



SCHOOL OF BUSINESS AND SOCIAL SCIENCES  
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# ARE FRONT-OF-PACK LABELS WORTH THEIR SALT? CONSUMER ACCEPTANCE OF SALT REDUCED FOOD PRODUCTS

PhD dissertation

by

**Trine Mørk**

Aarhus BSS  
Aarhus University  
Department  
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The past three years of achieving difficult things that I had not thought possible have taught me that the only impossible journey is the one that one never begins. I am now at the end of this journey. I have failed, tried again and tried my best while focusing on the three things that matter most in my life: my children, my health and my mission (my PhD).

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Trine Mørk

## Executive summary

Should marketers highlight the reduced salt content at the point of purchase by using a low-salt label to emphasize the health benefit or should they avoid communicating the lower salt content in order not to infer diminished taste experience? The overall goal of the present research is to uncover whether or not consumers accept salt-reduced products and whether consumers will pick the salt-reduced products if they are easily identifiable by means of a purpose-designed FOP salt label. The primary postulation of this dissertation is that despite consumers' reluctance to cut back on dietary salt intake, they do state a high preparedness to purchase salt-reduced products, meaning that the solution to overconsumption of salt may be to alter the supply rather than the demand. The findings from three scientific papers presented in this dissertation support this postulate and provide insight into how stakeholders might collaborate to reduce consumers' dietary salt consumption. The results of this dissertation provide evidence that consumers are pragmatic regarding trying salt-reduced food products, and that for most products, the taste expectation is unaffected by the FOP salt label tested in this dissertation.

First, I find that consumers do not need a formulated salt-reduction goal for them to form an intention to purchase salt-reduced products if available.

Second, I find that when employing an FOP label, it is important to consider the various types of labels and their strengths and weaknesses. If an interpretative endorsement salt reduction FOP label is developed and used on commercial food products, marketers should have the product category (i.e., hedonic vs. utilitarian) in mind as the choice probability between these categories varies.

Third, I find that an FOP label, with a positive wording, as tested in these studies has the potential to shift some of the sale from conventional to salt-reduced products, if consumers are primed.

This research has a variety of theoretical implications adding to the goal implementation, decision-making, trans-theoretical and hedonic/utilitarian literature. In addition, this work has practical implications for policymakers, by the food industry and by the marketing sector. The insights from this dissertation can prove useful when designing public health campaigns and when utilizing consumer trust in authority-issued label schemes for the framing of public health messages, or when deciding how to communicate a product reformulation on an FOP label and to whom.

## Resumé

Bør et reduceret saltindhold fremhæves på emballagen ved hjælp af et saltmærke for at understrege den sundhedsmæssige fordel, eller skal man undlade at kommunikere det lavere saltindhold for at hindre, at forbrugere udleder, at produktet smager af mindre? Det overordnede mål med denne afhandling er at afdække, hvorvidt forbrugere accepterer saltreducerede produkter, og om forbrugerne vil vælge de saltreducerede produkter, hvis de let kan identificere dem ved hjælp af et specielt designet saltmærke på produktet. Den primære påstand i denne afhandling er, at trods forbrugernes uvilje mod at skære ned på indtagelse af salt, indikerer forbrugerne, at de er meget villige til at købe salt-reducerede produkter. Dette kan betyde, at løsningen på overforbrug af salt kan være at ændre udbuddet snarere end efterspørgslen. Resultaterne fra de tre videnskabelige artikler, som præsenteres i denne afhandling, understøtter denne påstand og giver indsigt i, hvordan interessenter kunne samarbejde for at reducere forbrugernes saltindtag. Resultaterne af denne afhandling, er nemlig at forbrugerne er pragmatiske med hensyn til at prøve saltreducerede fødevarerprodukter, og at smagsforventningen for de fleste produkters vedkommende ikke påvirkes af saltmærket, der er testet i denne afhandling.

For det første finder jeg, at forbrugerne ikke har brug for at formulere et saltreduktionsmål for at kunne danne sig en intention om at købe saltreducerede produkter, hvis de er tilgængelige.

For det andet finder jeg, at hvis industrien skal have succes med brug af et saltmærke kræver det, at man er opmærksom på de forskellige typer mærker og deres styrker og svagheder.

Hvis man skulle vælge at udvikle og bruge et saltmærke på kommercielle fødevarerprodukter, bør marketingfolk tage produktkategorien i betragtning (dvs. hedonisk vs. utilitaristisk), da sandsynligheden for, at forbrugerne vælger produkterne, kan afhænge af kategorien.

For det tredje finder jeg, at undersøgelsen af saltmærket antyder, at et sådan mærke med en positiv ordlyd har potentiale til at flytte noget af salget fra de konventionelle produkter til de saltreducerede produkter.

Denne forskning bidrager til litteraturen inden for Goal Implementation, Decision-making, Transtheoretical tilgang og hedonisme/utilitaristisme. Derudover har dette arbejde et praktisk aspekt, idet det kan bruges af offentlige beslutningstagere, af fødevareindustrien og marketingsektoren. Bidraget fra denne afhandling kan vise sig nyttigt, når man udarbejder kampagner på folkesundhedsområdet, træffer beslutninger i professionelle partnerskaber eller når man beslutter sig for strategier i industrien. Her kan man bruge disse indsigter til at udnytte den forbrugertillid til myndighedernes mærkningsordninger, som vi ser i Skandinavien, eller når man beslutter, hvordan og til hvem man skal kommunikere en reformulering på produktet.

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# 1

## Dissertation overview

The World Health Organization recommends a dietary salt intake not higher than 5-6 g/day, while the average intake in fact is 9 – 12 g/day (WHO, 2016). Therefore, the food industry has been urged to reduce the amount of dietary salt in food products. However, it is not clear if marketers should highlight the reduced salt content at the point of purchase by using a low-salt label to emphasize the health benefit or avoid communicating the lower salt content in order so as not to suggest a diminished taste experience. In this PhD, I hope to provide the answers that help stakeholders make the right decision. This work builds on four experiments, conducted online and administered to people in Denmark and Norway, as well as on a field experiment conducted in a Danish supermarket.

In chapter 1 of the dissertation, I introduce the subject and discuss key concepts and theories on which this work is built, and I provide an overview of the empirical work undertaken together with reflections on the research design, methodology and data collection. Chapters 2, 3 and 4 comprise three scientific papers. The last part of the dissertation, chapter 5, consists of a reflection on the major findings in the three papers and the overall contributions to the scientific community and society in general.

## 1.0 Introduction

The Global Burden of Disease Study estimated that within the member states of the EU, a high salt diet was directly accountable for more than 182.000 premature deaths and 2.950.000

disability adjusted life years (DALYs) in 2017 (Stanaway et al., 2018). The causes were mainly associated with cardiovascular diseases, stomach cancer and kidney diseases.

In many high-income countries, more than 70% of dietary salt comes from processed foods such as bread, breakfast cereals, processed meats, snack foods, soups and sauces (Fischer, Vigneault, Huang, Arvaniti, & Roach, 2009; Ni Mhurchu et al., 2011; Rasmussen & Lassen, 2016). Due to the rapid transformation of eating patterns around the globe, whereby the production of processed food has never been more extensive, more available and more affordable, processed foods are forming an increasing amount of people's total diet (Fischer et al., 2009; Ni Mhurchu et al., 2011). This transformation is also happening in the Scandinavian countries (Juil & Hemmingsson, 2015; Solberg, Terragni, & Granheim, 2016).

This shift in consumption patterns prompted the WHO to call for action on salt-reduction strategies (WHO, 2009). Because of increased health orientation in the general population and among public health stakeholders, dietary salt has become a cause for concern among health administrations. The industry has already made considerable efforts to reformulate food products across food categories (i.e. trans fat and sodium) (Kloss, Meyer, Graeve, & Vetter, 2015; Vyth, Steenhuis, Roodenburg, Brug, & Seidell, 2010a), however, industry faces the challenge of meeting consumer preferences for products that are both tasty and have a healthy profile. It is widely accepted that informational campaigns primarily reach consumers who are already health-oriented (Andrews, 2009; Carbone & Zoellner, 2012). Policy interventions to influence the healthfulness of the population's diet often take the form of informational campaigns, and while these are often successful in influencing the population's perception, they rarely manage to change their behaviour (Trivedi, Sridhar, & Kumar, 2016), as intention only accounts for approximately 20–30 % of actual behaviour (Gollwitzer, 1999). Research suggests that the industry can successfully lower the added salt in a wide variety of

products without affecting the purchasing behaviour of consumers (Jaenke, Barzi, McMahon, Webster, & Brimblecombe, 2016).

In the following section, I will try and lay out arguments as to why it is important to work for a decrease in dietary salt intake, by presenting research on the implications for health.

Moreover, I will present a summary of the literature relating to salt-reduction strategies and identify relevant stakeholders.

### 1.1 Salt influences on Health

Excess dietary salt intake is a cause of major concern for The World Health Organisation (WHO, 2016). The World Health Organization (WHO) recommends that dietary salt intake should not exceed 5 grams per day. Despite WHO recommendations, the average intake is approximately 9–12 grams per day in most populations, including in the Scandinavian countries (DTU, 2015; Helsedirektoratet, 2017; WHO, 2016). Excess dietary salt intake has negative health consequences, such as cardiovascular diseases (CVD) (Aburto et al., 2013; Mozaffarian et al., 2014), and these negative health consequences were estimated to result in 1.65 million premature deaths worldwide in 2010 (Mozaffarian et al., 2014). Around the world, many countries have initiated the work of implementing salt-reduction strategies for a healthier population (EUFIC, 2018). In the UK, the level of salt intake (based on urine measurement) fell from 9.5 grams per day in 2003 to 8.1 grams per day in 2011. This decline of 15% has also meant a significant drop in the population's blood pressure and deaths from CVDs (He, Pombo-Rodrigues, & MacGregor, 2014). From a public health perspective, dietary salt reduction is an important and necessary measure to take in order to save lives. Apart from saving lives around the globe, the drop in dietary salt intake that took place in the UK between 2003 and 2011 has also meant savings in the UK health care system of approximately £1.5 billion per year (NICE, 2010).

## 1.2 Salt-Reduction Strategies

In 2015, as many as 75 countries had implemented some form of national salt-reduction strategy (Trieu et al., 2015). These salt-reduction strategies vary across countries, not only in ambition and effectiveness but also in form, with initiatives ranging from individual-level interventions such as dietary consultation, leaflets or medical advice to structural interventions such as policy regulations/pleas, taxes or subsidies and the reformulation of products and different labelling schemes (Trieu et al., 2015). Most countries have not implemented a mandatory reformulation of food products, although this is the most effective tool to cut population salt intake (Van Vliet & Campbell, 2011). This means that the food industry is urged to but not forced to reformulate (Bech-Larsen & Aschemann-Witzel, 2012; Nghiem, Blakely, Cobiac, Pearson, & Wilson, 2015). With this kind of approach, it may take many years to reach the WHO's target of 5 grams per day for individual consumption. Hyseni et al. (2017) found in their systematic review of the literature on salt-reduction strategies that of all the strategies employed worldwide, the up-stream approach (i.e., regulation, mandatory reformulation and nutrition labelling) resulted in the greatest population-wide dietary salt reduction. Nutrition labelling has two core benefits: it can be an effective strategy that can allow consumers to make informed choices, but can also put pressure on the industry to reformulate food products so that its products contain less salt.

## 1.3 Stakeholders in Salt Reduction

To achieve the best result with regard to dietary salt reduction at a population level, many stakeholders need to be involved. A comprehensive multi-component strategy whereby authorities regulate the market for processed foods, demand mandatory reformulation and agree on an effective food labelling system will be the most effective (Hyseni et al., 2017). However, much emphasis has traditionally been placed on the consumer to take responsibility for a healthier diet. This has been attempted through consumer awareness campaigns, with the goal of leading the consumer to create demand for low-salt options (Zandstra, Lion, &

Newson, 2016). However, consumers might not have salt intake as a top-of-mind priority, thus they may not be willing to change their dietary salt habits, but maybe they would be willing to purchase salt reduced products if the industry made them available and easy to identify. The five studies in this dissertation are driven by the desire to understand:

*What are consumers' considerations and barriers with regard to reduced-salt food products and do salt reduction labels move consumers to purchase salt reduced products?*

More specifically, this work intends to investigate how consumers would react to different types of salt labelling and with the overall aim to inform industry and health authorities of the feasibility of a salt specific front-of-pack label.

#### 1.4 Conceptual approach

In what follows, I first introduce the concept of front-of-pack labels and consumer responses to them. Because I have developed new FOP labels for the purpose of this dissertation, I also introduce these labels in the context of an existing typology while introducing some of the factors that can affect a consumer's decision-making process.

##### 1.4.1 Front-of-Pack Labels and Consumer Responses

Many consumers do not use back-of-pack salt information on food labels to select low-salt options (Grimes, Riddell, & Nowson, 2009) and their interpretation of labels depends on health literacy and relies on consumers to actively search for the nutritional information and being both able and willing to interpret the information (Campos, Doxey, & Hammond, 2011). Front-of-pack (FOP) nutrition labelling was developed in order to communicate nutritional information in a simple way (EUFIC, 2018). The communication of nutrition or health messages through front-of-pack nutrition labelling, claims or symbols is widely used (Bech-Larsen & Scholderer, 2007) in many different forms. Claims (e.g., nutrition claims, health claims, sustainability claims or clean label claims, (Grunert, Scholderer, & Rogeaux,

2011), front-of-pack nutrition labelling systems (e.g., a traffic light system, Nutri-score, Health Star or Warning system.), symbols communicating products that are ‘better for you’ (e.g., the choices logo, Keyhole logo or Heart logo, (Mørk, Grunert, Fenger, Juhl, & Tsalis, 2017) or environmental/process logos (e.g., the organic or fair-trade logo, (Grunert, Hieke, & Wills, 2014) are all different ways of communicating about a products’ credence qualities on food packaging. By the end of the day, it is a label’s effect on purchase intention or actual purchase that is the key criterion for a labels success and thus relevance (EUFIC, 2018). Purchase intention differs between various kinds of FOP labelling schemes. Ares et al. (2018) found that the health star rating did not significantly modify consumers’ purchase intention and the Nutri-score and the warning system did not succeed in decreasing the purchase intention for the un-healthiest product (potato chips). Although, the warning system still had a better effect on more products than Nutri-score (Ares et al., 2018).

Research looking into the change in purchase decisions when applying FOP nutrition labels has shown that FOP labels can induce healthier choices in supermarkets, compared to when only back-of-pack nutrition information is available (Elshiewy & Boztug, 2018; Smed, Edenbrandt, & Jansen, 2019). However, the effectiveness of a FOP label differs between product categories, such as whether products are perceived as healthy or unhealthy (Smed et al., 2019), Moreover, prior research has found that FOP labels vary in both what they are communicating, how they are designed and their effect (Ares et al., 2018; Newman, Howlett, & Burton, 2016; Talati et al., 2017). Therefore, it is helpful to look at differences between FOP labels in more detail.

#### 1.4.2 The typology of front-of-pack labels

Because the different FOP nutrition labelling schemes vary in content and design, I have created a typology in order to place the hypothetical labels created for the purpose of this dissertation. I study the effect of both “Reduced Salt Content” and Follows the Food

Administrations Recommended Salt Targets” and have included both of them in the typology. Figure 1 depicts my typology of FOP labels, which builds on other recent categorizations ((Ikonen, Sotgiu, Aydinli, & Verlegh, 2019; Pomeranz, Wilde, Mozaffarian, & Micha, 2019; Talati et al., 2017) and the consumer-based typology derived by (Hodgkins et al., 2012).

FOP nutrition labels can be grouped into two different categories: *reductive labels* and *interpretive labels*. Reductive labels (e.g., GDA and Facts Up Front) are simplifications of the back-of-pack nutritional information, but presented to the consumer on the front of the pack. Reductive labels are regarded by consumers as time-consuming to read and difficult to understand (Talati et al., 2017). Interpretive labels (e.g., traffic light, Keyhole, Heart symbol, warning labels, Nutri-star and health logos) are a FOP *evaluation* of the nutritional information presented on the back-of-pack, meaning that the consumer does not have to interpret detailed information about nutrient content (Newman, Burton, Andrews, Netemeyer, & Kees, 2018). Interpretive labels can be further categorised into two types, depending on whether they deal with a single nutrient or whether they are based on an aggregation across several nutrients (Talati et al., 2017). Interpretative nutrient-specific labels provide an evaluation of one or more specific nutrients, like the Chilean warning system that consists of mandatory warning FOP labels on products that exceed the recommended content of either sugar, salt or fat (Corvalán, Reyes, Garmendia, & Uauy, 2013). Interpretative summary indicator labels are more aggregated and provide an overall summary of a product’s overall healthiness, for example the Finnish Heart symbol, the Scandinavian Keyhole or the Choices Program health logo.

The effect of FOP nutrition and salt labels are unclear (Grimes et al., 2009), and the inconclusiveness on whether or not FOP nutrition labels work as intended might be attributed to consumers’ underlying reasons for choosing a product or their expectations when doing so

(Grimes et al., 2009; Ikonen et al., 2019). In this dissertation we deal with *interpretive nutrient (salt) specific FOP nutrition labels*. We have attempted to place the two labels developed for the purpose of these experiments in a continuum of FOP nutrition labels (see Figure 1).

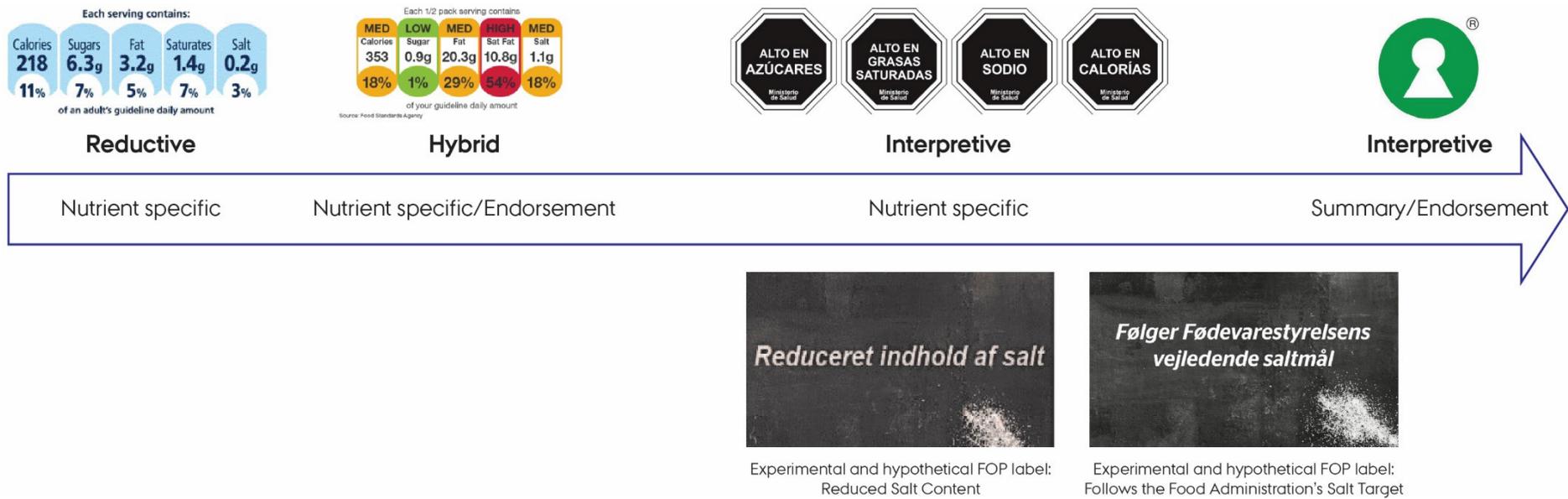


Figure 1: Continuum of reductive and interpretative FOP nutrition labels. The pictures are examples of labels and do not constitute an exhaustive list of formats.

By testing interpretative FOP nutrition salt labels, we address at least three issues. Firstly, these nutrition-specific FOP labels only addresses salt content. This means that the information is simplified and does not imply that the product is healthy or unhealthy but merely that it has a reasonable salt content. To this day, no such FOP label exists worldwide. However, the warning system is a label in the same category. Instead of endorsing a product based on salt content, the warning system warn consumers of a high salt content. An interpretive FOP salt label would make products that are low in salt much more identifiable. Secondly, at present, producers of traditional hedonic products, such as potato chips, cake and confectionery, cannot obtain an interpretative endorsement or summary label because such labels (for example the Keyhole) only can be awarded to products that contribute to a healthy daily diet. With an interpretive FOP salt label, producers would be able to reformulate these products and thus differentiate the product from other hedonic products with a salt content that is above the recommended target. In countries where the warning system is implemented, producers can reformulate products and avoid the warning label. Thirdly, and most importantly we are testing if such a label has an effect on purchase probability.

The wording of the typology represented in figure 1 is in line with the wording in the work by Ikonen et al. (2019); Pomeranz et al. (2019); Talati et al. (2017) however it is in agreement with the typology from Hodgkins et al. (2012), even though the wording is different.

#### 1.4.3 Consumer Behaviour in Food Choices

Consumers are not a homogeneous group of people and therefore they will respond differently to the environment due to differences in relation to interests, preferences and motivations. In this section, I will attempt to outline some of the aspects of consumer behaviour that can have an influence on how a consumer will behave in relation to salt reduced food products.

Historically, Stages of Change (Prochaska & Velicer, 1997) has been used to determine a population or an individual's readiness to change a certain behaviour while documenting that behaviour changes through the different stages described. Most of the research that has been conducted has examined cases such as smoking, drugs, alcohol, obesity, contraception and other life circumstances that if (or if not) changed, have more immediate and/or life-changing effects. However, more recently some research has used Stages of Change as an indication for the readiness of a population for a salt-reduction intervention (Newson et al., 2013), thus ensuring that this readiness is taken into account by authorities, industries and policymakers when making decisions. This readiness is used as a parameter for the likely success of a given intervention and thus also used to determine if and how to design population interventions. Adopting a goal to reduce salt intake will lead to an actual reduction of salt intake only if the abstract goal is linked to more concrete goals about specific behaviours, like to purchase salt-reduced products or to restrict the use of salt during cooking and while eating. To explore the relationship between abstract and concrete goals, we look at Goal Implementation Theory (Gollwitzer, 1999; Gollwitzer & Brandstatter, 1997; Gollwitzer, Heckhausen, & Ratajczak, 1990; Gollwitzer & Moskowitz, 1996; Gollwitzer & Oettingen, 1998). According to Goal Implementation Theory, the attainment of abstract goals is facilitated by the formulation of implementation intentions, which specify what a person will do when encountering a specific situation, like choosing a salt-reduced product whenever such an alternative is available. Previous research suggests that implementation intentions can activate action when the

situation for which the implementation intention is formulated is encountered. In this way, a consciously formed goal intention can be turned into automatic elicitation of behaviour, which in turn increases the likelihood of goal intention (Sheeran, Webb, & Gollwitzer, 2005). This evidence suggests that goal intentions without implementation intentions will not lead to behavioural change, but also that goal intentions are a prerequisite for the formulation of implementation intentions and their subsequent role in activating behaviour.

