een vroeg stadium omdat de voorgestelde innovatie niet tegemoetkomt aan de huidige standaard van "bewijs-gebaseerd" werken.
2. Kritische reflectie is nodig over de mogelijke consequenties van het uitstellen van betrokkenheid omdat in een later stadium het ontwikkelingsproces onvol-doende flexibiliteit biedt om de perspectieven van maatschappelijke actoren te integreren.

3. Deze exercitie zal ook gericht moeten zijn op het vinden van oplossingen. De betekenis die verschillende actoren geven aan “voldoende bewijs” dient te worden onderzocht om zodoende hun actieve betrokkenheid mogelijk te maken.
4. Reflectie is ook vereist over de betekenis van “bewijs” in het ontwikkelingsproces van geïndividualiseerd voedingsadvies om zodoende de blik te verbreden van de huidige nadruk op wetenschappelijke, biomedische kennis over de relatie tussen voeding en gezondheid naar ‘praktische’ bewijs over de betekenis van voeding in het alledaagse leven.
5. Expertise over het leven van alledag kan worden geleverd door maatschappelijke actoren in de voedingscommunicatie en door het publiek zelf. Reflectie is daarom ook nodig over wie verantwoordelijkheid neemt voor de problemen en oplossingen die in sociaal acceptabel geïndividualiseerd voedingsadvies geadresseerd dienen te worden. Hierbij moet de groeiende rol van het publiek zelf in de vormgeving van geïndividualiseerd voedingsadvies in het achterhoofd worden gehouden

Een verbetering van de aansluiting tussen geïndividualiseerd voedingsadvies en sociale voorwaarden is mogelijk op basis van een participatief proces. In dit proces moeten alle actoren de kans krijgen bij te dragen aan deze zoektocht naar manieren om gezond eten te bevorderen en zij moeten overtuigd zijn van het belang van de integratie van hun expertise in het innovatieproces.

List of Publications

Peer-reviewed journals

Bouwman, L., te Molder, H., & Hiddink, G. (2008). Patients, evidence and genes: an exploration of GPs' perspectives on gene-based personalized nutrition advice. F*amily Practice, 25*(suppl.1), i116-122

Bouwman, L., & Te Molder, H. (2008). About Evidence-Based and Beyond: A discourse-analytic study on stakeholders' talk on involvement in the early development of personalized nutrition. *Health Education Research*. Advance Access published May 21st (doi: 10.1093/her/cyn016).

Bouwman, L., Hiddink, G., Koelen, M., Korthals, M., van't Veer, P., & van Woerkum, C. (2005). Personalized nutrition communication through ICT application: how to overcome the gap between potential effectiveness and reality. *EJCN,* 59(S1), 108-116.

Bouwman, L., & Koelen, M. (2007). Communication on personalized nutrition: individual-environment interaction. *Genes Nutrition, 2* (October)(1), 81-83.

Book chapters

Bouwman, L., & van Woerkum, C. (2009). Placing healthful eating in the everyday context: towards an Action Approach of gene-based personalised nutrition advice. In D. Castle & N. Ries (Eds.), *Nutrition and Genomics; Issues of Ethics, Regulation and Communication* (pp. 123-138). San Diego: Elsevier.

Bouwman, L., Koelen, M., & Hiddink, G. (2008). The Personal factor in nutrition communication. In F. Kok, L. I. Bouwman & F. Desiere (Eds.), *Personalised Nutrition: Principles and Applications* (pp. 169-183). Boca Raton: CRC Press.

Other publications

Bouwman, L (2008) Voedingsgenomics in de diëtistenpraktijk. Nederlands Tijdschrift voor Voeding & Diëtetiek; 63(1).

Bouwman, L., & Astley, S. (2006). *Exploring actors' perspectives about nutrigenomics-based personalized nutrition*: The European Nutrigenomics Organisation; Project no: FP6-506360, Priority 5. available from www.nugo.org.

Curriculum Vitae

Laura Ivonne Bouwman was born on the 5th of August 1971 in te Dutch city of Culemborg. After secondary-school, she attended the higher professional training in nutrition and dietetics at the Haagsche School, where she graduated in 1993. Subsequently, Laura started her study in Human Nutrition at Wageningen University, with a specialization in health communication. After graduation in 1996, she worked at the Product Board for Margarine, Fats and Oils, a non-profit organization which represents all trade and production companies in the Dutch oils and fats chain. Her job entailed the initiation and execution of education and promotion programs on the health aspects of margarines, oils and fats for health professionals and consumers through the Education Office of the organization.

In 2004, Laura started a research project resulting in the studies described in this thesis, at the sub-department of Communication Strategies at Wageningen University. The project aimed at the exploration of societal preconditions for innovative personalized nutrition advice and was positioned at the interface of two research area's: health promotion and innovation research. With regards to the first area, she participated in international training courses on health promotion and Salutogenese. She also joined the Heelsum Collaboration network on nutrition guidance in general practice. This network offered a valuable platform for the exchange of expertise on barriers and opportunities for nutrition advice in general, and personalized advice in particular. The second area concerned the innovative nutritional research of nutrigenomics, which studies the interaction between food, genes and health. Laura therefore joined NuGO, the European Network of Nutrigenomics research. In 2007, she co-edited a book in which both natural and social scientists expressed their views on the principles and applications of innovative personalized nutrition advice.

Completed Training and Supervision Plan

Description	Institute / Department	Year	ECTS*
Courses:			
Mansholt Introduction course	Mansholt Graduate School of Social Sciences (MG3S)	2007	1.5
Scientific Writing	Wageningen Graduate Schools (WGS)	2007	1.5
Seminar Planning: omgaan met de media	Consultancy S Piet	2002	1.5
The Evidence Base of Salutogenic Research-PhD course (Post-Graduate level)	Helsinki Research Centre, IUHPE[1], ETC-PHHP[2]	2008	5
Editor book Personalised Nutrition	CRC-Press, USA	2007	2
Society of Risk Analyses Europe, Annual conference, the Hague	SRA	2007	1
ETC-PHPP International training course, Perugia, Italy: "Strategies for Health in Europe: Rethinking Health Promotion in a Changing Europe".	ETC-PHHP consortium European Master Programme	2005	6
The future Genomics Society	MG3S	2005	4
Various teaching and supervising activities	Teaching of MSc and PhD courses, MSc thesis supervision	2005-2008	4
Presentations at conferences and workshops:			**4**
Mansholt Multidisciplinary seminar: Corsage Wintersymposium: Genomics in Society: from intentions to implementation		2006	1
CSG/CESAgen[3], Fourth International Conference, London		2002	1
Society for Risk Analysis, Building bridges, issues for future risk research, the Hague		2004	1
ISBNPA[4] International Congress, Amsterdam			1
Total (minimum 30 ECTS)			**30.5**

[1] International Union for Health Promotion and Education
[2] European Training Consortium in Public health and Health Promotion
[3] Center for Society & Genomics /CESAgen = a multidisciplinary centre for social sciences -humanities
[4] International Society for Behavioral Nutrition and Physical Activity

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