Up to 82 % of consumers' purchase decisions are made inside the supermarket ("Point of Purchase Advertising International," 2014). FOP nutrition labels struggle to attract consumers' attention partly because the visual environment acts as a barrier (Orquin, Bagger, Lahm, Grunert, & Scholderer, 2019). As shown in chapter 3 in this dissertation, when attempting to prompt consumers to make healthier choices, it is a prerequisite for success that there is extensive presence of healthier identifiable options while the consumer also knows about the relationship between health and diet. Finally, the consumer must be motivated to make healthier choices (Grunert, 2018). For many years, much effort has globally been devoted to the work of educating consumers in making healthier dietary choices (EUFIC, 2018) by the use of increasing knowledge, regulations, policy changes and interventions. However, despite the increasing global interest in FOP labels (Kanter, Vanderlee, & Vandevijvere, 2018) and an increasing willingness from industry to reformulate food products (Buttriss, 2012; Webster, Trieu, Dunford, & Hawkes, 2014), consumers' diets remain high in salt (WHO, 2016a). Kahneman (2011) has with his most famous work on irrational decision processes provided us with a good explanation for the discrepancy between being motivated and knowledgeable about a specific area and then not making a decision in line with that. Kahneman (2011) refers to the two different modes of thinking as System 1 and System 2. System 1 operates automatically and quickly, with little or no effort and no sense of voluntary control, while System 2 gives attention to the mental activities that demand it. System 2 is often associated with the subjective experience of agency, choice and

concentration (Kahneman 2011). When we think of ourselves, we like to think that we are operating on System 2 that we are rational thinkers and the “paragons of reason” however; humans are wired to prefer the use of System 1, because it is the system that requires the least effort. Therefore, even if people are knowledgeable and motivated to perform a specific behaviour, they might not manage to do so, if the mental surplus has been directed at other tasks in the day such as getting up in the morning, going to work, solving demanding tasks, learning new things. This means that System 1 will be in charge when the mental surplus is low and decisions are made automatically and with little or no conscious reasoning.

Therefore, when designing labels and FOP labels we should keep in mind that most people do their grocery shopping late in the afternoon when they have already depleted their mental surplus thus putting System 1 in charge of decisions.

As shown later in this dissertation (chapter 2), consumers differ in their inclination for choosing utilitarian or hedonic salt reduced products for consumption. Kahn, Dahr, and Wertenbroch (2004) distinguished hedonic from utilitarian products by describing hedonic products as characterised by being fun, enjoyable and pleasurable, while utilitarian products are characterised by being functional, practical and plain. With regard to food, consumers’ orientation/preferences towards either primarily hedonic or utilitarian products might have an effect on their dietary choices and long-term health outcomes. For example, hedonic oriented consumers may be less willing to choose an apple than a chocolate bar, which they consider to be tastier, but also less willing to choose a product with reduced salt because they regard salt to be synonymous with good taste (Batra & Ahtola, 1991; Kahn et al., 2004).

Conversely, utilitarian oriented consumers may be more inclined to choose an apple and a product with less salt, as their choice is mainly driven by functionality in terms of fullness and healthiness of foods. Having a preference for certain kinds of foods such as a hedonic preference can make it extremely difficult to make choices that differ from the consumer’s preferences, even if the consumer knows that they should avoid sugary or savory processed

foods. This is in part because the act of shopping for food products is mostly habit-based. Habit-based everyday decisions are made by the use of System 1 and are automatic, fast and often with little or no voluntary control (Kahneman, 2011). If consumers were to employ System 2 for the decision-making in a comparative environment such as a supermarket, it would require vast amounts of mental capacity and efforts (Kahneman, 2011). This is why consumers make use of heuristics for these everyday low involvement decisions (Bettman, Luce, & Payne, 1998; Gigerenzer & Gaissmaier, 2011). A heuristic is a strategy that ignores part of the available information, with the goal of making decisions more quickly, frugally, and/or accurately than methods that are more complex (Gigerenzer & Gaissmaier 2011). In a food domain it could be “recognition” heuristic which is when the consumer searches and stops/chooses when the consumer recognizes a product/brand. Alternatively, it could be “take the best” heuristic, which is when a consumer searches for cues that discriminates between the alternatives. These heuristics are subjective in nature.

Because many FOP labels go unnoticed, marketers can make use of goal priming in order to increase the likelihood of FOP labels being noticed. Goal priming is about activating a latent goal so it will result in goal-related behaviour (Minton, Cornwell, & Kahle, 2017). Goal priming has become more and more prevalent as a nudging strategy. This follows the acknowledgement of the fact that good intentions rarely lead to behavioural change (Gollwitzer, 1999) and that for most parts, behaviour does not begin with a conscious decision (Dijksterhuis, Chartrand, & Aarts, 2007). Papies (2016) refers to a series of studies where different kinds of health primes were applied in experimental studies resulting in more frequent healthy decisions both in a grocery-shopping situation and in a restaurant setting. Because salt is a hidden problem, which is not easily detected in many everyday food products, a specific salt label, would make products with less salt easier to identify and by adding a health prime choosing a salt reduced product might feel as a relevant choice for some consumers. In this

dissertation, we are testing a hypothetical salt label, not yet implemented. This means that for all participants that it will be the first time they ever see the label. The goal priming we use in these studies are health primes, and whether this prime will activate participant's latent goal of a healthier lifestyle, reflected by salt reduced choices, has yet to be investigated.

### 1.5 Research question

Against this background, the present PhD dissertation focuses on understanding consumer's acceptance of salt reduced food products, when presented with different kinds of front-of-pack labelling. The dissertation seeks to identify the underlying psychological reasons for choosing/not choosing a salt reduced product and to suggest an alternative FOP label. To this end, the following research questions will be addressed:

***RQ1:** Does consumers' intention to reduce dietary salt intake predict willingness to purchase food products with reduced salt?*

***RQ2:** Does a FOP salt label and priming of the salt-reduction goal have an effect on consumers' choice of reduced salt products in both hedonic and utilitarian categories?*

***RQ3:** How do different wordings of salt labels affect consumers' choice of products?*

***RQ4:** Does the choice of salt-reduced products influence consumers' level of guilt and taste expectations?*

## 1.6 Methodological approach

This section presents the methodological approach taken in this dissertation and provides details regarding the research designs of the empirical studies.

### 1.6.1 Research Approach

Consumer acceptance of reduced-salt food products has largely been studied in a laboratory setting by measuring consumers' preference for specific products with different levels of added salt. These studies have demonstrated that many different products can be reformulated to contain less salt without consumers rejecting the product based on their sensory characteristics (Jaenke et al., 2016).

However, products are not purchased on a plastic plate in a laboratory, under circumstances in which the consumer is 100% attentive to the specific product. Products are purchased in a supermarket, with hundreds of distractions that originate from the environment, such as sounds, time constraints, lights, pricing, labels, brands, layout, placing and many others. Therefore, in this dissertation, I build upon the established knowledge regarding the general acceptance of lower salt levels in a wide variety of processed foods and proceed to study consumer acceptance and purchase decision-making for products with reduced salt

In this dissertation, I have applied quantitative research methods. See table 1 for an overview of studies, papers and research design.

Table 1: Overview of Studies, Papers and Research Design

Paper	Chapter	Study	Research Questions	Data/Participants	Experimental Treatment and Design	Main Dependent Variables
A	2	1	Does consumers' intention to reduce dietary salt intake predict willingness to purchase food products with reduced salt?	Web survey in Denmark (N=1030).	A web-based questionnaire distributed to a representative (age and gender) sample from Denmark.	Willingness to purchase reduced-salt products,  Intention to change dietary salt habits.
B	3	2	Does information in form of FOP labels and priming of the salt-reduction goal have an effect on consumers' choice of reduced-salt products in both the hedonic and utilitarian categories?	Web survey in Denmark and Norway  (DK N=1074 – NO N=1025).	Between-subjects design. Four experimental groups: Control group, Priming group, Label group and Label/Priming group. Approximately 250 respondents from each country were assigned to each group.	Hedonic reduced-salt product choice, Utilitarian reduced-salt product choice.
C	4	1/3/4	How do different salt labels affect consumers' selection of products?  What is the probability that consumers will choose reduced-salt food products when products are labelled and respondents are primed?  Does labelling of reduced-salt products affect consumers' level of guilt and taste expectations?	Choice experiment in Web survey in Denmark (N=1030).  In-store study (N=190)  Web survey in Denmark (N=759)	Within-subjects design (N=1030).  Between-subjects design. Four experimental groups: Control group, Priming group, Label group and Label/Priming group.  Between-subjects design. Respondents were assigned to one of three groups: Control, Reduced label and DFA-endorsment label.	Probability of reduced-salt product choice with one or the other label.  Hedonic reduced-salt product choice.  Utilitarian reduced-salt product choice.  Levels of guilt, etc.

For the quantitative controlled web experiments, we provide a methodology to evaluate an idea in a reliable manner by testing for causal relationships. By conducting a controlled web experiment, we are able to discover changes in acceptance of products with/without our treatments (labels/priming). In the experiments, respondents are assigned randomly to one of the groups available in the experiment. When the experiments are strictly designed and respondents assigned randomly, the only thing that varies across all respondents are whether they received a treatment. This means that any difference in response between control group and treatment group is the result of the treatment, establishing causality (Weiss & Weiss, 1998).

For the quantitative fieldwork in the in-store experiment, the main strength lies in its external validity because the data collected is as close as one can get to real life behaviour, while it is still controlled due to our between subjects experimental design with four groups. Another strength is that they (field experiments) may generate conclusions and solutions for stakeholders, in this case retailers, authorities and industry that are more easily applicable.

### 1.6.2 Research Design of Empirical Studies

The three papers described in this dissertation are based on four empirical studies. All of the aforementioned empirical studies used quantitative methods. An overview of the empirical studies and methods is provided in Table 1 and are explained further in this section.

For all the three empirical web studies participants were recruited through an online panel provider, Userneeds, which is registered under the General Data Protection Regulation (GDPR). Informed consent was provided by all participants. They received a minor standard reward for their time and effort.

The *first empirical study (Chapter 2 and 4)* was a web survey of 1,030 respondents and was conducted during summer 2016. The first part of the survey, was a discrete choice experiment. This discrete choice experiment is reported as *the first study in paper three* (Chapter 4). The second part of the study was a web-based survey questionnaire and these results are reported in paper one (Chapter 2). The aim of the first part of the study was to study the effect of two different versions of salt-content labels on consumer choice. The aim of the second part of the survey was to determine how consumers' knowledge and motivation influence their willingness to purchase food products with Reduced Salt Content and their intention to change dietary salt intake.

The *second empirical study (Chapter 3)* is reported in paper two. The study was a web-based experiment with a between-subjects design. The study was implemented as an online survey administered in May 2018 to a representative sample (in terms of age, gender and education) of Danish and Norwegian citizens. Respondents were assigned to one of four experimental groups: the Control group, the Priming group, the Label group and the Label/Priming group. Approximately 250 respondents from each country were assigned to each group. The aim of the study was to investigate the effect of information in the form of

FOP labels and the priming of the salt-reduction goal on the participants' choice of reduced-salt products in both the hedonic and utilitarian categories.

The *third empirical study (Chapter 4)* is reported as study two in paper three and took the form of an in-store field experiment. Questionnaire data, scanner data and respondents' grocery shopping data were collected in this study. The purpose of this study was to validate the results from study one and two, to investigate whether respondents in a real-life situation would act as they had claimed in the intention measures and choice tasks in the questionnaire and to explore through scanner data if how consumers react to the DFA-endorsement label when they are not part of an experiment or have been primed. The overall aim of this study was to determine how DFA-endorsement label and salt priming affect decision-making in a real-life store.

The *fourth empirical study (Chapter 4)* also employed quantitative methods, the results of which are reported as the third study in paper three. The study was implemented as an online study in Denmark in February 2019 to a representative sample (in terms of age, gender and education) of Danish citizens. The study was a web-based experiment with a between-subjects design. The participants assigned to the control group saw no labels on the products and had no priming. The participants assigned to either the DFA-endorsement label group or the Salt Reduced Content label saw half of the choices with the label and half of the products was without labels. Participants were primed with salt/health messages. In this study, we explored why we found a difference in choice between the two labels, DFA-endorsement label and the Reduced Salt Content label. The difference in choice was found in the online choice experiment (first empirical study), in which a significantly higher proportion of participants selected the products that were labelled with the DFA-endorsement label. We also explore whether priming with health messages can make increase the number of choices in the utilitarian category as well as whether health priming affects the performance of the

‘Reduced Salt Content’ label. In addition, we explore whether guilt and taste expectation can explain some of the variances that we observed between the hedonic and utilitarian group.

### 1.6.3 Overview of papers in the dissertation and how they build on another

The aim of **paper 1** was to determine how consumers’ knowledge and motivation influence their intentions to purchase food products with reduced salt content. We find high willingness to purchase salt-reduced products even when people do not have an intention to change their dietary salt intake. This suggests focusing on consumers’ willingness to purchase, and not on their intention to change, when trying to promote the sales of salt-reduced products.

Therefore, in **paper 2**, we investigate the effect of a FOP salt label and the priming of the salt-reduction goal on the participants’ stated choice of salt-reduced products in both the hedonic and utilitarian categories. We found that health priming with salt-related messages does not have an effect on its own. However, a FOP salt label in combination with priming by health information increased stated choice of salt reduced products in the hedonic category in both Denmark and Norway. Moreover, we found that the FOP salt label, even without priming, increased choice for the utilitarian category in both countries. Based on the insights from the previous papers the aim of **paper 3**, was to compare the effectiveness of two different wordings of a salt label in a choice experiment, test the most successful label in a real-life store, both with and without priming of the health goal. We did this to see if label and priming could increase actual choices in both hedonic and utilitarian categories. Finally, we try to explain the process by which the label increases willingness to purchase by means of a choice task in a web survey. In the choice experiment, we found that a label ‘Complies with the Food Administration’s Recommendations on Maximum Salt Content’ can increase choice of salt reduced products under certain conditions and “Reduced Salt Content” decreased choice. In the in-store experiment, we found a significant effect of our experimental conditions for the label/priming group in the hedonic category. The differences

between the other groups were not significant. In the choice task in the last study, we found that choice probability for salt-reduced products increases significantly when there is FOP salt-content labelling and respondents are primed on cake and cheese products. The salt-reduced label induced more guilt in respondents than the DFA-endorsed label. Such increased guilt does not result in more healthy choices. We find no difference in taste expectations among the three manipulation groups, except for rye bread.

#### 1.6.4 Protecting Human Research Participants

In all research, ethical practice should be assured at every step of the process. As the principal investigator, I made every effort to comply with the highest standards of ethical conduct in research. To ensure the highest ethical standards, I completed two ethics courses: ‘Protecting Human Research Participants’ at the National Institutes of Health (NIH) and the ‘Introduction to Responsible Research Conduct’ course at Aarhus University. These courses guided me when recruiting participants for my in-store experiment and thus, all participants (1) were briefed, verbally and on paper, regarding their rights and the scope of the study; (2) gave written informed consent; (3) were provided assurances regarding the protection of their data and privacy; (4) had their data anonymized as soon as it had been coded in Qualtrics, while paper copies of the data and personal information were secured in a locked facility at Aarhus University; and (5) received monetary compensation for their time and effort.

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# 2

## Determinants of intention to reduce salt intake and willingness to purchase salt-reduced food products: Evidence from a web survey

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**Trine Mørk,  
Liisa Lähteenmäki &  
Klaus G. Grunert**

*Aarhus University*

### **Abstract**

To study consumers' intention to reduce their dietary salt intake and willingness to purchase salt-reduced food products, as well as the determinants of these, this research relies on data collected through a web survey of 1030 participants in Denmark. The majority of respondents (66.8%) express no intentions to change their dietary salt intake, but 12.6% indicate such intentions, and 20.6% claim to have already implemented a change. Willingness to purchase salt-reduced food products is high but varies across product categories, ranging from 52% for olives to 72% for meat spreads. Personal and social norms reveal the strongest influences on intention to change dietary habits, whereas personal norms, knowledge, and awareness of health consequences exert the strongest influences on willingness to purchase salt-reduced food products. These results suggest that most consumers are willing to purchase salt-reduced food products, even without having a salt reduction goal. These results are relevant for stakeholders and policy makers, as evidence of how consumers respond to salt-reduced food products and their intention to lower their dietary salt intake.

### **Keywords**

Salt intake, food products, willingness to purchase, intention to change, consumer acceptance

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## 2.0 Introduction

Elevated dietary salt levels increase people's risk of high blood pressure and hypertension, as well as cardiovascular disease (Aburto et al., 2013). The World Health Organization (2012) recommends that dietary salt intakes should be no more than 6 grams per day, yet average intake rates are 9–12 grams daily, mainly coming from processed food products (Fischer, Vigneault, Huang, Arvaniti, & Roach, 2009b; Ni Mhurchu et al., 2011a; Rasmussen & Lassen, 2016b).

Furthermore, despite consumers' extensive knowledge about the link between salt and health, consumers do not use salt information on food labels to pick low salt options (Grimes et al., 2009). Informational health campaigns mainly reach consumers who are already health oriented (Andrews, Netemeyer, & Burton, 2009; Carbone & Zoellner, 2012), and they rarely succeed in changing consumption behavior (Trivedi et al., 2016). That is, even when people know about and have good intentions to lead a healthy life; their actual behaviors might not reflect their intentions. According to Gollwitzer (1999b), intentions account for approximately 20%–30% of the variance in actual behaviors. To limit dietary salt intake, multiple stakeholders thus must share the responsibility jointly.

The food industry has made considerable progress in providing low-salt options (Kloss et al., 2015; Vyth et al., 2010a). However, to have a meaningful effect, salt-reduced food products would need to prompt adoption among consumers (Prochaska & Velicer, 1997). Newson et al. (2013) note that one-third of their study participants, from five countries, were not interested in reducing their dietary salt intake. Thus, marketers also must develop communication strategies to promote products with lower salt content. The question is, should they highlight the reduced salt content at the point of purchase by using a low-salt label to emphasize the health benefit or avoid communicating the lower salt content in order not to infer diminished taste experience?

Prior research into salt labels indicates their very small, negative effects on acceptance of reformulated food products (VÁZquez, Curia, & Hough, 2009), though these effects may be product or context specific and difficult to generalize across product categories and countries.

The objective of this study is to identify consumers' intention to change their dietary salt intake and the determinants of their willingness to purchase salt-reduced processed food products. We identify potential determinants of both and investigate their relationship using data from a web survey. We start by outlining the theoretical framework and hypotheses before detailing our study methodology. After presenting the results, we outline their implications for understanding food related behavior in relation to salt-reduced food products.

### 2.1 Theoretical approach and hypotheses development

The Transtheoretical Approach with the Stages of Change model has been widely used in defining how ready individuals are to make a change in their behavior (Prochaska & Velicer, 1997). This model contains six stages: pre-contemplation (no intention of changing behavior), contemplation (aware of the problem but with no intention to change), preparation (intention to take action to address the problem), action (active change of behavior), maintenance (new behavior replaces old behavior), and relapse (fall back into old behavior). This model was developed to analyze smokers' intention to quit, then extended to other risky behaviors, and more recently, it also has served to measure a population's readiness to change dietary habits, such as reducing salt intake. This theoretical framework can be used to identify the population's interest in making a change, before it is possible to establish an appropriate intervention (Prochaska & Velicer, 1997).

The adoption of a goal to reduce salt intake will reduce salt intake in reality only if the abstract goal is linked to more concrete goals for specific behaviors, such as purchasing salt-reduced products or restricting the use of salt in cooking. To explore the relationship of these abstract and concrete goals, we employed the goal implementation theory (Gollwitzer, 1999b; Gollwitzer & Brandstatter, 1997;

Gollwitzer, Heckhausen, & Ratajczak, 1990; Gollwitzer & Moskowitz, 1996a). This theory argues that the attainment of abstract goals is facilitated by the formulation of implementation intentions, which specify what a person will do in any a specific situation, like choosing a salt-reduced product if such an alternative is available.

Implementation intentions can activate action if the situation for which they have been formulated occurs, which increases the likelihood of goal attainment (Sheeran, Webb, & Gollwitzer, 2005). Goal intentions without implementation intentions might not lead to behavioral change, but goal intentions remain a prerequisite for the formulation of implementation intentions, which in turn can activate behavior.

**H1.** There is a positive relationship between intention to change dietary intake of salt and willingness to purchase salt-reduced food products.

We also take a socio-cognitive view of the cognitive and social processes that might affect consumers' intention to change their dietary salt intake and willingness to purchase salt-reduced food products. The potential determinants span multiple categories: personal norms, social norms, general health interest, awareness of consequences, knowledge, perceived behavioral control, and salt habits. In particular, *personal norms* represent self-expectations of a certain action or behavior, and imply a more internalized, mature reasoning process, such that the person considers the context for applying personal norms and the possible outcome of the behavior (Thøgersen, 2006). For example, strong personal norms for buying organic products increases the likelihood of changing purchasing patterns in favor of organic products (Thøgersen, 2006). In our case, personal norms can refer to purchasing salt-reduced food products or actively reducing dietary salt intake. In addition, *social norms* refer to accepted standards of behavior in specific situations (Dubois, 2003). A person's willingness to purchase salt-reduced food products might increase if he or she believes important peers expect such purchases (Vabø & Hansen, 2016). However, social norms and the resulting group pressure might be less relevant in this case than for more visible or socially unacceptable behaviors, such as smoking.

**H2.** Strong personal and social norms for reducing dietary salt intake increase willingness to purchase salt-reduced food products and intention to change dietary salt habits.

Very *health oriented* consumers are already likely to purchase healthy food products (Andrews et al., 2009; Olsen, Menichelli, Sørheim, & Næs, 2012). In addition, consumers with more *knowledge* about dietary salt may be more inclined to purchase salt-reduced food products and more ready to change their dietary salt intake (Andrews et al., 2009), because of the motivational effect of that knowledge, as well as its ability to facilitate their information processing of the salt-related label information.

**H3.** Consumers who are more health oriented and have more knowledge about dietary salt are more willing to purchase salt-reduced food products and have a higher intention to change their dietary salt intake.

We also distinguish hedonic from utilitarian products (Uzma Kahn, Ravi Dahr, & Klaus Wertenbroch, 2004). A hedonic food product is fun, enjoyable, and pleasurable; a utilitarian food product is functional, practical, and plain. When purchasing hedonic products, consumers may be less willing to choose a product with less salt if they expect diminished taste, because they purchase hedonic products for their immediate pleasure (Batra & Ahtola, 1991; Uzma Kahn et al., 2004). For utilitarian products though, consumers may be more inclined to choose a product with less salt, if their purchase decision is dominated by health reasons more long-term goal. Notably, Verbeke (2006) reveals that consumers are not willing to accept poorer taste in exchange for a healthier product, and Uzma Kahn et al. (2004) finds that consumers typically choose taste over health, even when they shop with health as a motive. This relationship also might be moderated by the product's predominant characterization as hedonic or utilitarian.

**H4:** Consumers are more willing to purchase salt-reduced food products from

utilitarian than from hedonic categories.

A large study by Newson et al. (2013) found that awareness of consequences of excess dietary salt intake was an important predictor for a positive attitude towards salt reduction. In another study (Grimes et al., 2009), participants that were aware of the risk of stroke, kidney disease and high blood pressure with a high salt intake were more likely to report reading the salt content on food labels than those participants that were not aware of the risk. These participants reported to previously have purchased salt reduced products, which could possibly be a proxy for having good (better) dietary salt habits. (Grimes et al., 2009).

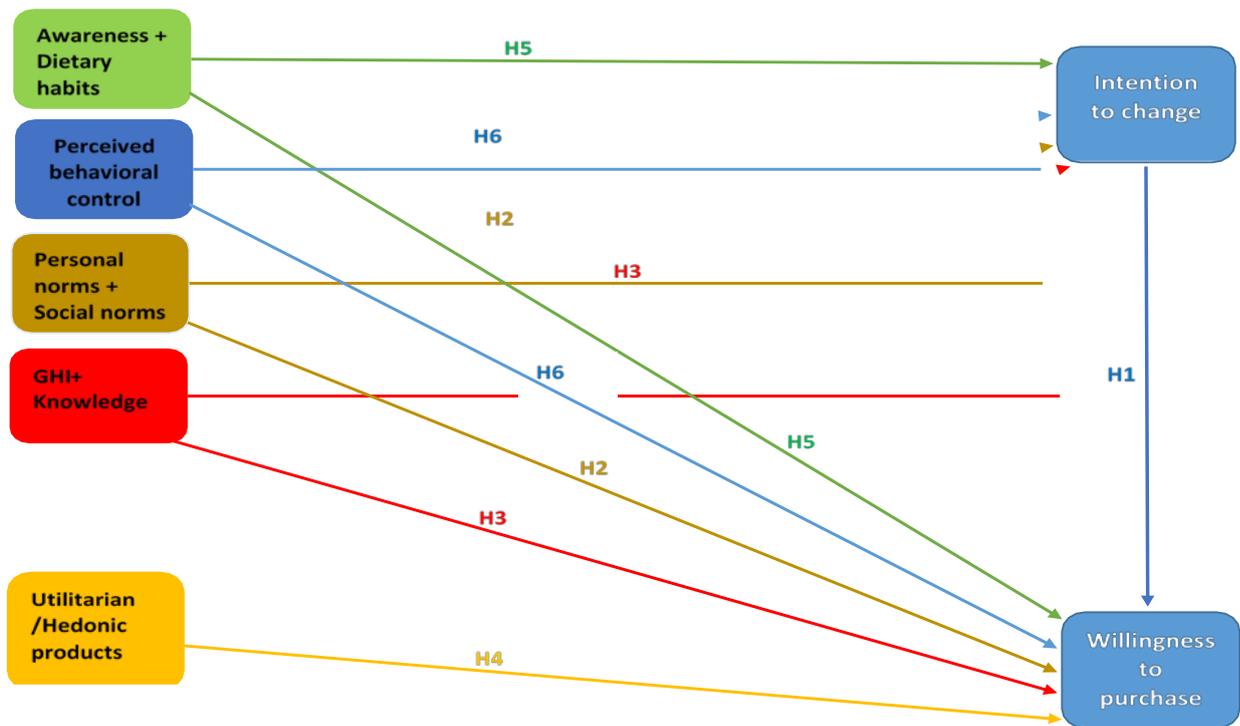
**H5:** Awareness of health consequences of dietary salt intake and good dietary salt habits increase people's willingness to purchase salt-reduced food products and their intentions to change their dietary salt habits.

Intentions to perform various behaviors relate to perceived behavioral control (Ajzen, 1985; Ajzen, Joyce, Sheikh, & Cote, 2011). Ajzen et al. (2011) show that, for both environmental and alcohol consumption behaviors, perceived behavioral control offers a better predictor than knowledge. However, this better prediction might be explained by the way knowledge is often measured, as general knowledge. When knowledge items is measured largely as factual, having no clear implications for respondents behavior, the knowledge will be unlikely to correspond to the behavioral, normative, or control beliefs that actually guide people's behavior (Ajzen et al., 2011).

**H6:** Higher perceived behavioral control leads to higher willingness to purchase salt-reduced food products and intentions to change dietary salt habits.

In Figure 1, we provide an overview of the hypotheses.

**Figure 1: Determinants of intention to change salt intake and willingness to purchase salt-reduced products**



## 2.2 Method

### Sample and data collection

A web-based questionnaire was administered in June 2016 to a representative (age and gender) sample of Danish citizens. After deleting respondents who took insufficient (less than 5 minutes) or too much (more than one hour) time to complete the survey, the mean time for completing the survey was 16 minutes. Prompting tactics helped avoid incomplete answers, reducing missing data to a minimum. Participants were recruited through an online panel provider (Userneeds) that is registered with the Data Protection Act, and all of them provided informed consent. They received a minor, standard reimbursement for their time and effort. In total, 1030 participants entered the data analysis, as detailed in Table 1. The gender distribution was almost equal with 51,7 % being female and 48,3 % being male. 60,9 % reported that they

were either married or co-habituating and 39,1 % reported that they were single. 68,7 % of the sample had no children while 26,7 % had 1 or 2 and 4,6 % had more than two children. Self-reported diagnoses of diseases that could influence dietary pattern was distributed with 67,7 % on zero diseases, 21,4 % with one disease and 7,5 % who had 2 or more diseases. Highest level of education was recorded with three possible answers. Primary school 28 %, secondary school and vocational training 40,3 % and higher education 30,2 %. The sample was distributed evenly between the different age groups from 18 to 77 years of age. The sample is similar to the Danish official national mean on gender, education and age.

**Table 1: Demographic composition of sample (n = 1030)**

Gender	%
Female	51.7
Male	48.3
Marital status	
Married/Co-habituating	60.9
Single	39.1
Children	
0 children	68.7
1-2 children	26.7
>2 children	4.6
Education	
Primary school	28.0
Secondary school/vocational training	40.3
Higher education	30.2
Age	
18-27	15.5
28-37	15.4
38-47	24.5
48-57	24.0
58-77	20.6

### 2.2.1 Questionnaire and measures

The questionnaire consisted of measures of the Stages of Change model as it applies to salt reduction, daily salt usage, knowledge of salt recommendations, sources of salt intake,

general health interest, social and personal norms about dietary salt, perceived behavioral control, knowledge of salt content in food products, and willingness to purchase salt-reduced food products.

We measured intention to change dietary salt intake with adapted versions of six items from Newson et al. (2013): “I am not at all interested in lowering salt in my diet and I have no intention of doing so in the next 6 months,” “I am interested in lowering salt in my diet and I have the intention of doing that within the next 6 months,” “I am interested in lowering salt in my diet and I have the intention of doing that in the next month,” “I am interested in lowering salt in my diet and I have started lowering my salt intake during the last 6 months,” and “I am interested in lowering salt in my diet and I have already lowered my salt intake for longer than 6 months.” Then for the analysis, we reduced the six items to two categories: no intention or intention to lower salt in the diet.

To measure willingness to purchase salt-reduced food products, we chose 17 food items and asked participants to indicate (yes/no), “Would you be willing to purchase the following products if they were salt reduced?” The products were biscuits, ready meals, butter, deli products, white bread, cheese, canned fish, sauces (bullion/soya, barbecue oils), olives, sausages, tomato sauce, rye bread, cornflakes, crisps, meat spread, bacon, and cake. One point was assigned for each product the participant was willing to purchase, so each respondent could obtain a maximum of 17 points and a minimum of 0 points. We then grouped respondents into two categories: scores of 0–3, indicating low willingness, and scores of 4–17, indicating high willingness. The classification into two categories was based on the reasoning that people not willing to purchase salt-reduced products generally may have 1-2 exceptions, for example because they think that salt-reduced crisps have a better taste. The two groups are thus created to divide respondents into those generally not willing to purchase salt-reduced products and those who do.

These 17 products also were classified as hedonic or utilitarian, according to a pretest with 43 participants who classified them as hedonic (yes/no) or utilitarian (yes/no). We used the majority scores to classify products as hedonic or utilitarian. For example, rye bread was classified as utilitarian by 88% of the respondents and hedonic by the rest, so we consider it a utilitarian product. Cake, scored as hedonic by all but one respondent, was classified as a hedonic product. Cheese was less clear, with 65% of respondents classifying it as utilitarian and 35% as hedonic, but we still classified it as a utilitarian product, reflecting the majority perception.

We operationalized social norms with seven items from Cialdini, Kallgren, and Reno (1991): “Other people like me better if I reduce my dietary salt intake,” “Many people reduce their dietary salt intake,” “It makes a good impression on other people to reduce one’s dietary salt intake,” “Many people I know reduce their dietary salt intake,” “To reduce one’s dietary salt intake gives social status,” “People who are important to me think I should reduce my dietary salt intake,” and “Many people think I should reduce my dietary salt intake.” For personal norms, we used four items from Thøgersen (2006): “I feel bad when I am not deducing my dietary salt intake,” “I feel that it is my duty to reduce my dietary salt intake,” “I get a bad conscience when I do not reduce my dietary salt intake whenever it is possible,” and “I feel that I should choose to reduce my dietary salt intake instead of *not* reducing it.” All items were rated on seven-point scales (1 = “totally disagree,” 7 = “totally agree”). The items measure participants’ perceptions of the way society expects them to act when choosing food products, as well as their perceptions of how they should act when choosing food products. Both social and personal norm measures achieve high internal consistency (social Cronbach’s alpha = .91; personal Cronbach’s alpha = .88).

We measured people’s interest in healthy eating with eight items from the general health interest scale (Roininen, Lähteenmäki, & Tuorila, 1999): “I am very particular about the

healthiness of food,” “I always follow a healthy and balanced diet,” “It is important for me that my diet is low in fat,” “It is important for me that my daily diet contains a lot of vitamins and minerals,” “I eat what I like and I do not worry about healthiness of food,” “I do not avoid any foods, even if they may raise my cholesterol,” “The healthiness of food has little impact on my food choices,” and “The healthiness of snacks makes no difference to me.” These measure also use seven-point scales (1 = “totally disagree,” 7 = “totally agree”). The principal components analysis resulted in a two-factor solution. Low health interest items loaded on the first factor, whereas high health interest items loaded on the second factor. Both groups of items achieved satisfactory internal consistency (low interest Cronbach’s alpha = .78; high interest Cronbach’s alpha = .70). For the analysis, we only used the low interest group.

To measure respondents’ basic knowledge about salt sources, we asked, "For each product, please take a position on whether it contributes a little or a lot of salt to diets." The answers were classified as wrong or right, based on an unpublished ranking from experts in relevant institutions.<sup>1</sup> The experts ranked the products according to their relative salt contributions to daily diets, not the salt content of individual products. Seven food products were classified as containing a lot of salt, whereas ten contributed little or no salt. Each correct answer earned the respondent 1 point, so the knowledge scores ranged from 0 to 17 points.

For the measure of discretionary salt use, we developed a novel measure with four items: “When I cook a home-cooked meal, I taste it before adding salt,” “When I eat takeaway fast-food, I add salt at the table,” “I add salt to my food before I taste it,” and “When I eat my home-cooked food, I add salt at the table,” on a seven-point scale (1 = “totally disagree,” 7 = “totally agree”). A principal components analysis on the four items resulted in a one-factor

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<sup>1</sup>The determination of the set of products came from a collaboration between the National Food Administration and the Danish Technical University.

solution. The item, “When I cook a home-cooked meal, I taste it before adding salt” had a loading of less than .3 and was removed from further analysis. The internal consistency of the remaining three items was satisfactory (Cronbach’s alpha = .71).

The measure of respondents’ awareness of the consequences of salt intake started with the stem, “Salt in my food...,” and then featured the following items: “helps iodine uptake,” “increases blood pressure,” “replaces what is sweat out,” “is important when you exercise,” “stimulates appetite,” “increases the durability of food products,” “increases water retention,” “increases my weight,” “increases the risk for cardiovascular diseases,” and “increases thirst.” The scale ranged from 1 (“totally disagree”) to 7 (“totally agree”). A principal components analysis resulted in a two-factor solution, with negative consequence items on one factor and positive consequence items on the second factor. Both groups of items achieved satisfactory internal constancy (negative consequences Cronbach’s alpha = .77; positive consequences Cronbach’s alpha = .67).

Finally, the measure of perceived behavioral control reflects studies that apply the theory of planned behavior, with three items from Povey, Conner, Sparks, James, and Shepherd (2000). Specifically, respondents answered, “To what extent do you decide yourself if you eat salt reduced foods?” “How much personal control do you have over whether you will eat salt-reduced foods?” and “Whether I eat salt reduced foods or not is entirely up to myself.” The items achieved reasonable internal consistency (Cronbach’s alpha = .62).

#### 2.2.2 Data analysis

All analyses were conducted in SPSS 24. Determinants of intention to change were analyzed using binary logistic regression. As noted above, data for willingness to purchase salt-reduced products were converted into a binary variable and determinants of willingness to purchase were likewise analyzed by binary logistic regression.

Initial analyses indicated that, contrary to our expectations, there was an asymmetric relationship between intention to change and willingness to purchase: respondents having an intention to change were willing to purchase salt-reduced products, but among respondents having no intention to change there were still many who were willing to purchase salt-reduced products. We therefore concentrate the analysis on three groups of respondents: Those that have an intention to change and are willing to purchase salt-reduced products, those that have no intention to change and low willingness to purchase salt-reduced products, and those that have no intention to change but are still willing to buy salt-reduced products. ANOVAs were conducted to analyze differences between these three groups in terms of the potential predictors. Post hoc analyses using the Scheffé post hoc criterion for significance was used.

Finally, a Wilcoxon signed-ranks test was conducted to determine whether there is a difference in willingness to purchase between hedonic and utilitarian products. The test is a non-parametric statistical test and is used to compare two related samples and to assess whether the mean ranks differ.

**Table 2: Summary of measures**

<b>Motivation to reduce salt intake</b>	“I am not at all interested in lowering salt in my diet and I have no intention of doing so in the next 6 months”/“I am interested in lowering salt in my diet and I have the intention of doing that within the next 6 months”/“I am interested in lowering salt in my diet and I have the intention of doing that in the next month”/“I am interested in lowering salt in my diet and I have started lowering my salt intake during the last 6 months”/“I am interested in lowering salt in my diet and I have already lowered my salt intake for longer than 6 months”
<b>Willingness to buy salt-reduced products</b>	“Yes” or a “No” to: “Would you be willing to purchase the following products if they were salt reduced?”  biscuits, ready meals, butter, deli products, white bread, cheese, canned fish, sauces (bouillon/soya, barbecue oils), olives, sausages, tomato sauce, rye bread, cornflakes, crisps, meat spread, bacon and cake.
<b>Knowledge of salt-related diseases</b>	Salt in my food....  “Helps the iodine uptake”/“Increases blood pressure”/“Replaces what’s sweat out”/“Is important when you exercise”/“Stimulates appetite”/Increases the durability of food

	products”/”Increases water retention”/”Increases my weight”/”Increases the risk for cardiovascular diseases”/”Increases thirst”.
<b>Knowledge of salt in the diet</b>	For each product, please take a position on whether it contributes with a little or much salt in the diet....  Answers were classified as wrong or correct based on an unpublished ranking provided by a number of experts from relevant institutions <sup>2</sup> . These experts ranked the products based on their relative salt contribution to the daily diet and not based on the salt content of the individual product. Seven food products were classified as ‘much salt’ and eight food products as ‘little/no salt’. Each correct answer for these 15 foods gave 1 point, so that respondents obtained a knowledge score of 0 to 15 points.
<b>Perceived behavioral control</b>	To what extent do you decide yourself if you eat salt reduced foods?” “How much personal control do you have over whether you will eat salt-reduced foods?” and “Whether I eat salt reduced foods or not is entirely up to myself.”
<b>Norms and motives</b>	Social norms: “Other people like me better if I reduce my dietary salt intake”/”Many people reduce their dietary salt intake”/”It makes a good impression on other people to reduce once dietary salt intake”/”Many people I know reduces their dietary salt intake”/”To reduce once dietary salt intake gives social status”/”People who are important to me thinks I should reduce my dietary salt intake”/”Many people thinks I should reduce my dietary salt intake”,  Personal norms: “I feel bad when I am not deducing my dietary salt intake”/”I feel that it is my duty to reduce my dietary salt intake”/”I get a bad conscience when I do not reduce my dietary salt intake whenever it is possible”/”I feel that I should choose to deduce my dietary salt intake instead of <i>not</i> reducing it”.
<b>Discretionary salt use</b>	“When I cook a home-cooked meal, I taste it before adding salt,” “When I eat takeaway fast-food, I add salt at the table,” “I add salt to my food before I taste it,” and “When I eat my home-cooked food, I add salt at the table,”
<b>General Health Interest</b>	“I am very particular about the healthiness of food”/”I always follow a healthy and balanced diet”/”It is important for me that my diet is low in fat”/”It is important for me that my daily diet contains a lot of vitamins and minerals”/”I eat what I like and I do not worry about healthiness of food”/”I do not avoid any foods, even if they may raise my cholesterol”/”The healthiness of food has little impact on my food choices”/”The healthiness of snacks makes no difference to me”

## 2.3 Results

### Intention to change and willingness to purchase

We find good correspondence between intention to change and willingness to purchase among participants who intend to change their salt intake or have already done so; people who indicate they have or intend to change their dietary salt intake are also willing to purchase many salt-reduced food products. We find less correspondence among those with no

<sup>2</sup>The ranking of products was a collaboration between the National Food Administration and the Danish Technical University

intentions of reducing their intake, such that many of them still express a willingness to purchase salt-reduced products, even if they have no intentions to reduce their salt intake.

Table 3 details this asymmetric relationship.

To specify additional determinants of intention to change and willingness to purchase, we grouped respondents into three groups:

- 1) Those who indicate that they have no intention to change their salt intake and also have low willingness to purchase salt-reduced products (0–3 scores for willingness to purchase).
- 2) Those who indicate that they have no intention to change their salt intake but still express willingness to purchase salt-reduced food products (4–17 score for willingness to purchase).
- 3) Those who indicate that they intend to change or have already changed (0–17 score for willingness to purchase).

**Table 3: Intention to change and willingness to purchase salt-reduced products (% of sample)**

Intention to change dietary salt intake	Willingness to purchase	
	Low willingness to purchase 0-3 score	High willingness to purchase 4-17 score
No Intention to change	13.3	53.5
	Willingness to purchase 0 – 17 score	
Intention to change	32.2	

With a Wilcoxon signed-ranks test, we also seek to determine which product type, hedonic or utilitarian, is more likely to be purchased in a salt-reduced version across groups. As we detail in Table 4, 307 respondents indicate they are more likely to purchase utilitarian products (mean rank = 326.32) in a salt-reduced version, whereas for 274 respondents, hedonic products (mean rank = 251.43) are more likely to be purchased in a salt-reduced

version. For 449 respondents, we find a tie. However, the difference between utilitarian and hedonic products is statistically significant ( $Z = -3.86, p < .001$ ). Utilitarian products are slightly more likely to be purchased in a salt-reduced version than are products from a hedonic category.

**Table 4: Food products by category, listing percentages of respondents by groups who indicated willingness to purchase salt-reduced versions**

<b>Utilitarian products (Mean Rank 326.43)</b>	<b>No intention to change and willingness to purchase score 0–3, n=137</b>	<b>No intention to change and willingness to purchase score 4–17, n = 551</b>	<b>Intention to change and willingness to purchase score 0–17, n=342</b>
Olives	1.7	63.4	61.9
Sauces/Grill oils/Soya	2.2	78.3	75.7
Bacon	2.2	73.5	74.5
Butter	2.2	67.4	69.9
Ready meals	2.8	83.9	70.8
Canned fish	0.5	79.5	74.3
Deli products	2.8	81.1	79.2
Meat spread	2.2	88.0	83.6
Rye bread	4.4	85.5	81.6
Tomato sauce	0.5	76.6	72.2
Sausages	0.5	82.0	81.3
Cheese	2.2	75.6	72.2
<b>Hedonic products (Mean Rank 251.26)</b>	<b>No intention to change and willingness to purchase score 0–3</b>	<b>No intention to change and willingness to purchase score 4–17</b>	<b>Intention to change and willingness to purchase score 0–17</b>
Crisps	5.0	73.0	71.6
Cornflakes	0.5	74.6	63.1
Biscuits	1.1	80.5	68.7
White bread	0.5	76.0	71.0
Cake	2.8	78.4	67.2

### 2.3.1 Possible determinants of intention to change

With a binary logistic regression, we seek to ascertain the effects of general health interest, awareness of consequences, salt habits, perceived behavioral control, knowledge index, and personal and social norms had on respondents’ intention to change their dietary salt intake (Table 5). We find significant effects of personal norms, social norms, and general health interest. Personal norms exert the strongest influence on respondents’ intention to change, followed by social norms, such that higher scores for both types of norms increase the likelihood that the respondent appears in the group intending to change dietary salt intake. General health interest also has a significant influence; respondents with higher scores

(indicating less general health interest) have less likelihood of intending to change their dietary salt intake. We find no significant effects for awareness of consequences, knowledge index, salt habits, or perceived behavioral control. The Hosmer-Lemeshow chi-square test also suggests that the model achieves good fit with the data ( $p = .350$ ). Our model correctly classifies the outcomes for 78.1% of cases. The Nagelkerke R-square value also suggests that it explains roughly 43% of the variation in the outcomes.

**Table 5: Binary logistic regression for intention to change**

Binary logistic regression	B	S.E.	Wald	df	Sig.	Exp(B)
<i>Independent variable</i>						
Perceived behavioral control	-.139	.073	3.580	1	.058	.870
Salt habit	-.118	.072	2.648	1	.104	.889
Social norms	.325	.085	14.738	1	<.001	1.385
Personal norms	.821	.075	118.346	1	<.001	2.273
Knowledge index	.034	.051	.444	1	.505	1.035
Awareness of consequences_negative	.119	.090	1.754	1	.185	1.126
Awareness of consequences_positive	-.036	.086	.175	1	.676	.965
General health interest_low	-.326	.073	20.140	1	<.001	.722

Notes: Dependent variable is intention to change. The variable is binary; Intention to change and No intention to change. Computed from the six questions in the Stages of Change measure.

### 2.3.2 Possible determinants of willingness to purchase

Another binary logistic regression tests the effects of general health interest, awareness of consequences, salt habits, perceived behavioral control, knowledge index, and personal and social norms on willingness to purchase salt-reduced food products (Table 6). We find a significant, positive effect of salt-related knowledge; higher levels of knowledge increase the likelihood of being willing to purchase salt-reduced products. Stronger personal norms and greater awareness of the negative consequences of salt intake also increase this likelihood. Low levels of general health interest instead lower the likelihood of being willing to purchase salt-reduced products. We uncover no effects of social norms, awareness of positive consequences, salt habits, or perceived behavioral control. Again, the Hosmer-Lemeshow

chi-square test suggests good fit to the data ( $p = .853$ ). The model correctly classifies the outcomes for 80.3% of cases, and the Nagelkerke R-square value suggests it explains roughly 20% of the variation in the outcomes.

**Table 6: Binary logistic regression for willingness to purchase**

Binary logistic regression	B	S.E.	Wald	df	Sig.	Exp(B)
<i>Independent variable</i>						
Perceived behavioral control	-.107	.072	2.196	1	.138	.898
Salt habit	-.052	.069	.579	1	.447	.949
Social norms	-.035	.096	.132	1	.717	.966
Personal norms	.418	.083	25.113	1	<.001	1.519
Knowledge index	.168	.054	9.802	1	.002	1.183
Awareness of consequences_negative	.416	.086	23.551	1	<.001	1.516
Awareness of consequences_positive	-.088	.087	1.025	1	.311	.916
General health interest_low	-.223	.065	11.813	1	<.001	.800

Notes: Dependent variable is willingness to purchase. The variable is binary; willingness to purchase 0-3 products and willingness to purchase 4-17 products. Computed from the question on willingness to purchase 17 different products in a salt reduced version.

### 2.3.3 Three-group comparison

The One-Way ANOVA results in Table 6 is a comparison of the three groups; No intention to change and willingness to purchase score 0–3, No intention to change and willingness to purchase score 4–17, Intention to change and willingness to purchase score 0–17. The ANOVA confirm the importance of personal norms for both intention to change and willingness to purchase: Personal norms are highest for those who intend to change and lowest for those who do not intend to change and are not willing to purchase, whereas an in-between value refers to those not intending to change but willing to purchase. The findings confirm the importance of social norms only for intention to change; those not willing to change feel less social pressure to reduce their salt intake, as do those who do not intend to change but still are willing to purchase. We also note that general health interest is related to

intention to change but does not discriminate between those willing to purchase and those not willing to purchase. Awareness of negative consequences is highest for those who intend to change and lowest for those who do not intend to change and who are not willing to purchase and the awareness of those not intending to change but willing to purchase falls in between these extremes. Finally, knowledge of food products' contribution to salt intake is highest for those not intending to change but willing to purchase.

**Table 7: Three groups: Stages of Change model and willingness to purchase**

Independent variable	No intention to change and willingness to purchase score 0–3	No intention to change and willingness to purchase score 4–17	Intention to change and willingness to purchase score 0–17	F	<i>p</i>
Awareness of consequences_negative	4.63 <sup>a</sup>	5.07 <sup>b</sup>	5.23 <sup>b</sup>	19.12	< .001
Awareness of consequences_positive	4.19 <sup>a</sup>	4.09 <sup>a</sup>	4.13 <sup>a</sup>	.61	.544
General health interest_low	4.52 <sup>a</sup>	4.50 <sup>a</sup>	3.55 <sup>b</sup>	36.10	< .001
Personal norms	2.01 <sup>a</sup>	2.49 <sup>b</sup>	4.11 <sup>c</sup>	229.54	< .001
Social norms	1.85 <sup>a</sup>	1.95 <sup>a</sup>	2.84 <sup>b</sup>	80.79	< .001
Perceived behavioral control	5.80 <sup>a</sup>	5.59 <sup>a</sup>	5.31 <sup>b</sup>	11.29	< .001
Salt habits	8.40 <sup>a</sup>	7.85 <sup>a</sup>	8.43 <sup>a</sup>	2.34	.097
Knowledge index	11.11 <sup>a</sup>	11.53 <sup>b</sup>	11.35 <sup>ab</sup>	4.82	.008

Notes: Means that share the same superscript letter are not significantly different at the .05 level. Post hoc analyses using the Scheffé post hoc criterion for significance was used.

## 2.4 Discussion

The primary aim of the current study was to investigate intention and willingness to reduce dietary salt intake. We have measured people's intention to change their dietary salt intake and their willingness to purchase salt-reduced products. We also have sought to explain differences in intention to change and willingness to purchase by including constructs selected from a review of prior literature, including awareness of the consequences of salt intake, general health interest, personal norms, social norms, salt habits, knowledge about food products' contributions to salt intake, and perceived behavioral control. Furthermore, we

consider possible differences in the willingness to purchase between hedonic and utilitarian food products. While intention to change dietary salt habits previously has been discussed in literature (e.g. Newson et al. (2013)), to our knowledge the combination of willingness to purchase and intention to change, has not previously been tested.

#### 2.4.1 Hypothesis testing results

Specifically we predicted a positive relationship between intention to change dietary intake of salt and willingness to purchase salt-reduced food products. However, we find an asymmetrical relationship between intention to change and willingness to purchase salt-reduced food products. People who plan to implement a change or who have already done so are also willing to purchase salt-reduced food products. In addition, most of those respondents who indicate that they have no intention to reduce their salt intake are still willing to buy at least some salt-reduced food products. Furthermore, one-quarter of the respondents who have no intention to change indicate a willingness to purchase all the suggested food products in salt-reduced versions. Thus, we must reject H1. What we expect to be an obstacle for being willing to purchase salt reduced food products was not really an obstacle after all. This study showed that the intention to change did not predict the respondent's intention to purchase salt reduced food products. In previous studies (Newson et al., 2013) Stages of Change have been used to indicate the population's openness to change, under the assumption that this intention to change provides important knowledge regarding the potential for improvements within dietary salt intake and that it serves as an important indicator of individuals interest in engaging in salt reduction. However, this study suggests that intention to change dietary salt habits is not a prerequisite for being willing to purchase salt reduced food products, This may be related to that having an intention to reduce salt intake is an abstract goal, with immediate costs and delayed rewards, whereas willingness to purchase a salt reduced product is perceived as a concrete goal where the costs are low and

where it is somebody else than the consumer himself who has done all the hard work. All that the consumer needs to do is to put the salt reduced product in the basket.

We find partial support for H2, in which we claimed that strong personal and social norms for reducing dietary salt intake would make it more likely that consumers would intend to change their dietary salt intake and be more willing to purchase salt-reduced products. Stronger personal norms increase both intention to change and willingness to purchase, but social norms relate only to intention to change, not willingness to purchase. As we noted previously, previous studies show that strong personal norms for buying organic products increase the likelihood of altering purchasing patterns to include more organic products (Thøgersen, 2006); a similar effect appears to apply to the purchase of salt-reduced products. However, personal norms may need to be accompanied by perceived social pressure before people will not just purchase salt-reduced products but also actually indicate intention to reduce their salt intake. The decision to reduce dietary salt intake appears to represent a more involving issue for people than the decision to buy salt-reduced products. This variability in the level of involvement could help explain the asymmetrical relationship between intention to change and willingness to purchase.

Zandstra et al. (2016) urge industry to continue product reformulation, they also emphasize that consumer awareness about dietary salt and consequences about excessive salt intake should get more attention, because educating the consumer to be more knowledgeable about dietary salt will create a demand for low salt products. This is in line with our study where we found that willingness to purchase relates to awareness of the negative consequences of salt intake and knowledge about salt; a knowledge factor thus appears involved in the formation of a willingness to purchase salt-reduced products. The more knowledge a person has about the salt content in different food products, and the more awareness the person has about the negative consequences of excessive salt intake, the more willing this person is to purchase

salt-reduced food products. However, we find only partial support for our contention in H3 that consumers who are health oriented and have knowledge about dietary salt are more willing to purchase salt-reduced food products and more likely to intend to change their dietary salt intake. The group of consumers not intending to change but willing to purchase exhibits the highest score on knowledge about salt-reduced food products, and their awareness of the negative consequences of salt intake is similar to that among the group intending to change. Thus knowledge-related factors appear related to a willingness to purchase salt-reduced products but not to an intention to reduce dietary salt intake. In H5, we predicted that awareness of the health consequences of excess dietary salt intake and good dietary salt habits would influence both intention to change and willingness to purchase; again, it receives only partial support, because the effect of awareness of consequences emerges only for willingness to purchase, whereas salt habits have no effect.

These results indicate that it might be more feasible to start by making a wide variety of salt reduced food products available and visible in grocery stores, instead of waiting for the consumer to be aware of consequences of excessive dietary salt intake and thus for them to demand salt-reduced products.

We cannot confirm H6, because perceived behavioral control does not predict intention to change or willingness to purchase. Specifically, it is not related to willingness to purchase, and though it is weakly related to intention to change, the effect is negative, such that people who believe they would have no problem reducing their salt intake are less inclined to do so.

The finding that the utilitarian salt-reduced food products are more likely to be purchased supports the underlying distinction of hedonic and utilitarian products and differences in acceptance of taste between them (Kahn et al., 2004). However, respondents still expressed willingness to purchase a wide variety of salt-reduced food products, including

hedonic categories. Our prediction in H4 that consumers are more willing to purchase salt-reduced utilitarian food products is supported though. The relative high willingness to purchase hedonic salt reduced food products, despite the common perception that salt reduced products are less tasty products, might be explained by justification as Okada (2005) applies to a series of studies. When hedonic and utilitarian products are displayed simultaneously, people find it easier to justify the relatively more utilitarian choice however, if people is provided with some kind of justification for a hedonic choice, like that it is salt reduced, it is easier to justify and thus easier to choose (Okada, 2005).

#### 2.4.2 Theoretical implications

The discrepancy between the willingness to purchase measure and the intention to change measure offers insights for goal implementation literature, which predicts that implementation intentions mediate the link between goal intentions and action, such that there cannot be an implementation intention without a goal (Gollwitzer, 1999; Gollwitzer & Brandstatter, 1997; Gollwitzer et al., 1990; Gollwitzer & Moskowitz, 1996; Gollwitzer & Oettingen, 1998). Goal implementation theory predicts that people go from having a general goal to performing a specific action, by forming intentions to implement that goal. However, we find that many people report intentions to purchase salt-reduced products without having any goal to reduce their salt intake. Sheeran et al. (2005) suggests that goal intentions without implementation intentions will not lead to behavioral change, but also that goal intentions are a prerequisite for the formulation of implementation intentions and their subsequent role in activating behavior. We find that adopting a goal to reduce salt intake is not necessary in order to reduce dietary salt in the diet, because people are able to form intentions about concrete goals about specific behaviors, like to purchase salt-reduced products.

#### 2.4.3 Implications for behavioral changes

Our measure of intention to change is derived from the Stages of Change concept, at the heart of transtheoretical approaches (Prochaska & Velicer, 1997). These stages have been used widely in public health research and community initiatives (Bunton, Baldwin, Flynn, & Whitelaw, 2000), with the suggestion that when a person (or population) is in the pre-contemplation stage, the costs of changing the behavior outweigh its benefits (Prochaska & Velicer, 1997). To achieve behavioral change, it is necessary to start by moving people from the pre-contemplation to the contemplation phase, perhaps through public health campaigns. However, we find that being in the pre-contemplation stage does not prevent people from expressing a willingness to purchase salt-reduced food products. Therefore, food producers will be able to find customers for their salt-reduced food products, even if the population claims to have no intention to change their salt intake. Our results also suggest that this purchase intention can be strengthened by increasing people's knowledge about salt, even if this knowledge does not increase their intentions to reduce their salt intake.

The data we obtained about the factors related to people's willingness to purchase salt-reduced food products can be used to design evidence-based health promotion campaigns and develop salt reduction strategies, in corporation with industry actors. This study also can inform industry and health agencies about the market potential, as well as which consumers to target.

#### 2.4.4 Limitations

These findings are based on one study, conducted as a web survey. The findings are subject to the particular setting in which we conducted this study (i.e., Denmark). Previous studies note that intentions to reduce dietary salt vary significantly across countries (Newson et al., 2013). Replications of this study in other countries thus might uncover different results for Intention to change, but we anticipate similar results with regard to the discrepancy between

Intention to change and willingness to purchase. We call for continued cross-national research that includes countries representing different continents and cultures.

Our study also is subject to the usual limitations of survey research, specifically in relation to behavior and intentions based on self-reports. The respondents' replies about how much salt they use in home cooking or how willing they are to purchase salt-reduced food items might reflect a social desirability bias; answering more positively in a survey imposes no immediate costs on them.

## 2.5 Conclusion

These results suggest that most consumers are willing to purchase salt-reduced food products, even if they lack any clearly defined salt reduction goal. The responsibility for the reduction of dietary salt thus should not fall solely on public health agencies or individual consumers; it demands cooperation among all stakeholders. Our study evidence suggests that industry actors might be able to drive diminished salt intake through product reformulation alone. In particular, the availability of a wide variety of salt-reduced products is important and offers the potential for market success. The solution to overconsumption of salt may be to alter supply, rather than demand. Our results indicate that if health authorities wish to influence dietary salt intake, it may be effective to focus on the point of purchase in stores, while also undertaking general campaigns to urge and educate consumers to think about their own salt intake.

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# 3

Choice of salt-reduced products in the hedonic and utilitarian product categories:

A cross-country comparison of Denmark and Norway

Under review in *Appetite*

**Trine Mørk<sup>a</sup>,**  
**Klaus G. Grunert<sup>a</sup>,**  
**Mari Gaarder<sup>b</sup>**  
**Valérie L. Almlí<sup>b</sup>**

<sup>a</sup>*Aarhus University*

<sup>b</sup>*Nofima AS*

## **Abstract**

Dietary salt gives rise to concern and marketers are increasingly challenged to develop communication strategies for products with a lower salt content. The main objective is to investigate the effect of information in the form of front-of-pack (FOP) salt labels and priming of salt-reduction goals on choice of salt-reduced products.

The study was implemented as an online choice task and a questionnaire in Norway (n=1025) and Denmark (n=1074), where participants were split into four manipulation groups: Priming, Label, Priming-Label and Control. The Priming and Priming-Label groups received health information on dietary salt prior to the choice task, while the Label and Priming-Label groups conducted choices on images featuring salt-reduction labels where relevant.

Priming and labeling significantly increased choice probability of salt-reduced product alternatives in the utilitarian category in Denmark and in the hedonic category in both countries.

Our results suggest that product labels indicating compliance with the national food administrations recommended salt levels combined with information campaigns, may successfully prompt consumer choices towards salt-reduced products in both countries.

### 3.0 Introduction

High levels of dietary salt intake have been linked to several negative health consequences as high blood pressure and cardiovascular disease (Aburto et al., 2013). Salt has always been used in food preparation and conservation and still contributes to various processes in modern food industry (Durack, Alonso-Gomez, & Wilkinson, 2008). In most households, salt is added during cooking or at the table; however, the vast dietary salt intake stems from processed foods (up to 80% of adult daily dietary salt) (WHO, 2016). In the Nordic countries, it is estimated that household salt contributes to approx. 10 to 20 percent of the daily dietary salt intake ("Nordic Nutrition Recommendations 2012: Integrating nutrition and physical activity," 2014), which means that 80 to 90 percent of the salt consumed by citizens of the Nordic countries stems from natural occurrence in produce, meals from canteens/restaurants and packaged foods. In Norway, studies have shown that approx. six grams of salt per day stem from products purchased in a supermarket (packaged foods) (Helsedirektoratet, 2011). Due to the over-consumption of dietary salt and the negative impact this has on public health, there is a need to reduce excess dietary salt intake, especially from processed foods. The average salt intake in Norway is estimated to be 10 g/day (Helsedirektoratet, 2018) and in Denmark it is 9.5 g/day (DTU, 2015). Both estimates are above what is recommended by WHO (5 g/day). It is therefore imperative to reduce the salt intake in both populations. However, it is difficult to obtain an exact estimate of the salt intake in a population due to the large number of products containing salt and to large variations within these products. Studies have shown that diets in the Nordic countries are relatively similar, but proportions of types of food vary and indicate a country-specific dietary pattern (Engeset et al., 2014). In addition, the salt added by consumers themselves is difficult to measure. Even though the Nordic countries have worked together on shared recommendations for nutrition since 1993 and jointly publish the Nordic Nutrition Recommendations, variations on how the recommendations are implemented in policies exist (Cernerud, 1995). Finland is the frontrunner in the area of salt reduction, making the decision

to consider salt a food additive, making legislation possible for a maximum level of salt in a wide variety of processed foods and taking steps to implement a label for either high salt content or low salt content on pre-packed foods (Cernerud, 1995). No such legislation exists in Norway or Denmark. The objective of this study was to investigate the effect of information in the form of front-of-pack (FOP) salt label and priming of salt-reduction goals on choice of salt-reduced products.

### 3.1 Conceptual development

#### 3.1.1 Front-of-pack labelling

In order to reduce salt intake, one option might be the use of front-of-pack (FOP) nutrition labelling. FOP has received much attention in most parts of the world where it is used as a strategy to counter the unhealthy dietary lifestyle seen in many countries (EUFIC, 2018). Whether these FOP nutrition labels are driving consumers towards healthier choices depends on many different factors such as label design, knowledge, motivation, socio-economic status and context (Grunert & Wills, 2007; Guthrie, Mancino, & Lin, 2015; Mariotti, 2010; Newman, Howlett, & Burton, 2016). The literature on use of labels is extensive, although most of this literature covers consumers' self-reported use of labels (Drichoutis, 2005; Gracia, Loureiro, & Nayga, 2007), hypothetical use of new labels not yet in the market (Bailey, 2005) and intention to purchase labelled products (Feunekes, Gortemaker, Willems, Lion, & van den Kommer, 2008; Mørk, Lähteenmäki, & Grunert, 2019). Only very few studies have looked at actual use in a real-life setting (Grunert & Wills, 2007; Mørk, Grunert, Fenger, Juhl, & Tsalis, 2017). Government-endorsed FOP nutrition labels are already in use or being developed in countries around the world such as Australia, New Zealand, Israel, South Africa, Denmark, Norway, Sweden, Venezuela and Chile (EUFIC, 2018).

Ikonen, Sotgiu, Aydinli, and Verlegh (2019) report that three countries (Chile, Peru and Finland) have implemented FOP high salt content warning labels to guide consumers towards lower salt intake. Additionally, also Uruguay (Ares et al., 2018, *Manual para la aplicación del Decreto N° 272/018 sobre rotulado frontal de alimentos*, 2019), Israel (Israeli Ministry of Health, 2018), Brazil (ANVISA, 2018) and Canada (Health Canada, 2017) are in the process of discussing and implementing a warning system. However, no government-endorsed FOP salt labels exist. Whether a FOP salt label will add value to a product and increase willingness to purchase will depend on the degree to which the message on the specific FOP is in line with the consumer's life values (Grunert, 2005). Research is divided regarding the usefulness of front-of-pack nutrition labels and salt (Grimes, Riddell & Nowson, 2009). This inconclusiveness as to whether or not FOP nutrition labels work as intended might be attributed to consumers' underlying reasons/expectations for choosing a product and their ability to decode information on sodium vs. salt and percentage of daily intake (%DI) (Grimes, Riddell, & Nowson, 2009). However, some studies do report a positive effect, where consumers make healthier choices based on various FOP labeling systems. In Denmark, an evaluation of the Keyhole campaign found that sales increased by up to 20 percent during the campaign (Mørk et al., 2017). Elshiewy and Boztug (2018) found that compared with products only labeled with back-of-pack nutrition information, front-of-pack labeling increased choice of healthier products and decreased the total amount of calories purchased. Also other research has found that interpretative labels (Health Star Rating) are more effective in prompting consumers to make healthier choices than reductive labels (Daily Intake Guide) (Talati et al., 2017). The meta-analysis generalizing the effect of FOP labels by Ikonen et al. (2019) found that FOP labels help consumers identify healthier options, but the ability of FOP labels to prompt consumers to make healthier choices is more limited. However, even though the effects of FOP labels do not (in general) prompt consumers to choose healthier, research shows that mandatory

FOP nutrition labeling is one of the most effective strategies to reduce the population's dietary salt intake (Hyseni et al., 2017), mainly because it encourages the food industry to reformulate a wide variety of food products (Hawkes et al., 2015). Recent research has found that consumers prefer products without any nutritional warning and that the effect is strongest for non-market leaders (Ares et al., 2018). This indicates that the warning system might motivate the industry to reformulate food products, in order to avoid the mandatory warning label. In a study of how the food industry has reacted to the Choices logo, researchers found that the logo had prompted food manufacturers to reformulate products and develop new products (Vyth, Steenhuis, Roodenburg, Brug, & Seidell, 2010a).

### 3.1.2 Priming

Most FOP labels go unnoticed. In order to increase the likelihood of FOP labels being noticed, one approach is goal priming. Goal priming is about activating a latent goal so that it will result in goal-related behavior. Goal priming has become ever more prevalent as a nudging strategy. This follows the acknowledgement that good intentions rarely lead to behavioral change (Gollwitzer, 1999). Papiés (2016) refers to a series of experimental studies where various kinds of health primes were applied resulting in more frequent healthy decisions both in a grocery shopping situations and in a restaurant setting. Also, in their study on hard cheese fat content, Øvrum, Alfnes, Almli, and Rickertsen (2012) found that health message priming prior to a choice task increased preference for healthier cheese and acceptance of a price premium of approx. 27 percent in the group exposed to health information. Salt is an additive, which is not easily detected in many everyday food products. With a specific salt label, products with less salt will be easier to identify. Mørk et al. (2019) found that having specific knowledge regarding dietary salt content in various food products and being generally interested in a healthy lifestyle increased the willingness to purchase a wide variety of salt-reduced food products. Whether this willingness to purchase can be converted into actual choice of salt-

reduced products and whether such choices can be spurred by priming has yet to be investigated.

### 3.1.3 Hedonic vs. utilitarian products

In this study, we distinguish between hedonic and utilitarian products (Kahn, Dahr, & Wertenbroch, 2004) to explore possible differences in the effect of FOP salt labelling between these two product categories. This distinction is inspired by Kahn (2004); hedonic goods are multisensory and provide for experiential consumption, fun, pleasure and excitement, while utilitarian products are primarily instrumental and their purchase is motivated by functional product aspects. We have adapted this distinction for the food category. We consider a hedonic food product to be one that is characterized by being fun, enjoyable and pleasurable, while a utilitarian food product is a product that is characterized by being functional, practical and plain. In a previous web survey, 1030 respondents were asked to indicate for 17 food products representing both hedonic and utilitarian products, if they would be willing to purchase salt-reduced product variant if they were available. This study showed a significantly higher willingness to choose salt-reduced products in the utilitarian category (Mørk et al., 2019).

Because hedonic products primarily are purchased for pleasure, consumers may be less willing to choose a salt-reduced product, as they regard salt as an essential contributor to tastiness (Batra & Ahtola, 1991; Kahn et al., 2004). For the utilitarian products, consumers may be more inclined to choose a product with less salt, as their willingness to purchase may be dominated by health reasons, cultural reasons or because the products are considered part of the normal diet.

### 3.1.4 Salty and sweet orientation

Humans perceive five basic tastes: salty, sour, bitter, sweet and umami. Preferences for the different taste qualities are partly “hard wired” in our DNA at birth and partly acquired through dietary exposure. Thus, also culture, social and psychological aspects play a role in

this development of preferences. It has been shown that during the first year of infancy, sweet and salty tastes are the most preferred ones (Schwartz, Issanchou, & Nicklaus, 2009), and it is a fact that these two tastes remain largely pleasant in adulthood.

The so-called “sweet tooth” has been addressed in previous research. Having a “sweet tooth” means that you have preferences for a high sweetness intensity as well as for sweet rather than for savory foods (Drewnowski, Mennella, Johnson, & Bellisle, 2012). Much like the “sweet tooth” humans may also have a “salty tooth”. Already four months post-natal, an infant has preferences for salt and in early childhood they have a preferred level of saltiness that is more concentrated (stronger saltiness taste) than seen with adults (Birch, 1999). Both salt and sweet literature distinguish between liking and wanting, claiming that a preference for sweet or salty products occurs when you both like an intense sweet/salty taste and want the sweet/salty foods. Wanting is influenced by liking but also by social norms, satiety and the context you are in (Berridge, 2009). Liking for less salty products can be learned even if a salt preference still exists (Bobowski, Rendahl, & Vickers, 2015a, 2015b). Our research suggests that consumer preferences for salty versus sweet foods will mitigate their choices.

#### 3.1.5 Work on salt reduction by means of labelling

Since 2011, the Danish Salt Partnership has worked to “create effective tools for policy-makers and industry to reformulate processed foodstuffs in categories that contribute significantly to the intake of salt from industrially produced foods” (Halloran, Fischer-Møller, Persson, & Skylare, 2018). The Norwegian Salt Partnership was formed in 2015; it aims at stimulating food producers in Norway to reduce the salt content in their products and to increase the public knowledge and awareness of salt and its link to health. In both countries, the food industry has worked gradually with salt reduction through internal product development and as partners in several national research projects (Akkerman et al., 2017; Almli & Hersleth, 2012).

In a survey conducted by the Norwegian Directorate of Health, 49 percent of the Norwegian participants answered that they were attentive regarding reducing their salt intake. The Norwegian health authorities aim at increasing this to 80 percent by 2021 (Helsedirektoratet, 2017). In a web survey, Mørk et al. (2019) found that when Danish respondents were asked whether they had any interest in changing their dietary salt intake, 67 percent responded “No, I have no interest in reducing my dietary salt intake now or within the next six months.” Yet, in the same study, most consumers were willing to purchase salt-reduced food products, even without having a salt reduction goal.

Thirty-one countries around the world have a voluntary or mandatory FOP nutrition-labelling scheme containing information about salt. The most frequently used FOP labelling scheme is symbols like the traffic light labels, the Finnish Heart symbol and the Nordic keyhole, which indicate that the product meets established nutrient criteria (Trieu et al., 2015). In the context of salt, however, the Nordic Keyhole falls short. Classic hedonic products cannot be awarded the Keyhole to due to their typical high levels of sugar, saturated fat and/or salt, and in the Nordic countries, for a large proportion of products containing too much salt, there is no labelling available, except for the mandatory back-of-pack nutrition information list. The second most commonly used FOP scheme is the percentage daily intake (%DI) or guideline daily amount (% GDA), used by 16 countries. The %DI or the %GDA have some serious drawbacks when it comes to dietary salt. On products that contain little to moderate salt, but are consumed in large quantities, these measures will likely underestimate the daily contribution to the diet as a whole. To our knowledge, five countries (Chile, Peru, Uruguay, Israel and Finland) have warning labels on high-salt foods. With a multidisciplinary approach, Finland has succeeded in reducing the population’s dietary salt intake by 30 percent over the last 30 years. The various FOP schemes have been introduced by government, NGOs and industry (Trieu et al., 2015).

### 3.1.6 Research objectives

The aim of the present study was to investigate the effect of a front-of-pack (FOP) salt label (“Follows the Food Agency's Recommended Salt Target”) and priming of the salt reduction goal on choice of salt-reduced products in both the hedonic and the utilitarian categories. Moreover, we wanted to investigate possible drivers of low salt choices in terms of sociodemographic and attitudinal measures. To this end, two online experiments, one in Denmark and one in Norway, were carried out to uncover if a FOP salt label would increase the choice of salt-reduced food products and if salt-related health priming has an effect. We hypothesize that this behavior will be modulated by the hedonic or utilitarian nature of the product at stake. The results can serve as evidence for health promotion campaigns and salt reduction strategies, while also informing industry and health agencies about consumer reaction to FOP salt labelling.

## 3.2 Method

### 3.2.1 Data collection

The study was implemented as a between-subjects choice experiment embedded in an online survey. Respondents were assigned to one of four experimental groups: Control group, Priming group, Label group and Label/Priming group. Approximately 250 respondents in each country were assigned to each group. The online survey was administered in May 2018 to a representative (in terms of age, gender and education) sample of Danish and Norwegian citizens. After deleting respondents who completed the survey in a very short time (less than 5 minutes), the mean time for completing the survey was 24 minutes. Prompting by means of “forced answer function” was used to avoid incomplete answers. This reduced missing data to a minimum. Participants were recruited through an online panel provider (Userneeds) who is registered with the Data Protection Act. Informed consent was provided by all participants. They received a standard reward (points) for their time and effort.

A total of 2457 respondents participated to the survey. After clean-up of unreliably short and incomplete responses, n=1025 Norwegian and n=1074 Danish participants remained for data analysis. Demographic characteristics of the sample are displayed in Table 1. A small overrepresentation of Danes with secondary school/vocational training and a small underrepresentation of Norwegians with primary school is observed (not shown). The respondents did not significantly differ in their sociodemographic characteristics.

Table 1. Sample composition for the four manipulation groups and for country population

	Control	Label	Priming	Label/Priming	DK sample	NO Sample	Total sample
Sample size (n)	513	515	540	530	1074	1025	2099
Share of females (%)	49.5	48.6	49.3	49.0	50.0	48.3	50.0
Age in years (mean (SD))	47.9 (16.5)	47.1 (14.7)	47.9 (16.2)	45.3 (15.2)	47.0 (15.5)	44.6 (26.6)	49.2 (16.5)
Education, higher (%)	35.5	24.3	33.1	57.6	27.2	38.4	54.0
Yearly household income in DKK or NOK (%)							
Under 400 k	6.8	8.25	8.35	9.6	45.9	20.0	32.95
400-900 k	12.3	12.1	11.9	11.35	45.8	48.3	47.05
Over 900 k	5.3	4.65	5.15	4.9	8.3	31.7	20.0
Marital status							
Single (%)	9.6	9.7	9.5	10.1	40.0	36.1	38.05
Married/Partner (%)	15.8	15.1	16.3	15.0	60.0	63.9	61.95
With child(ren) (%)	6.9	6.3	6.9	6.1	15.0	37.8	26.1
With responsibility for grocery shopping (%)	21.9	22.0	22.8	22.7	45.4	44.0	44.7

### 3.2.2 Product choice task

#### 3.2.2.1 Product categories

To study the effect of priming, label and priming/label between different product categories, eight product categories from both the hedonic and the utilitarian food categories were chosen

for the experiment. For each product category, respondents had to choose between four product alternatives. It was not possible *not* to choose one of the options. The product categories used for this study were selected in order to have an equal number of hedonic and utilitarian categories and to ensure that product categories contributed substantially to the overall salt intake in the two populations. The following product categories were chosen: cake, bread, chips, cornflakes, meatballs, shrimps, cheese and crackers. For each product category, respondents were shown four different products on the screen. The sequence of product categories as well as the position of the four pictures on the screen were randomized. In each of the product categories, two products complied with the official guidelines for salt content and two did not (see Appendix 1).

The product images shown were of real products currently existing on the two markets of the study, except for inclusion of the salt label where appropriate. Real products were selected as stimuli in order to maximize the external validity of the results, such that the choice task replicates as closely as possible a choice situation that would be encountered in a store. We realize that using real products introduces other factors that can influence consumer choice, most notably the brand, resulting in potentially lower effect sizes for the label/priming effects than if the stimuli were constructed and did not resemble existing brands. On the other hand, this is the situation that consumers will encounter in real life should a salt label be introduced, and we believe that the gain in external validity of our results outweighs the disadvantages of being unable to control for the effect of existing brand preferences.

Prior to the study, a pilot pre-test was conducted with the purpose of identifying food products to represent the hedonic and utilitarian food categories (Appendix 2). The Danish and Norwegian Food Administrations have a “Salt list” with recommended thresholds of salt content for all food product categories. This “Salt list” was consulted in the selection of products for the study. For each category, we chose two products that were above the

recommended threshold and thus “high in salt” and two that lived up to the salt recommendations and were below the recommended threshold and thus “low in salt”. Only images of products that are actually low in salt were manipulated with a low-in-salt label in the choice experiment.

There was only little country variation in the choice task images. For bread, the choice set included white wholegrain bread in Norway and rye bread in Denmark to ensure cultural relevance. All Norwegian products were purchased at a Norwegian Meny store and the Danish products were purchased at a Danish Meny store.

#### 3.2.2.2 Experimental label

For the purpose of this study, we developed a *nutrient specific interpretative endorsement*

*label*: “Follows the Food Administration’s Recommended Salt Targets”. Previous sensory

research shows that when emphasizing the terms “Salt Reduction,” or “Reduced Salt

Content,” it may affect consumers’ taste perceptions negatively and it can increase their

desire to add salt to products on consumption (Liem, Miremadi, Zandstra, & Keast, 2012).

Acton, Vanderlee, Roberto, and Hammond (2018) found that a government warning on soft

drink beverages in Canada increased the believability of the label and increased the

likelihood of the consumer choosing a product without that government-warning label. These

results suggest that including some form of authority endorsement strengthens the effect of

evaluative labels. In this paper, we include a label with the wording “Follows the Food

Administration’s Recommended Salt Target” to test if this hypothetical label can affect

choice probability for salt-reduced food products. We initiated this work intending it to have

the potential for real implementation in Denmark and Norway, and therefore the positive

endorsement wording of the label was done in collaboration with the Danish Food

Administration, so that the labels are in line with specific rules and regulations of country-

specific nutrition labeling. Also the Norwegian Food Administration approved this wording and did the translation to fit the Norwegian market. In the choice experiment, only images of products that are actually low in salt according to the thresholds set by the food administration authorities, were manipulated with an endorsement label.



Picture 1. Experimental labels for Norway (left) and Denmark (right), meaning “Follows the Food Administration’s Recommended Salt Targets”. The two countries’ food administrations approved the wordings.

### 3.2.2.3 Attitudinal, behavioural and willingness to purchase measures

In addition to the choice task, the survey included measures of Stages of Change (Prochaska & Velicer, 1997) with regard to salt reduction (Newson et al., 2013), sources of salt intake, General Health Interest (GHI) (Urala & Lähteenmäki, 2007), social (SNO) and personal norms (PNO) regarding dietary salt, knowledge of salt content in food products, willingness to purchase salt-reduced food products, preferences for salty/sweet foods and preferences for utilitarian/hedonic foods (see Appendix 3 for specific items).

In order to measure consumer hedonic/utilitarian orientation for different kinds of foods, the hedonic-utilitarian orientation scale was developed. The scale consists of eight statements (Table 3) to which the participants responded on a 7-point Likert scale (1 = “Very much disagree” and 7 = “Very much agree”).

Table 3. The Hedonic-Utilitarian orientation scale (pooled sample of n=2099)

<b>Item (source)</b>	<b>Mean (SD)</b>
I think of myself as someone who is concerned with the health consequences of what I eat <sup>1</sup> .	5.05 (1.294)
I think of myself as someone who enjoys the pleasures of eating <sup>1</sup> .	6.00 (1.135)
I think of myself as someone who is interested in eating food that is tasty <sup>2</sup> .	5.93 (1.071)
I see myself as someone who eats for pleasure.	4.13 (1.652)
I see myself as someone who eats so that my body can function.	4.20 (1.582)
I see myself as someone who is interested in eating food that nourishes my body in the best way.	4.82 (1.282)
I see myself as someone who chooses sweet, fatty or salty items when I need a snack.	4.63 (1.629)
I see myself as someone who chooses fruit, vegetables or wholegrain items, when I need a snack.	4.06 (1.642)

<sup>1</sup>Source: (Sparks & Shepherd, 1992); <sup>2</sup>Source: (Roininen, Lähteenmäki, & Tuorila, 1999)

Additionally, a Check-All-That-Apply (CATA) question was included to measure respondent preferences for various sweet or salty snacks from the hedonic and utilitarian categories (see Figure 1). The CATA question included 20 food item images representing the hedonic and utilitarian food categories and covering both sweet and salty items. Respondents were asked to indicate all items that apply to the statement “When I am tempted to eat a snack, I most often choose...”

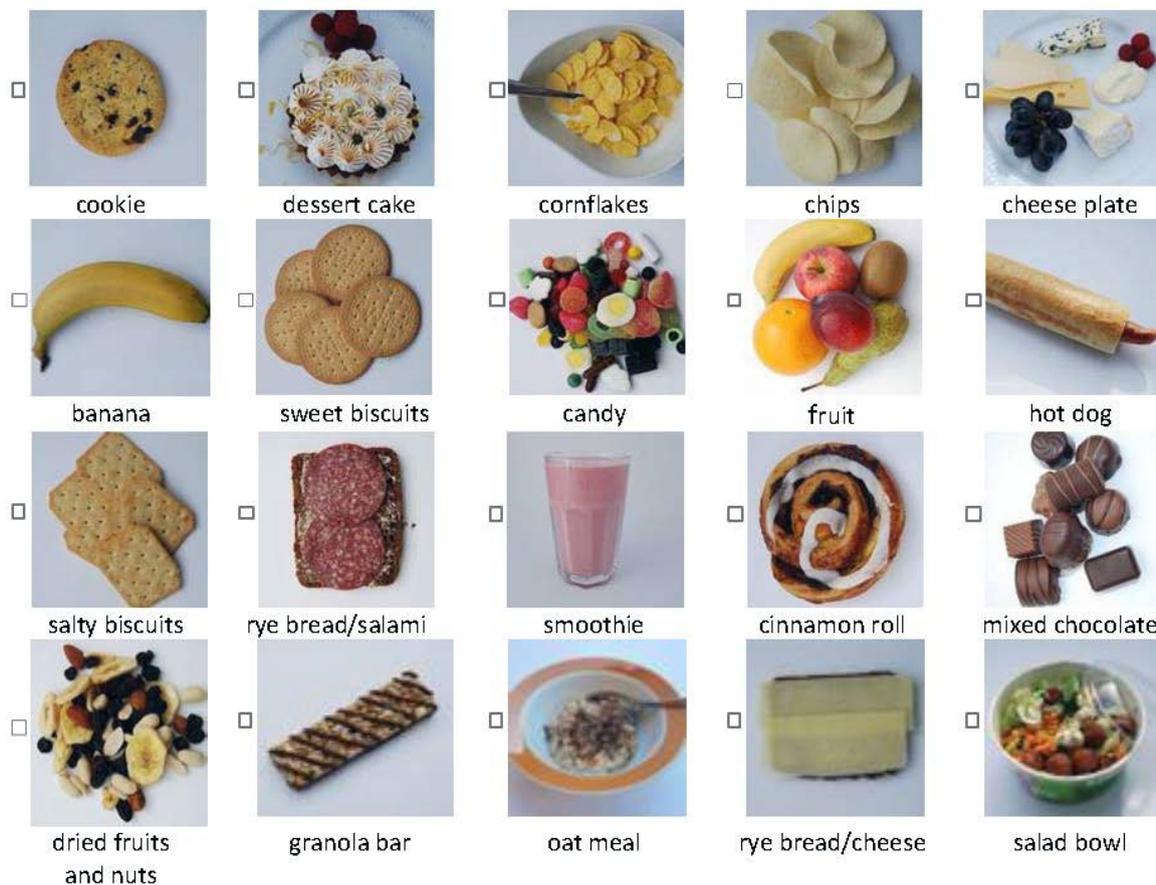


Figure 1. CATA task on 20 hedonic and utilitarian snack alternatives in Denmark (in Norway rye bread was replaced by wholegrain bread and hot dog was displayed in a bun instead of a baguette).

We measured Stages of Change by five statements adapted from Newson et al. (2013). In the analysis, these five statements were reduced to three categories: “I am not at all interested in lowering salt in my diet and I have no intention of doing so in the next six months” = “No Intention” / “I am interested in lowering salt in my diet and I have the intention of doing so

within the next six months”/”I am interested in lowering salt in my diet and I have the intention of doing so in the next month”= “Intention” and /”I am interested in lowering salt in my diet and I have started lowering my salt intake during the last six months”/”I am interested in lowering salt in my diet and I have already lowered my salt intake for longer than six months”= “Has changed”.

The point of this study was not to examine the respondents’ development but their current state, making the nuances found in the five statements redundant. The same approach was applied by Mørk et al. (2019). Willingness to purchase salt-reduced food products was measured with 17 food items and by asking the participants to answer with a “Yes” or a “No” to the question “Would you be willing to purchase the following products if they were salt reduced?” The products set up for evaluation were biscuits, ready meals, butter, deli products, white bread, cheese, canned fish, sauces (bouillon/soya, barbecue oils), olives, sausages, tomato sauce, rye bread, cornflakes, crisps, cold cut, bacon and cake. One point was assigned for each product the participant was willing to purchase, so that a respondent could obtain a maximum of 17 points and a minimum of 0 points.

In order to measure respondents’ awareness of the consequences of salt intake, items were rated on a scale from 1 (totally disagree) to 7 (totally agree). Salt in my food...“Helps the iodine uptake”/”Increases blood pressure”/”Replaces what’s sweat out”/”Is important when you exercise”/”Stimulates appetite”/”Increases the durability of food products”/”Increases water retention”/”Increases my weight”/”Increases the risk for cardiovascular diseases”/”Increases thirst”. A principal component analysis performed on the ten items resulted in a two-factor solution. The negative consequence items loaded on the first factor and the positive consequence items loaded on the second factor. Both groups of items had satisfactory internal consistency (negative consequences: Cronbach’s alpha = 0.88; positive consequences: Cronbach’s alpha: 0.79).

In order to measure respondents' basic knowledge about sources of salt, they were asked: "For each product, please take a position on whether it contributes with a little or much salt in the diet." Answers were classified as wrong or correct based on an unpublished ranking provided by a number of experts from relevant institutions<sup>3</sup>. These experts ranked the products based on their relative salt contribution to the daily diet and not based on the salt content of the individual product. Products ranked were cheese, rye bread, white bread, tomato soup, cake, meatballs, sausages, sweet biscuits, ham, popcorn, oatmeal, dark chocolate, broccoli, dries pasta, frozen vegetables. Seven food products were classified as 'much salt' (cheese, rye bread, white bread, tomato soup, cake, sausages) and eight food products as 'little/no salt'(sweet biscuits, ham, popcorn, oatmeal, dark chocolate, broccoli, dries pasta, frozen vegetables). Each correct answer for these 15 foods released 1 point, so that respondents obtained a knowledge score of 0 to 15 points (Mørk et al., 2019).

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We operationalized social norms by seven items and personal norms by four items from Thøgersen (2006). All items were rated on a 7-point scale (1 = "totally disagree" and 7 = "totally agree"). The items measure participants' perceptions of how society expects them to act when choosing food products as well as their perception of how they themselves should act on choosing. Both social norms and personal norms had high internal consistency (social norms: Cronbach's alpha = 0.87; personal norms: Cronbach's alpha =0.87). We measured participants' interest in healthy eating using eight items from the General Health Interest scale (Roininen et al., 1999). Ratings were done on a 7-point scale (1="totally disagree" and 7="totally agree"). Principal component analysis resulted in a two-factor solution. The low health interest items loaded on the first factor and the high health interest items loaded on the second factor. Both groups of items had satisfactory internal constancy (Low General Health Interest: Cronbach's alpha = 0.79; High General Health Interest: Cronbach's alpha: 0.82).

<sup>3</sup>The ranking of products was a collaboration between the National Food Administration and the Danish Technical University.

#### 3.2.2.4 Experimental groups

In each country, the respondents were randomly assigned to one of four groups: Control, Priming, Label and Label/Priming. The respondents assigned to the **Priming** group (N=620; n=275 in DK, n=265 in NO) were primed with information regarding the risk involved in consuming excess amounts of dietary salt and the diseases that could occur (Appendix 4); they saw the questions regarding the Stages of Change in salt intake with regard to salt reduction and willingness to purchase salt-reduced food products before they were exposed to the product choices. These respondents saw no salt reduction labels on the FOP images in the choice task.

The respondents assigned to the **Label** group (N=621; n=269 in DK, n=246 in NO) saw salt reduction labels on the front-of-pack images of products that complied with the official salt content guidelines (see Appendix 1 for a choice set example). These respondents received no salt/health priming information and completed the questionnaire in the same order as the Control group (see below).

The respondents assigned to the **Label/Priming** group (N=625; n=266 in DK, n=264 in NO) were given the same questionnaire as the Priming group and saw salt labels on the products that complied with the salt content guidelines similar to the label group.

The respondents assigned to the **Control** group (N=623; n = 264 in DK, n=250 in NO) saw no salt reduction labels and had no priming. They completed the questionnaire in this order: the choice task on eight product categories, preferences for salty/sweet foods and preferences for utilitarian/hedonic foods, Stages of Change with regard to salt reduction, willingness to purchase salt-reduced food products, knowledge regarding disease affected by salt intake, knowledge of salt content in food products, social and personal norms regarding dietary salt, General Health Interest and finally, socio-demographics.

### 3.3 Data analysis

The data analysis is divided into two parts: firstly, we model the results of the experimental choice task to test the effects of information priming and endorsement labels on consumer low-salt choices, as well as a selection of key socio-demographic characteristics. Secondly, we investigate socio-demographic, attitudinal and self-reported measures collected through the remainder of the survey to further highlight possible drivers of low-salt choices, besides the presence/absence of priming information and salt labels from our experiment.

Respondent choices for low-salt products in the experimental choice task were summed up into a hedonic choice score (utilitarian choice score respectively) for the four hedonic (utilitarian) products. As four choice sets were presented per utilitarian/hedonic type, these scores range from 0 to 4. Data from the two countries were pooled for analysis. General linear ANOVA models were used to explain low-salt choices in the hedonic and utilitarian product categories, by the manipulation variables (label and priming) and socio-demographic variables. The models included the following main effects: label, priming, country (Denmark or Norway), gender, age group (18-34, 35-54 and 55-75 years), marital status (single or with partner/spouse), children (with or without), education (university level or not), income (Under DKK/NOK 400 k, DKK/NOK 400-900 k, Over DKK/NOK 900 k) and shopping (has responsibility for shopping in the household or not), and their two-way interactions. The dependent variable was the number of low-salt choices among the four hedonic (utilitarian) products of the choice task. Each of the models was refined by removing interactions showing a  $p$ -value  $< 0.1$ . Effects were considered significant when  $p < 0.05$ , however also effects with  $p < 0.1$  may be discussed. The models were estimated in Minitab 18.1.

For the analysis of attitudinal and behavioural measures, a few data recoding steps were first carried out. To derive a hedonic-utilitarian snacker index from the CATA test, the data were converted by computing for each respondent the difference between the sum of selected hedonic snacks and the sum of selected utilitarian snacks, divided by the total number of snacks selected by the respondent. This index takes negative values for utilitarian-oriented snackers and positive values for hedonic-oriented snackers and was used to categorize respondents into two corresponding segments. Internal consistency of the hedonic-utilitarian snacker test was investigated by means of Multiple Factor Analysis (MFA). Further, the hedonic-utilitarian orientation scale, the awareness of consequences scale, the stated willingness to purchase (WTP) salt-reduced products measure, and the knowledge of salt in products measure were each converted into average scores. Finally, average scores were computed for the attitudinal scales of Personal norms (PNO), Social norms (SNO) and General Health Interest (GHI).

Partial Least Squares Regressions (PLSR) were used to identify socio-demographic, attitudinal and behavioural respondent characteristics associated with (i) experimental choices of salt-reduced hedonic products, (ii) experimental choices of salt-reduced utilitarian products and (iii) stated willingness to purchase salt-reduced product alternatives. All multivariate models were run on standardized data and cross-validated with 20 random segments. Original models included 111 independent variables. Uncertainty testing was used for variable selection and model reduction based on a 95-percent confidence interval, in a stepwise approach (Martens & Martens, 2000). Only refined regression models after variable selection are reported. All analyses were conducted in The Unscrambler X version 10.4.1 (CAMO Software AS, Norway).

### 3.4 Results

3.4.1 Choice task: Effect of label, priming and socio-demographic variables on low-salt product choices  
Table 4 presents the ANOVA results for the models on hedonic and utilitarian products, with focus on the analysis of the experimental choice task.

#### 3.4.1.1 Low-salt choices in the hedonic category

In the hedonic product category, respondents selected on average 1.63 low-salt products (SD 0.97) out of four (in Denmark: 1.58 (SD 0.97); in Norway: 1.69 (SD 0.98)). Low-salt choices of hedonic products were driven by the presence of our experimental low-salt label on the product packaging ( $p < 0.001$ ), but not by our experimental priming as a main effect ( $p > 0.1$ ). Low-salt choices in this product category were also significantly associated to country (more low-salt choices in Norway than in Denmark,  $p < 0.001$ ), age (more low-salt choices in the older age group,  $p < 0.01$ ), education (more low-salt choices among university-educated respondents,  $p < 0.001$ ), income (fewer low-salt choices among those who did not disclose their household income,  $p < 0.01$ ), and shopping responsibility (fewer low-salt choices among respondents who have shopping responsibility for the household,  $p < 0.05$ ). Additionally, five interaction effects significantly contributed to low-salt choices in hedonic products as presented in Figure 2. Firstly, our experimental priming information did not work alone. It only worked in synergy with our experimental salt label: low-salt choices in the presence of priming only increased in the label condition, while the label condition influences low-salt choices in the presence of a label ( $p < 0.001$ ). Secondly, the influence of a salt label is stronger for respondents who are not responsible for grocery shopping in the household than for those who are ( $p < 0.05$ ). Thirdly, in Denmark the low-salt hedonic choices increased with increasing age groups, while in Norway choices were more stable across ages, with a downward trend with age ( $p < 0.01$ ). Fourthly, in Norway, respondents with a university degree made more low-salt choices than those with a lower education, while in Denmark, there was no effect of education ( $p < 0.01$ ). Fifth, differences occurred between income groups among respondents who are not responsible for

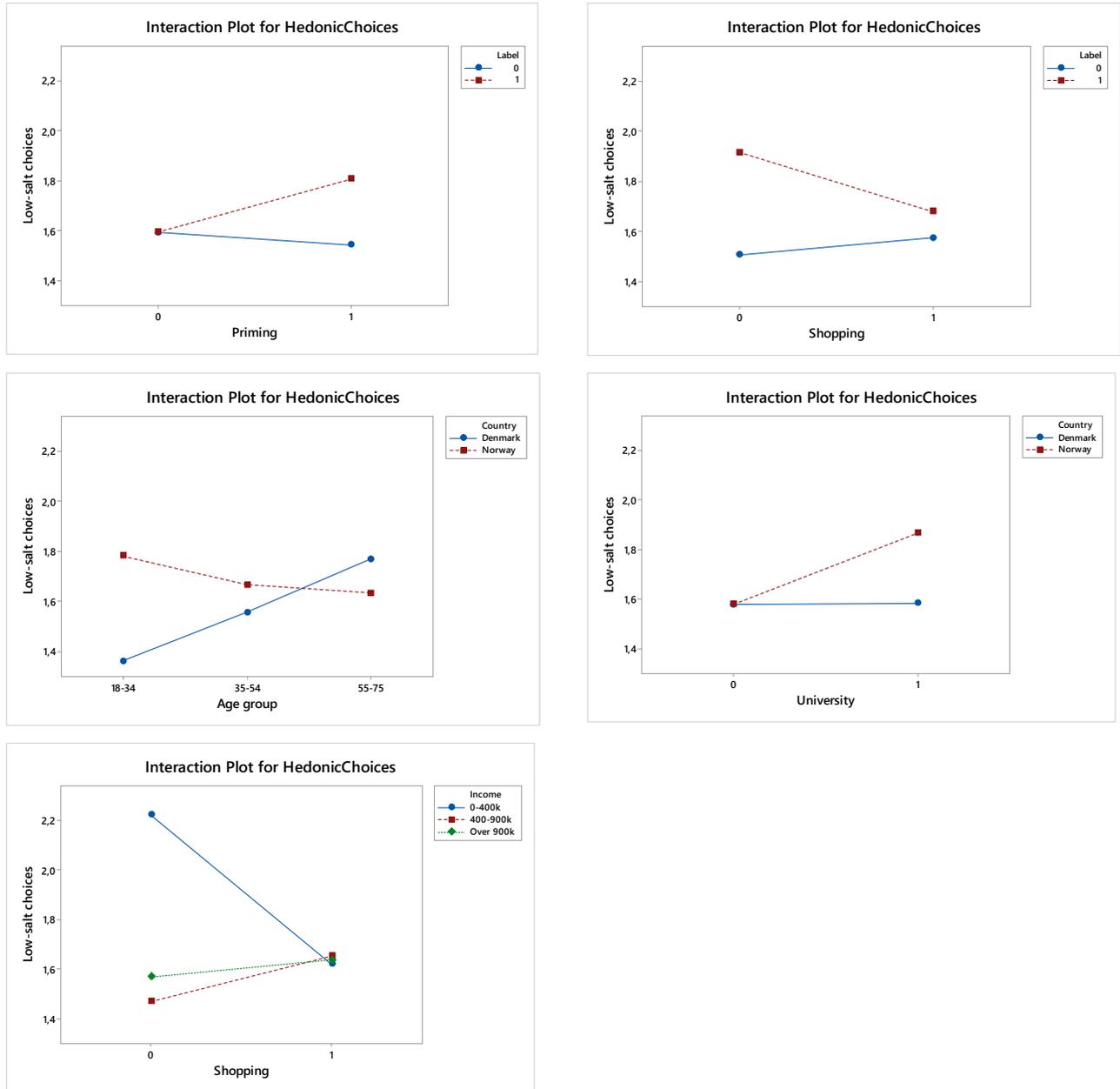
household grocery shopping. These income differences vanish among experienced grocery shoppers ( $p < 0.01$ ).

Table 4. Analysis of variance results for low-salt choices in the hedonic and utilitarian categories

Source	Hedonic low-salt choices					Utilitarian low-salt choices				
	DF	Adj SS	Adj MS	F-Value	P-Value	DF	Adj SS	Adj MS	F-Value	P-Value
Label	1	11.77	11.7747	12.96	0.000	1	10.28	10.280	10.75	0.001
Priming	1	0.78	0.7812	0.86	0.354	1	2.68	2.680	2.80	0.094
Country	1	11.14	11.1414	12.26	0.000	1	100.76	100.755	105.31	0.000
Gender	1	0.03	0.0263	0.03	0.865	1	5.71	5.710	5.97	0.015
Age group	2	13.02	6.5125	7.17	0.001	2	3.97	1.987	2.08	0.126
Partner	1	3.01	3.0121	3.32	0.069	1	1.42	1.422	1.49	0.223
Children	1	0.21	0.2091	0.23	0.632	1	3.08	3.084	3.22	0.073
University	1	14.78	14.7783	16.27	0.000	1	4.44	4.437	4.64	0.031
Income	2	10.83	5.4170	5.96	0.003	2	0.12	0.061	0.06	0.938
Shopping	1	4.25	4.2524	4.68	0.031	1	0.18	0.180	0.19	0.664
Label*Priming	1	6.95	6.9534	7.65	0.006	1	1.38	1.376	1.44	0.231
Country*University	1	9.25	9.2453	10.18	0.001	1	5.09	5.093	5.32	0.021
Label*Shopping	1	5.03	5.0350	5.54	0.019	n/a	n/a	n/a	n/a	n/a
Country*Age group	2	8.78	4.3922	4.83	0.008	n/a	n/a	n/a	n/a	n/a
Income*Shopping	2	12.02	6.0097	6.61	0.001	n/a	n/a	n/a	n/a	n/a
Priming*Country	n/a	n/a	n/a	n/a	n/a	1	10.66	10.656	11.14	0.001
Country*Gender	n/a	n/a	n/a	n/a	n/a	1	5.61	5.611	5.86	0.016
Age group*Partner	n/a	n/a	n/a	n/a	n/a	2	6.34	3.170	3.31	0.037
Error	1614	1466.33	0.9085			1591	1522.13	0.957		
Lack-of-Fit	638	568.45	0.8910	0.97	0.670	635	596.11	0.939	0.97	0.665

Pure Error	976	897.88	0.9200
Total	1633	1560.69	

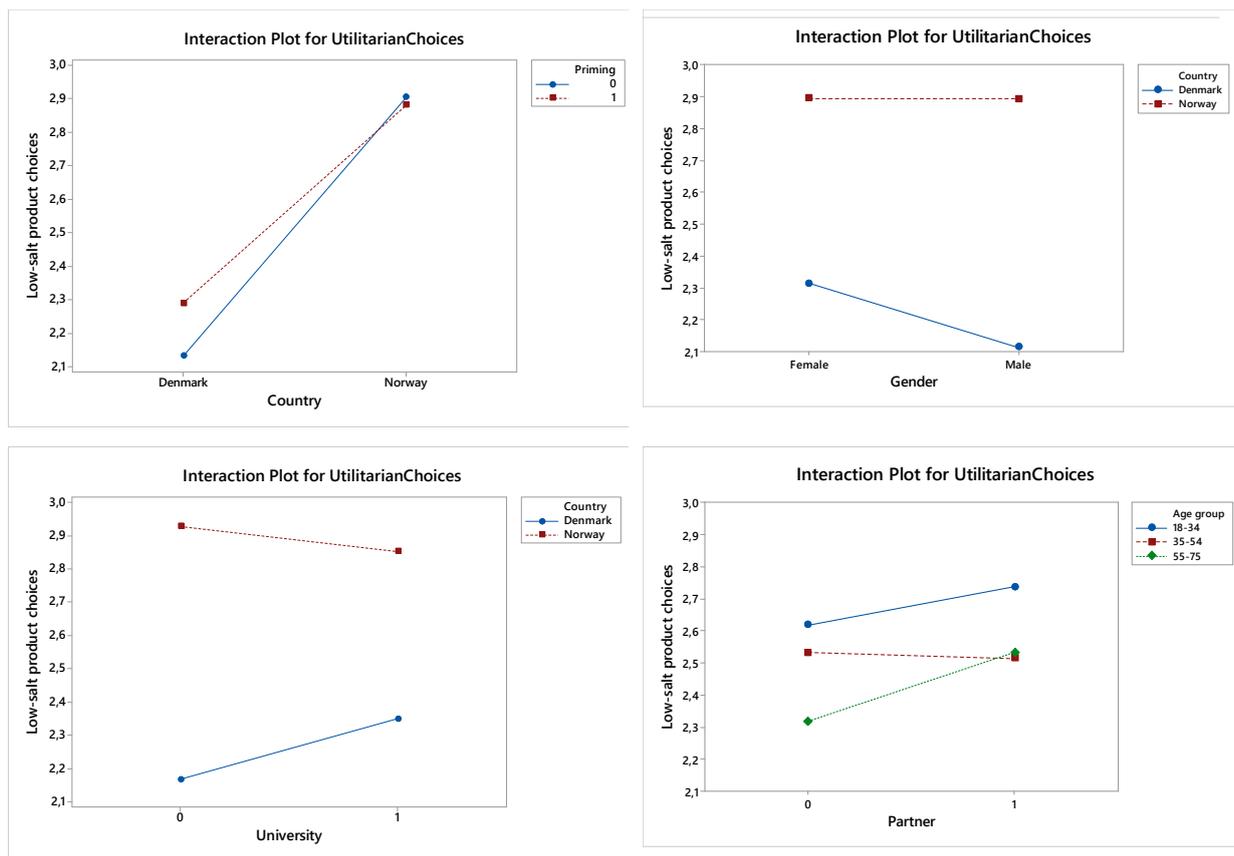
956	926.02	0.969
1609	1757.01	



**Figure 2.** Significant interaction effects in the hedonic low-salt choices. Top left: Label\*Priming, top right: Label\*Shopping, middle left: Country\*Age group, middle right: Country\*University education and bottom left: Income\*Shopping

#### 3.4.1.2 Low-salt choices in the utilitarian category

Respondents selected on average 2.53 (SD 1.03) low-salt products from the utilitarian category out of four (in Denmark: 2.20 (SD 1.03); in Norway: 2.88 (SD 0.91)). Low-salt choices of utilitarian products were driven by the presence of our experimental low-salt label on the product packaging ( $p < 0.01$ ), but not by our experimental priming ( $p = 0.094$ ). Low-salt choices in this product category were also significantly associated to country (more low-salt choices in Norway than in Denmark,  $p < 0.001$ ), gender (more low-salt choices among women than men,  $p < 0.05$ ) and education (more low-salt choices among university-educated respondents,  $p < 0.05$ ). Additionally, four interaction effects significantly explain low-salt choices in utilitarian products, as presented in Figure 3. Firstly, in Denmark priming had a positive effect on low-salt choices, but not so in Norway where low-salt choices are equally high (around 2.9 out of 4 on average) with or without priming ( $p < 0.01$ ). This difference between the two countries explains the nearly significant main effect of priming reported above. Secondly, in Denmark females chose more low-salt products than males, but not in Norway ( $p < 0.05$ ). Thirdly, in Denmark university-educated respondents chose more low-salt products, while in Norway higher education was associated with choosing fewer low-salt products ( $p < 0.05$ ). Fourthly, respondents of the lower and higher age-groups being in a couple (partner or spouse) made more low-salt choices than singles; however, this was not true for respondents in the middle age-group (35-54 years old) where being in a couple did not impact low-salt utilitarian product choices ( $p < 0.05$ ; Figure 3). Finally, it is interesting to note that no significant interaction was revealed between the label and priming manipulations for the utilitarian product group (Table 4).



**Figure 3.** Significant interaction effects in the utilitarian low-salt choices. Top left: Priming\*Country, top right: Country\*Gender, bottom left: Country\*University education and bottom right: Age\*Partner

Further, it should be noted that these models present a relatively low predictive ability, with R-squares of 6.1 percent and 13.4 percent for the hedonic and utilitarian models, respectively. This indicates that the important factors identified in the ANOVAs are not enough to explain respondents' low-salt choices fully. In a next step, consumers' salt-related attitudes will be investigated in multivariate models.

### 3.4.2 Consumer characteristics associated to low-salt choices

By means of PLS regressions, we first investigated consumer characteristics associated to the results of the experimental choice task for the hedonic and utilitarian product categories.

These PLSR models aim at highlighting consumer sociodemographic and attitudinal characteristics typically associated with the experimental choice of low or of regular salt content.

#### 3.4.2.1 Low-salt choices and salt-related attitudes in the hedonic product category

Results from the PLSR model on low-salt choices in the hedonic category show that few sociodemographic variables, but mostly attitudinal variables were significantly associated with consumer choices. Consumers from Norway, with university education, who typically check nutritional and/or health labels, who are knowledgeable on the diversity of salt sources in foods, who motivate their dietary choices in relation to body functions, who score high on the GHI and salt-related PNO scales, and/or who state having already changed their salt intake significantly performed more low-salt choices during the experimental choice task. On the contrary, consumers from Denmark, who have no intention to change their salt intake, who score high on the hedonic snacker index and/or who are attached to specific brands in the hedonic product category performed fewer low-salt choices in the hedonic product category during the experimental choice task (Figure 4, top row, left). In this model, one of the major variables that split the consumers is the status on intention to change the salt intake in their diet (Figure 3, top row, right).

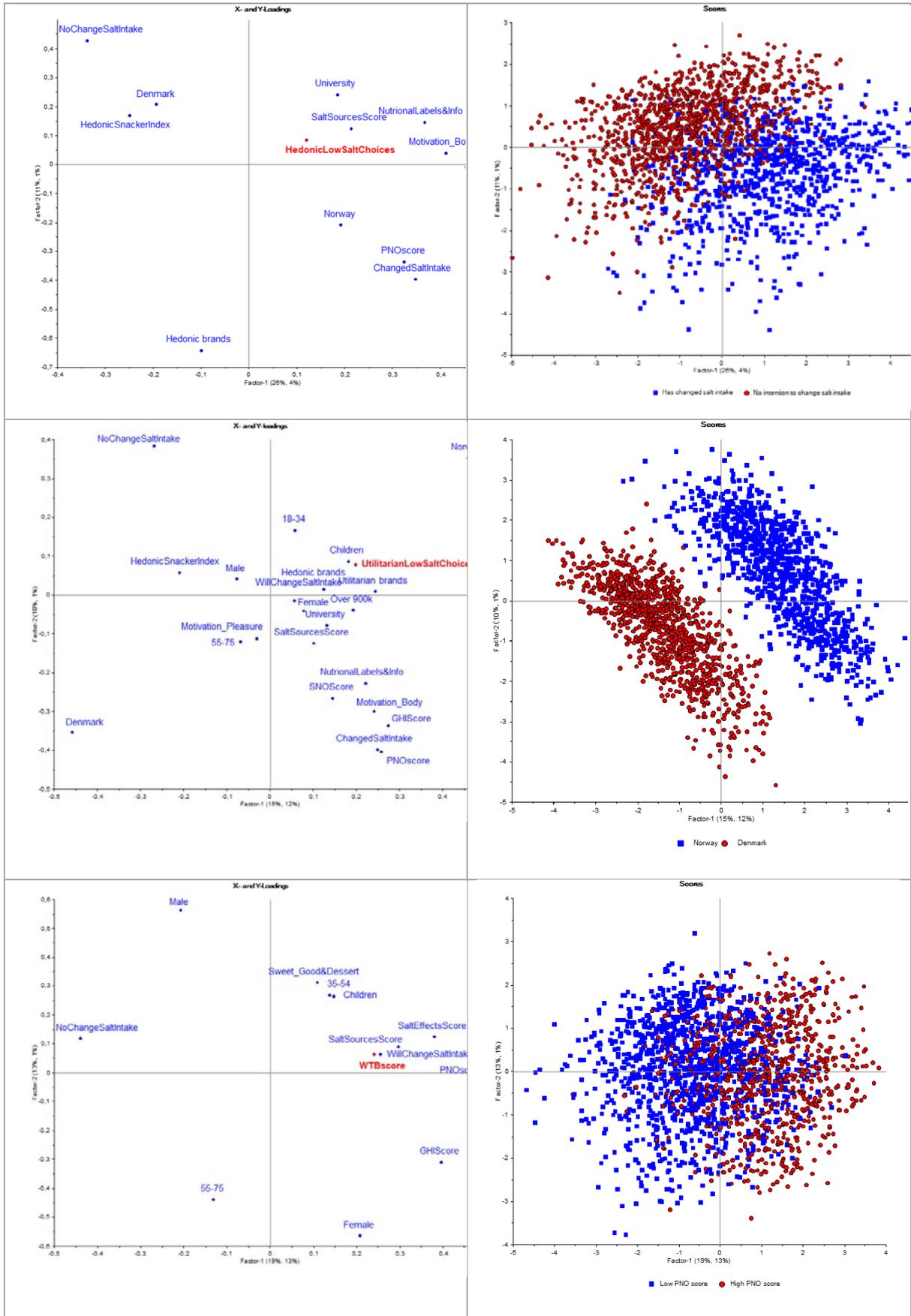
#### 3.4.2.2 Low-salt choices and salt-related attitudes in the utilitarian product category

For the utilitarian product category, the PLSR model shows that nearly all significant factors reported above for the hedonic category also apply to products in the utilitarian category with similar effects. The only exception is that consumers who are attached to specific brands in the utilitarian category performed more low-salt choices (as opposed to fewer choices in the hedonic category). Moreover, several additional characteristics come out statistically significant in the utilitarian model, indicating that more sociodemographic and attitudinal consumer characteristics contrast low-salt choices in this product category than for hedonic products. This, consumers in the 18 to 34-year-old group, females, with children, in a strong personal financial situation, who intend to change their salt intake in the near future, and/or who score high on the SNO scale chose more low-salt options in the utilitarian category. On the contrary, consumers in the 55 to 75 year-old group, males, and/or those who motivate their

dietary choices in relation to pleasure made fewer low-salt choices (Figure 3, middle row, left). In this model, the country of origin variable clearly splits consumers into two segments, where the Norwegians made more low-salt choices than the Danes for products in the utilitarian category (Figure 4, middle row, right).

#### 3.4.3 Willingness to purchase salt-reduced alternatives

A third PLSR model was developed to highlight sociodemographic and attitudinal characteristics associated with consumers' stated willingness to purchase salt-reduced alternatives from a list of 17 food items. Results show that consumers in the 35 to 54-year-old group, females, with children, who generally prefer sweet to salty items, who are knowledgeable about salt sources and salt effects on the body, who intend to change their salt intake, and/or who score high on PNO and GHI scales show a high willingness to purchase (WTP) salt-reduced items. On the contrary, consumers in the 55 to 75-year-old group, males, and/or consumers who do not intend to change their salt intake, show a low WTP salt-reduced items (Figure 3, bottom row, right). In this model, one of the major variables that splits the consumers is the PNO score (Figure 3, bottom row, right). Interestingly, no effect of country was observed in consumer's stated willingness to purchase salt-reduced product alternatives.



**Figure 4.** PLS regression models for low-salt choices (experimental task) and willingness to purchase low-salt product alternative (stated behavior). *Top:* Low-salt choices in the hedonic product category (left: Loadings plot; right: Scores plot with consumer segmentation on intention to change salt intake). *Middle:* Low-salt choices in the utilitarian product category (Left: Loadings plot; *right:* Scores plot with consumer segmentation on Norway and Denmark). *Bottom:* Willingness to purchase low-salt product alternatives (Left: Loadings plot; right: Scores plot with consumer segmentation on salt-related personal norms).

### 3.5 Discussion

Dietary salt reduction is at the top of the list when it comes to strategies to curb non-communicable diseases (WHO, 2016). FOP nutrition labelling is one of several measures applied around the world as a strategy to reduce dietary salt intake in the population (Trieu et al., 2015). However, the schemes put to use differ a lot across countries (Trieu et al., 2015). In this context, our work compares choice probability of salt-reduced processed food products with/without a government-endorsed FOP salt label and with/without goal priming regarding dietary salt and health between Denmark and Norway.

#### 3.5.1 Choice probability

Succeeding in moving consumers to choose low-salt products over high salt products is dependent on three main factors: 1) making low-salt options available to the consumers, 2) making the link between excessive dietary salt intake/cardiovascular diseases visible, and 3) the motivation of the individual consumer (Grunert, 2018). Our results show that low-salt choices in the hedonic and utilitarian categories are driven by our experimental low-salt label, and in addition, we find a significant interaction effect of label/priming in the hedonic category. No main interaction effect (label/priming) for the utilitarian category is found. While the data do not allow us to explain the exact reason for the difference between the hedonic and utilitarian categories, it might be related to a salt-reduction development potential. Maybe the full salt reduction potential has been reached for the utilitarian category, assuming that it is easier to

move a category that has not yet been focused on from a salt reduction perspective than to move the last few scale points from an already developed category (utilitarian). In addition, we may consider the possibility that health messages on products that are already considered as part of a healthy diet do not influence consumers, maybe because they find the messages redundant. It seems that in the hedonic category, respondents did not know where to find low-salt items, so even though they were primed they did not choose low salt – but if a label were there, they would know what to pick. The average level of low-salt choices was lower in the hedonic category (utilitarian). Half of the products in the hedonic category were sweet products and the other half were salty hedonic products. Another possible explanation as to why we find a difference between the choice probability of salt-labelled products for hedonic and utilitarian categories could be that consumers do not realize that sweet products can have a high salt content, so they see less relevance of "low salt" on hedonic products. Balasubramanian and Cole (2002) found that consumers ignore health information labels when they are placed on unhealthful products, which is in line with the findings by Ares et al. (2018) for front-of-pack nutrition labelling schemes on potato chips. As such, our results contradict the above-mentioned studies, as we find that our front-of-pack salt label increased purchase probability for the hedonic products by itself and when combined with health goal priming. Ares et al., 2018; Balasubramanian & Cole, 2002 did not include priming in their studies. Respondents in the Norwegian sample chose more salt-reduced products (Hedonic: 1.69 items on average; Utilitarian: 2.88) than respondents from the Danish sample (Hedonic: 1.58; Utilitarian: 2.20) across experimental group conditions, which might indicate that Norwegians already know about excess dietary salt intake from processed foods, probably based on national campaigns, so priming with already known information did not change their behavior. An alternative explanation could be that Norwegians trust official recommendations more than Danes do. We find that respondents who indicate that they do the shopping, are more influenced by product

familiarity, brand, and price experience than those who do not do the shopping. The latter focus solely on the computer task when making their stated choices. This finding is interesting for several reasons. It shows that even though this survey is “just” a computer task, low-income shoppers use their shopping experience to guide their choices; they do not just use the screen information. It also highlights that the more unexperienced a shopper, the more the environment may influence the shopper’s decisions.

We find that there is a low willingness to purchase salt reduced products among older males who state that they have no intention to change dietary salt intake. This is in line with national survey results on who consumes the most salt in both Denmark and Norway (Helsedirektoratet, 2018; DTU, 2015). Steps are taken to mitigate this by conducting national campaigns regarding use of the Keyhole, especially among men (Mørk et. al. 2017). Having high personal norms regarding salt intake and scoring high on general health interest proved to be predictors for low salt choices across categories. This is in line with the findings of Mørk et. al. (2019), where personal norms and general health was found to both predict willingness to purchase and intention to change dietary salt. In addition, personal norms and general health interest are motivational measures and being motivated is a well-established prerequisite for behavioral change (Grunert & Wills, 2007; Grunert, 2018).

Although our results suggest that a specific FOP salt label can increase choice probability of salt-reduced products, the findings do not shed light on actual consumer behavior. Respondents did not find themselves in a real purchasing situation in which they are distracted by prices on products, more than four choices, time pressure, a real need for specific products, etc. Therefore, results may not reflect the real consumer’s decision-making in a real-life purchase situation. Thus, further research is needed to look at the FOP labels potential to drive some of the sale toward a salt-reduced product within its category.

In closing, it is worth emphasizing that results from this study should be interpreted with its limitations in mind. The study was not conducted under externally valid conditions. Research considering government-endorsed FOP salt labels in an experimental design closer to real-life shopping is warranted. These findings are based on one study, conducted as a web survey. The findings are subject to the particular setting in which we conducted this study (i.e., Denmark and Norway). Replications of this study in other countries might arrive at different results. We call for continued cross-national research that includes countries representing different continents and cultures. Moreover, our study is subject to the usual limitations of survey research, specifically in relation to behavior and intentions based on self-reports. The respondents' replies about how they snack or what they choose might reflect a social desirability bias; answering more positively in a survey imposes no immediate costs on them. Finally, all pictures of products were displayed with brand, other FOP information such as organic label, wholegrain label or keyhole as per the original packaging, but without a price. We have taken steps to mitigate this limitation by employing a between-subjects design with random allocation of respondents to the different conditions so that any effects of brand and/or flavor would occur in the same way across the four experimental conditions.

In the categorization of hedonic and utilitarian products, we merely measured consumers' overall perception of a product. This means that a consumer might perceive a specific product as more or less hedonic/utilitarian depending on context, emotional state and possibility for actual consumption. Despite of the limitations of the measure, we found coherence between responses in Denmark and Norway and we used an already published method to measure the hedonic/utilitarian level (Khare & Chowdhury, 2015).

### 3.6 Conclusion

The objective of this research was to investigate the effect of information in the form of a front-of-pack salt label and priming of salt reduction goal on choice probability of salt-reduced food products between four experimental groups. Furthermore, our goal was to identify if choice probability differs between hedonic and utilitarian products, and which consumer socio-demographic and attitudinal characteristics may drive these choices. Salt labelling may represent an important step in prompting the consumer to choose products with less salt. Overall purchase probability of salt-reduced products was higher in Norway for both the hedonic and the utilitarian food categories. However, we found that the FOP salt label and health information via priming increased choice of salt-reduced products in the hedonic category in both countries. Moreover, we found that the FOP salt label increased choice from the utilitarian category in both countries. Finally, our data revealed that high general health interest and personal norms were impactful on the choice of low-salt products across product categories, while social norms led to low-salt choices in the utilitarian category, but not in the hedonic category. Our results suggest that product labels indicating compliance with the national Food Administrations recommended salt levels combined with information campaigns may successfully prompt consumer choices towards salt-reduced products in both countries. Further research is needed to investigate the ecological validity of the findings.

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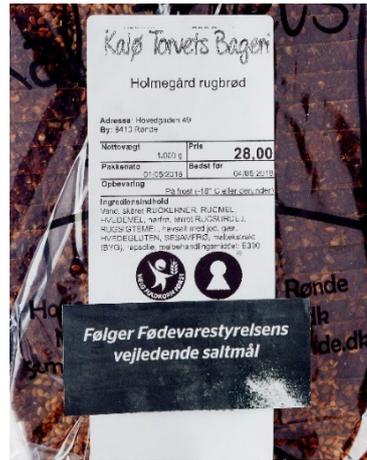
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Appendix 1

Choice sets Denmark











Choice sets Norway

Naturlig Sunn leveres sammen med Den Norske Turistforening. Et naturlig valg for gode og næringsrike matpakker.

**Naturlig Sunn**  
**SPELT**

- Naturlig kilde til jern\*
- Naturlig kilde til protein
- Naturlig høyt innhold av kostfiber

Følger Helsedirektoratets anbefalinger om saltreduksjon

Bakehuset

Jern bidrar til normal funksjon av immunforsvaret

Naturlig Sunn leveres sammen med Den Norske Turistforening. Et naturlig valg for gode og næringsrike matpakker.

**Naturlig Sunn**  
**GROV**

- Naturlig kilde til jern\*
- Naturlig høyt innhold av protein
- Naturlig høyt innhold av kostfiber

Følger Helsedirektoratets anbefalinger om saltreduksjon

Bakehuset

Jern bidrar til normal funksjon av immunforsvaret

Bakehuset

LANDEVEIS  
**RUG** BRØD

MED POTETER FRA STJØRDAL

MENY  
Matpakker fra NORGE

Stjørdal  
Trøndelag

Bakehuset 78-2000  
78%

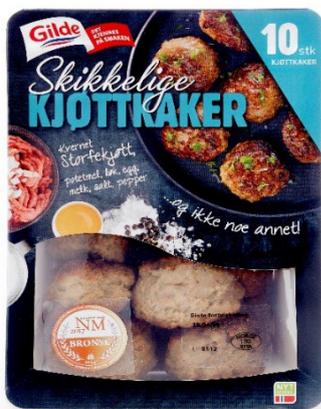
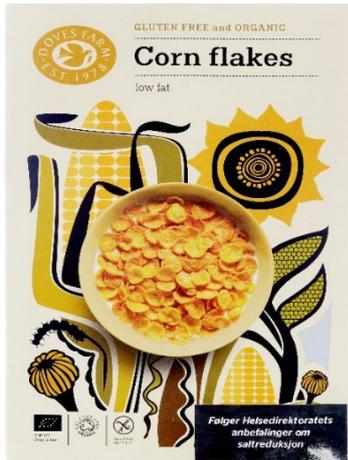
INGERS FIBERBRØD  
GODT FOR KROPPEN  
RIK PÅ FIBER

RIK PÅ FIBER  
**INGERS**  
Fiberbrød

Inger Klakstad  
TROND ELESTAD

Høyt innhold kostfiber. Brød bakt med høy innhold kostfiber. Brød









## Appendix 2 Pilot-test selection of hedonic and utilitarian food products

Twenty-four food products were classified into either the hedonic or the utilitarian category by means of a short survey distributed via email and Facebook in Denmark (n = 49) and Norway (n = 55). Participants were recruited via the first author's Facebook profile in Denmark and via a Norwegian collaborator's private Facebook profile in Norway and her professional network on email. There was a fair division in gender and age, however participants were not asked to disclose either. Participants were given instructions to fill out the questionnaire. "We ask you to indicate which category you believe every product belongs to. A **hedonic food product** is a product that you want to consume for pleasure and not because the body needs nutrition ("a pleasure food"). A **utilitarian food product** is a product that the body needs on a daily basis to provide nutrition ("a functional food"). On a scale from 1 to 7, please indicate where you believe each of the following foods is located on the scale (1 = very utilitarian, 7=very hedonic)."

Participants then were given a list of 24 products (shellfish, yoghurt, oatmeal, candy, chocolate, rye bread with cheese, rye bread with salami, cereal bar, banana, cookie, fruit, cornflakes with milk, hot dog, sweet biscuits, cheese crackers, chips, cake, cinnamon roll, salad on the go, cheese plate, nuts and dried fruit, cheese chunk, meatballs, smoothie). Participants were asked to rate each item on a 7-point Likert scale with the following headlines; 1 = Very Utilitarian (functional, practical, plain) to 7 = Very Hedonic (fun, enjoyable, pleasurable). For the Danish sample, the results were as expected, e.g. the rating for banana was significantly lower than the rating for cookie ( $M_{\text{banana}} = 2.78$ ,  $M_{\text{cookie}} = 6.69$ ) and rye bread and oatmeal were considered the most utilitarian items on the list ( $M_{\text{rye bread}} = 1.98$ ,  $M_{\text{oatmeal}} = 1.96$ ). Similar results were obtained from the Norwegian sample ( $M_{\text{banana}} = 2.85$ ,  $M_{\text{cookie}} = 6.71$ ,  $M_{\text{rye bread}} = 2.04$ ,  $M_{\text{oatmeal}} = 2.07$ ); there was agreement on all product classifications between the two countries. Finally, all products scoring above 5 on average on the Likert scale were categorized as hedonic products and all products scoring under 4 on average were classified as utilitarian products. See Table 2 for all the Danish and Norwegian means.

### Classification of food products into hedonic and utilitarian categories

	Denmark (n=49)		Norway (n=55)	
	Mean	Std. Deviation	Mean	Std. Deviation
<b>Hedonic products</b>				
Candy	6.86	0.884	6.67	1.375
Chips	6.82	0.900	6.80	0.869
Dessert cake	6.71	0.971	6.84	0.834
Cake	6.67	0.976	6.82	0.434

Mixed chocolates	6.65	1.051	6.38	1.163
Cookie	6.69	0.883	6.71	0.963
Cinnamon roll	6.59	0.825	6.53	1.086
Sweet biscuits	6.49	1.040	6.64	0.930
Hot dog	6.24	1.202	5.09	1.713
Cheese crackers	6.10	1.296	5.18	1.588
Granola bar	5.35	1.483	4.18	1.529
Cornflakes	5.02	1.602	5.13	1.564
<b>Utilitarian products</b>				
Cheese chunk	3.65	1.554	2.78	1.329
Yoghurt	3.47	1.381	3.35	1.294
Dried fruit and nuts	3.37	1.596	3.31	1.477
Smoothie	3.59	1.607	3.60	1.510
Rye bread with salami	3.37	1.390	2.91	1.337
Meatballs	3.39	1.451	3.18	1.376
Shellfish	3.33	1.667	3.04	1.633
Banana	2.78	1.343	2.85	1.380
Rye bread with cheese	2.59	1.176	2.22	1.287
Fruit	2.43	1.396	2.22	1.343
Rye bread	1.98	1.132	2.04	1.178
Oatmeal	1.96	1.223	2.07	1.297

### Appendix 3 Content of questionnaire

<b>Motivation to reduce salt intake</b> (Prochaska & Velicer, 1997)	<p>“I am not at all interested in lowering the salt in my diet and I have no intention of doing so in the next six months”/“I am interested in lowering the salt in my diet and I have the intention of doing so within the next six months”/“I am interested in lowering the salt in my diet and I have the intention of doing so in the next month”/“I am interested in lowering the salt in my diet and I have started lowering my salt intake during the last six months”/“I am interested in lowering the salt in my diet and I have already lowered my salt intake for longer than six months”</p>
<b>Willingness to purchase salt-reduced products</b>	<p>“Yes” or “No” to: “Would you be willing to purchase the following products if they were salt reduced?” biscuits, ready meals, butter, deli products, white bread, cheese, canned fish, sauces (bouillon/soya, barbecue oils), olives, sausages, tomato sauce, rye bread, cornflakes, crisps, meat spread, bacon and cake.</p>
<b>Awareness of salt-related consequences</b>	<p>Salt in my food.... “Helps the iodine uptake”/“Increases blood pressure”/“Replaces what’s sweat out”/“Is important when you exercise”/“Stimulates appetite”/Increases the durability of food products”/“Increases water retention”/“Increases my weight”/“Increases the risk for cardiovascular diseases”/ “Increases thirst”.</p>
<b>Knowledge of salt in products</b> (Mørk et al., 2019)	<p>For each product, please take a position on whether it contributes with a little or much salt in your diet.... Answers were classified as wrong or correct based on an unpublished ranking provided by a number of experts from relevant institutions<sup>4</sup>. These experts ranked the products based on their relative salt contribution to the daily diet and not based on the salt content of the individual product. Seven food products were classified as ‘much salt’ and eight food products as ‘little/no salt’. Each correct answer for these 15 foods gave 1 point, so that respondents obtained a knowledge score of 0 to 15 points.</p>
<b>Why and what do I eat</b>	<p>“I think of myself as someone who is concerned with the health consequences of what I eat”; and “I think of myself as someone who enjoys the pleasures of eating.” (Sparks &amp; Shepherd, 1992), “I think of myself as someone who is interested in eating food that is tasty”(Roininen et al., 1999) and the five ones developed for this purpose; “I see myself as someone who eats for pleasure”/“I see myself as someone who eats so that my body can function”/“I see myself as someone who is interested in eating food that nourishes my body the best”/“I see myself as someone who chooses sweet, fatty or salty items when I need a snack”/“I see myself as someone who chooses fruit, vegetables or wholegrain items, when I need a snack”.</p>
<b>Norms and motives</b>	<p>Social norms from Cialdini, Kallgren, and Reno (1991): “Other people like me better if I reduce my dietary salt intake”/“Many people reduce their dietary salt intake”/“It makes a good impression on other people to reduce one’s dietary salt intake”/“Many people I know reduce their dietary salt intake”/“To reduce one’s dietary salt intake gives social status”/“People who are important to me think I should reduce my dietary salt intake”/“Many people think I should reduce my dietary salt intake”. Personal norms with four items from Thøgersen (2006): “I feel bad when I am not reducing my dietary salt intake”/“I feel that it is my duty to reduce my dietary salt intake”/“I get a bad conscience when I do not reduce my dietary salt intake whenever it is possible”/“I feel that I should choose to reduce my dietary salt intake instead of <i>not</i> reducing it”. All items were rated on a 7-point scale (1 = “totally disagree” and 7 = “totally agree”)</p>
<b>Sweet or Salty preferences</b>	<p>If I want to treat myself with a snack, I prefer...” (pictures of products) Chips Chocolate None of the options</p>

<sup>4</sup>The ranking of products was a collaboration between the National Food Administration and the Danish Technical University

<b>Hedonic or utilitarian eater</b>	<p>“If I am having a dessert, I prefer...” (Pictures of dishes)</p> <p>Cheese platter Dessert cake None of the options</p>
<b>Preferences for various snack foods</b>	<p>“When I am tempted to eat a snack, I most often choose this/these...” (pictures of items)</p> <p>Cookie, dessert cake, cornflakes, chips, oat meal, cheese plate, banana, sweet biscuit, candy, salad bowl, fruit, hot dog, cracker, rye bread/sausages, rye bread/cheese, smoothie, cinnamon roll, mixed chocolate, dried fruit and nuts, grain bar</p>
<b>General Health Interest</b>	<p>“I am very particular about the healthiness of food”/“I always follow a healthy and balanced diet”/“It is important for me that my diet is low in fat”/“It is important for me that my daily diet contains a lot of vitamins and minerals”/“I eat what I like and I do not worry about healthiness of food”/“I do not avoid any foods, even if they may raise my cholesterol”/“The healthiness of food has little impact on my food choices”/“The healthiness of snacks makes no difference to me”</p>

## Appendix 4 Priming

### **Dear participant**

Welcome to this study on foods, conducted by the University of Aarhus in collaboration with Nofima, Norway.

The study aims to gain insight into the purchasing habits of Danes and Norwegians by studying the attitudes and motivations that cause a consumer to choose certain products over others, with a particular focus on salt and salt-reduced products.

The vast majority of the salt we consume comes from processed foods and it has been found that high levels of salt in the diet increase the risk of high blood pressure, which can lead to cardiovascular disease.

In 2005, cardiovascular disease was the second most frequent cause of death in Denmark, accounting for 30% of all deaths.

The study takes approx. 15 min to complete.

If you have any questions about the study, please contact:

PhD student Trine Mørk by email: [tmork@mgmt.au.dk](mailto:tmork@mgmt.au.dk)

In advance, thank you for your help!

Yours sincerely

The MAPP Center

Aarhus University

Nofima A / S



# 4

## The effect of labeling on purchase probability of salt-reduced food products and the roles of guilt and taste expectations in choice

Paper to be submitted

**Trine Mørk**  
*Aarhus University*

**Klaus G. Grunert**  
*Aarhus Universitet and  
University of Aaasa*

### **Abstract**

Around the World, countries are implementing salt-reduction strategies for a healthier population. Mandatory reformulation and nutrition labeling are strategies that are believed to provide the biggest population-wide dietary salt-reduction and nutrition labeling has a double potential. However, the effects of a salt label are not well investigated. We conducted three studies, a web-survey with a choice experiment (n=1030), an in-store experiment (n=190) and another web-survey with choice tasks (n=750). In the choice experiment, we tested the effect of two different salt labels on respondents' choices. In the in-store study, we tested the effect of the most successful label. In the web study, we explore if guilt and taste expectation can explain some of the variances we see between the choices of the different product categories and the two different types of labels in studies one and two. In study 1, we found that an authority-endorsed salt label has a positive impact on purchasing probability, while a “Reduced salt content” label has a negative effect. In the in-store experiment, we found that we can replicate the effect for the authority-endorsed label only when shoppers receive a health prime, and only for hedonic products. In study 3, we found that the effect of a salt label on probability of choosing a salt-reduced product depends on product category. We also found that a salt label induces guilt in the consumer, but does not generally affect taste expectations. Our results have implications for public labeling policy and for industry strategies on reformulation of products.

#### 4.0 Introduction

Grocery shopping is a habit-based activity; shoppers operate automatically and quickly, with little or no conscious effort or voluntary control (Dickson & Sawyer, 1990; Macdonald & Sharp, 2000). Even when their decisions are not habit-based, they are simplified by the use of heuristics, that is, the limited processing of information (Bettman, Luce, & Payne, 1998; Gigerenzer & Gaissmaier, 2011). The introduction of front-of-pack (FOP) nutrition labeling on food products is an attempt to reconcile heuristic decision making with a stronger focus on health. Because consumers make 82% of their grocery purchase decisions inside supermarkets (Point of Purchase Advertising International, 2014), this complex store environment is an excellent place to influence consumers by offering them cues that simplify their choices (Bettman et al., 1998). However, the true effect of FOP nutrition labeling on choice is not clear (Berning, Chouinard, & McCluskey, 2010; Grunert & Wills, 2007; Steenhuis, van Assema, van Breukelen, & Glanz, 2004; Sutherland, Kaley, & Fischer, 2010; Vyth et al., 2010).

The food industry is facing calls to reduce the amount of salt in its products; it can do so by reformulating products or by differentiating them according to salt content and informing consumers accordingly. Chile, Peru, Israel, and some products in Finland have FOP labels that contain specific salt-content *warnings* “High in sodium” (“Food Label and Nutritional Labeling,” 2018; Ikonen, Sotgiu, Aydinli, & Verlegh, 2019). Currently, food products in Scandinavia (Denmark, Norway, and Sweden) do not have specific FOP salt-content labels, neither warning labels on high sodium products or endorsement labels on low sodium products. Although salt reduction in processed foods benefits the health of those eating them (Brown, Tzoulaki, Candeias, & Elliott, 2009), it is not clear whether producers should use FOP labels to communicate salt-content reformulations to consumers. If FOP labels add value to salt-reduced products by increasing perceptions of healthiness, food authorities can better argue for reformulation. However, if consumers react negatively and reject the products because of negative taste expectations or lack of trust, the industry should be careful about using FOP labels to

communicate salt-content reformulations. FOP label policies have been implemented around the world, with very different strategies (EUFIC, 2018) and currently these policies are considered when mandating a potential front-of-package food label(s) in the U.S. (Pomeranz, Wilde, Mozaffarian, & Micha, 2019).

Products that are purchased for immediate pleasure are known as hedonic products; consumers may be less willing to choose salt-reduced hedonic foods because they expect them to taste worse than foods with a conventional salt content. However, consumers may choose salt-reduced foods when they regard the product category as utilitarian, that is, foods they purchase for health reasons or other longer-term benefits (Bazerman, Tenbrunsel, & Wade-Benzoni, 1998; Dhar & Wertenbroch, 2000; Khan, Dhar, & Wertenbroch, 2004).

Goal priming is an approach that can be used to activate people's latent goals; it can lead consumers to choose products consistent with their goals. Priming consumers to activate latent goals is a potentially effective way of making them evaluate food products in relation to health goals (Bargh, 2002). Because consuming too much salt can have a negative effect on health and play a role in pre-mature deaths, goal priming directed at the negative health consequences and risk of premature death with excessive salt intake may successfully activate consumers' goals about living a long life and make them more susceptible to salt-content cues.

The objective of this paper is to investigate whether differing versions of FOP salt-content labels increase or decrease consumers' likelihood of choosing salt-reduced products. We begin in study 1 by conducting a hypothetical choice experiment to determine the effects of two different salt-content labels. Next, in study 2, we conduct an in-store experiment to investigate whether the label that was most effective in the hypothetical choice experiment is similarly effective in real life. In this experiment, we also test whether goal priming of consumers increases the effectiveness of the label.

Finally, in order to shed additional light on the mechanisms by which salt labels affect consumer choice, in study 3 we again test the effects of salt-content labels on choice, taking into account how the salt labels affect felt guilt and taste expectations. The article concludes with a discussion of the results of the three studies from theoretical and policy/practice perspectives.

## 4.1 Theoretical foundation

### 4.1.1 Cue type and cognitive processing

In purchase situations, consumers have limited amounts of cognitive space to process information; their views and evaluations of a wide array of cues vary according to contexts, interests, purchase frequencies, and time constraints. The success of FOP labeling depends not only on the ease with which consumers can process information and infer its relevance (Schwarz, 2004), but also on the contexts in which processing takes place e.g., comparative (several options to choose from, like in a supermarket) or non-comparative (one or very few options to infer information from) environments. According to Newman, Howlett, and Burton (2016), interpretive cues increase evaluation and purchase probability in comparative environments, whereas reductive cues increase choice in non-comparative environments (see figure 1). The reductive cue is a cue that is back-of-pack nutrition information but placed front-of-pack. The hybrid label is a combination of the reductive nutrient specific label but combined with traffic light information providing some kind of endorsement or evaluation of the levels of the different nutrients in the product. The category of interpretive labels can be further divided into two types, depending on the level of evaluating/aggregation of information. The interpretative label can be a nutrient specific label that declares the level (high) of one nutrient but without declaring any numbers/percentages. Lastly, the interpretative label that hold no nutrient specific information is a summary/endorsement label that communicates about a products overall healthiness and will be based on evaluations of several nutrient specifications, but communicated in a simple logo front-of-pack. The typology depicted in figure 1 places our hypothetical label in the current typology.

The findings from Newman et al. (2016) emphasize the importance of reflecting on the environments in which products are available before deciding how to design related cues. In the case of grocery shopping, most consumer decisions are made in comparative environments, so evaluative cues are the relevant choice.

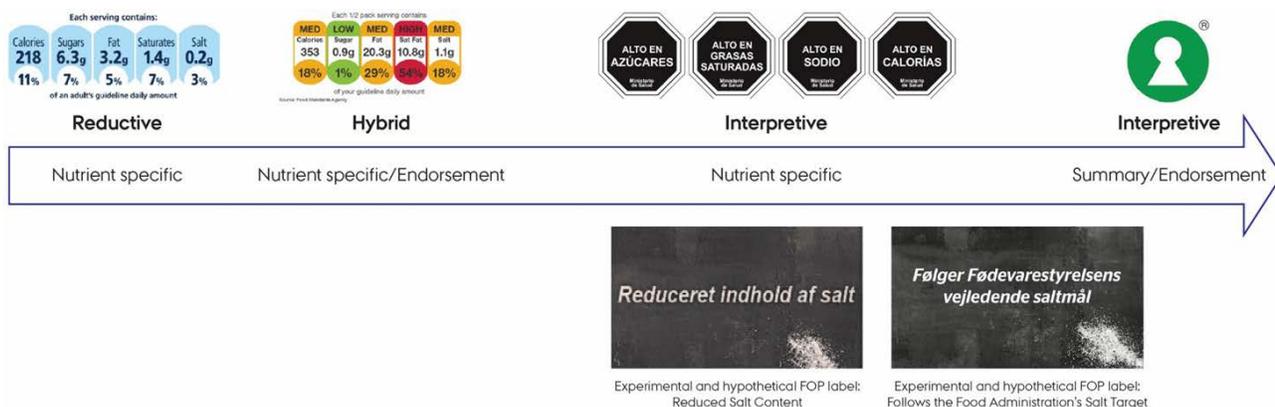


Figure 1: Typology of reductive labels and interpretive labels.

#### 4.1.2 Wording of evaluative cues

Evaluative cues differ according to salience, size, content, and wording. Although researchers do not fully understand all the effects of these differences, sensory research shows that emphasizing the terms “salt reduction,” “Reduced salt content,” or similar phrases can have a negative effect on consumers’ taste perceptions and on their desire to add salt to products upon consumption (Liem, Miremedi, Zandstra, & Keast, 2012). In their sensory study, Liem et al. (2012) find that emphasizing salt reduction in a soup has a negative effect on taste perception and increase salt use, especially for consumers who are able to taste the difference between the regular soup and the salt-reduced version; the authors also show that the Heart Foundation Tick logo, which does not emphasize salt reduction, is less likely to affect perceived salt intensity than use of the terms “salt reduction” or “salt-reduced.” (Acton, Vanderlee, Roberto, & Hammond, 2018) found that adding a government attribution on soft drink beverages in Canada increased the believability of the message (label) and most likely to change purchase decision. These results suggests that it makes a difference for the effect of evaluative labels whether they emphasize some form of authority endorsement of the product. In this paper, we include three different label wordings: “Reduced salt content,” “Complies with the Food Administrations Recommendations on Maximum Salt Content,” and a modification of the latter term, “Follows the Food Administration’s Recommended Salt Target,” to test their differing effects with regard to

expectation and choice.

#### 4.1.3 Priming

In the attempt to increase the effect of FOP on purchase probability, manufacturers and health administrations can make use of goal priming. Goal priming is about activating a latent goal so it will increase the likelihood of goal-related behavior (Minton, Cornwell, & Kahle, 2017). More and more stakeholders are making use of goal priming as a strategy to create attention. Goal priming can work unconsciously and does therefore not require the allocation of conscious effort to the decision (Dijksterhuis, Chartrand, & Aarts, 2007). Papies (2016) has done a series of studies where health primes resulted in more frequent healthy decisions both in a grocery-shopping situation and in a restaurant setting. However, the effects of goal priming are context specific. Since goal priming is about activating latent goals, it will fall short if the people being primed do not have a latent goal related to the prime. Since salt will most likely not be “top of mind” for most consumers, a salt label might need a health prime before consumers deem the salt reduced product relevant enough to choose.

#### 4.1.4 Justifying hedonic consumption

We distinguish hedonic products from utilitarian products (Kahn, 2004). Hedonic food products are fun, enjoyable, and pleasurable; utilitarian food products are functional, practical, and plain. When consumers purchase hedonic products, they may be less willing to choose salt-reduced products if they expect diminished taste, because they purchase hedonic products for their immediate pleasure (Batra & Ahtola, 1991; Kahn, 2004). However, with regard to utilitarian products, consumers may be more inclined to choose salt-reduced products if their purchase decisions are dominated by longer-term health goals. Notably, Verbeke (2006) shows that consumers are *not* willing to accept poorer taste in exchange for healthier products, and Kahn (2004) finds that consumers typically choose taste over health, even when they shop with health as a motive. This relationship may be moderated by products' predominant characterizations as hedonic or utilitarian.

Previous research (Mørk et. al., 2019, under review for *Appetite*) shows that respondents choose more salt-reduced products in the utilitarian (vs. hedonic) category, irrespective of salt-reduced labeling or priming. We propose that justification theory explains consumers' higher likelihood of choosing salt-reduced products in the utilitarian category: Because hedonic (utilitarian) products tend to be perceived as relatively more discretionary (necessary), it is more difficult (easier) to justify the purchase of hedonic (utilitarian) products. Possible reasons for this justification difficulty are that (1) consumers have a sense of guilt associated with purchasing hedonic products, and (2) it is more difficult to argue for discretionary purchases in the hedonic category (Okada, 2005). Because justifiable choices are easier to make (Hsee, 1995), it should be easier to choose hedonic products when choice situations favor justification (e.g., a selection of both salt-reduced and conventional, non-salt-reduced hedonic products). According to Baumeister, Stillwell, and Heatherton (1995), guilt is mainly social in nature; it is most likely to arise when there is conflict between one person's action/choice and a social norm or promise to another person. If effectively worded salt-content labeling can be used to justify hedonic purchases, we would see evidence of a shift in sales from high-salt products to low-salt products. From a public health perspective, it would be good news, though such a shift could possibly also have an unintended and a less favorable consequence by increasing the volume of food products purchased from hedonic categories if consumers confuse salt-reduced hedonic products with healthy products.

## 4.2 Study 1

### 4.2.1 Method

The main purpose of Study 1 was to test the effect of two different versions of a salt-content label on consumer choices. For this purpose, we designed a choice experiment and implemented it in an online survey in the summer of 2016. We used a market research agency, Userneeds, to collect the data according to a sample that was representative of the Danish population that purchases the focal

products in terms of gender, age, and education. A total of 1,030 respondents participated. Table 1 displays the demographic characteristics of the sample.

Table 1: Demographic characteristics of Study 1 sample

Gender	%
Female	51.7
Male	48.3
Marital status	
Married/cohabitating	60.9
Single	39.1
Children	
0 children	68.7
1–2 children	26.7
> 2 children	4.6
Education	
Primary school	28.0
Secondary school/vocational training	40.3
Higher education	30.2
Age (years)	
18–27	15.5
28–37	15.4
38–47	24.5
48–57	24.0
58–77	20.6

We designed choice experiments related to four product categories: potato chips, rye bread, sausage, and ready-made soups (see Table 2). We tested two salt-content labels; one featured the words “Reduced salt content,” and the other featured the words “Complies with the Food Administration’s Recommendations on Maximum Salt Content.” Before we selected the four product categories, we examined the market for categories that had products with both high and low levels of salt and at the same time were products that contributed with a substantial amount of salt to the average Danish diet. We selected the attributes in relation to their product-specific relevance, which we determined by means of a pilot test (n=42) of the four product categories. We recruited participants via Facebook and asked what product attributes consumers of the specific products found to be important when making a

purchase decision. Based on these answers we included what was perceived as the most relevant information for the consumers in the pilot test, on the different product categories. Each product description included realistic price information. Product descriptions on the rye bread, sausage, and soup could include the Keyhole logo (a health logo widely used in Scandinavian countries); the potato chip product descriptions could include an organic logo; the rye bread product descriptions could include a whole grain logo; the sausage and potato chips product descriptions included information on fat content; and the ready-made soups included information on calories. Using the software Ngene, based on the D-efficiency criterion, we generated 12 choice sets of three alternatives each. Half the respondents completed the choice experiment for rye bread and sausage, and the other half of respondents completed it for potato chips and soups. We presented the choice sets to respondents in random order.

Table 2: Design of choice experiments, Study 1

Product category	Attributes	Number of levels	Description of levels
Rye bread	Price	3	15.9/17.95/19.95
	Salt labeling	3	Complies with the Food Administration's Recommendation's on Maximum Salt Content/Reduced salt content
			Content/No Label
	Keyhole	2	Present/not present
	Whole grain label	2	Present/not present
Sausage	Price	3	12.95/18.95/23.50
	Salt labeling	3	Complies with the Food Administration's Recommendation's on Maximum Salt

			Content / Reduced salt content Content/No Label
	Keyhole	2	Present/not present
	Fat percentage	3	9%/12%/19%
Ready-made soups	Price	3	32.95/42.95/80.00
	Salt labeling	3	Complies with the Food Administration's Recommendation's on Maximum Salt Content / Reduced salt content
			Content/No Label Present/not present
	Calories per portion	3	250 kcal/200 kcal/150 kcal
Potato Chips	Price	3	(15.50/19.50/21.95
	Salt labeling	3	Complies with the Food Administration's endorsements for maximum content of salt/ Reduced salt content Content/No Label
	Organic	2	Present/not present
	Fat content	3	22 g/28 g/33 g

The remainder of the survey measured other possible determinants of willingness to reduce salt consumption; they are not relevant to this paper and are reported elsewhere.

To analyze the choice-set data, we estimated multinomial logit models in Latent GOLD.

#### 4.2.2 Results

Across all four products, we found that the label "Complies with the Food Administration's recommendations on Maximum Salt Content for the food category in question" had a positive impact on choice probability. However, the label "Reduced salt content" had a negative effect on choice probability

*Potato chips.* Overall, respondents were more likely to choose potato chips that had the medium price attribute, the Danish Food Administration (DFA) endorsement for salt content label, an organic label, and the lowest fat content.

*Rye Bread.* Overall, respondents were more likely to choose rye breads that had the DFA endorsement, the whole grain label, and the Keyhole logo.

*Sausage.* Overall, respondents were more likely to choose sausages that had the DFA endorsement, the Keyhole logo, the lowest price, and low fat content.

*Ready-made soup:* Overall, respondents were more likely to choose a soup product that had the DFA endorsement, the Keyhole logo, the lowest price, and lower calorie content.

Table 3 displays all results. The results show that across all categories attributes like low fat content, low price and low calories are more important for decision making than the different kinds of labels applied to the products. The hypothetical DFA endorsement label performed on a similar level as the established front-of-pack label like the organic logo, the keyhole and the wholegrain logo, while the “Reduced salt content” consistently had a negative effect on choice probability.

**Table 3:** Results of choice experiment, Study 1

Potato chips				Rye bread				Sausage				Soup			
R <sup>2</sup>	0.26			R <sup>2</sup>	0.25			R <sup>2</sup>	0.30			R <sup>2</sup>	0.30		
Attributes		Wald	p-value	Attributes		Wald	p-value	Attributes		Wald	p-value	Attributes		Wald	p-value
<b>Salt claim</b>	<b>18%</b>			<b>Salt claim</b>	16%			<b>Salt claim</b>	16%			<b>Salt claim</b>	11%		
No Label	-0.34	352.63	.00	None	-0.01	322.94	.00	No Label	-0.15	507.33	.00	No Label	-0.16	73.93	.00
DFA endorsement	.35			DFA endorsement	0.37			DFA endorsement	.59			DFA endorsement	0.18		
Salt-reduced	.00			Salt-reduced	-0.36			Salt-reduced	-.44			Salt-reduced	-0.02		
<b>Organic</b>	<b>18%</b>			<b>Keyhole</b>	22%			<b>Keyhole</b>	17%			<b>Keyhole</b>	13%		
No	-0.35	474.94	.00	No	-0.51	778.39	.00	No	-0.56	815.45	.00	No	-0.22	169.71	.00
Yes	.35			Yes	0.51			Yes	.35			Yes	0.22		
<b>Fat content</b>	<b>26%</b>			<b>Whole grain</b>	14%			<b>Fat content</b>	38%			<b>Calories</b>	22%		
22g per 100g	0.55	641.13	.00	No	-0.33	323.07	.00	9g per 100g	1.20	2003.94	.00	150	0.36	296.30	.00
28g per 100g	-.10			Yes	0.33			12g per 100g	0.15			200	0.00		
33g per 100g	-.45			Price	47%			19g per 100g	-1.35			250	-0.36		
<b>Price</b>	<b>38%</b>				-0.46	1972.21	.00	<b>Price</b>	28%			<b>Price</b>	54%		
	-0.36	1322.40	.00	Intercept					-0.27	1477.92	.00		-0.12	2407.71	.00
<b>Intercept</b>								<b>Intercept</b>				<b>Intercept</b>			

#### 4.2.3 Discussion

We found that the label "Complies with the Food Administration's recommendations on Maximum Salt Content for the food category in question" had a positive impact on choice probability. However, the label "Reduced salt content" had a negative effect on choice probability. There were also differences between products. These results are somewhat in line with research on acceptance of salt reduced products when labeling products with "Reduced salt content" (Liem, Aydin, & Zandstra, 2012) and on the effect on using government endorsement on warning labels (Acton et al., 2018). The two labels that we tested in this experiment had very different wording; their wording seems to be important for the success of the message. This difference in wording, on the one hand "Reduced salt content" that can be perceived as a rather negative attribution, that can negatively influence perception of the product in general but more specifically affect the taste expectancy (Liem et al., 2012). On the other hand, the "Follows the Food Administrations Recommendations on Salt Content" that has a positive endorsement cling to it and can be perceived as more trust worthy. Even though there to our knowledge are no research on the effect on nutrient specific interpretative endorsement label, research has shown that government endorsements on warning labels (Acton et al., 2018) successfully affect consumers purchase intention while has a high degree of believability. In the next experiment, we test whether the most effective salt-endorsement FOP label also is effective in a real-life setting.

### 4.3 Study 2

#### 4.3.1 Methods

In study 2 we used a factorial design and had four groups of shoppers to test the effect of two manipulations in an in-store experiment. In one manipulation, we put "Complies with the Food Administration's recommendations on Maximum Salt Content", i.e., the salt- content label that was most successful in promoting choice in Study 1, on store shelves for selected product categories. We rephrased it slightly at the request of the Danish Food Administration.

Hereafter, the wording for the label for study 2 was; “Follows the Food Administrations recommended Salt Targets”. In the other manipulation, we goal-primed respondents using information about dietary salt and its influence on health (see Appendix 1).

Prior to designing the experiment, we conducted a thorough review of potential product categories. We started by investigating the categories (rye bread, soup, potato chips, and sausage) that we also used in Study 1. We reviewed the ingredients list and compared their salt contents with the Salt List (a list of product categories with recommended salt targets for each category, developed by the Danish Food Agency). During this process, it became evident that we could not use the soup and sausage in the in-store experiment, because too many products in the soup category complied with the recommended targets for salt, making the category unsuitable for an in-store choice experiment. Because we needed an equal distribution of products that were available both below and above the recommended salt targets, we needed to find product categories that met those criteria. In addition, it was important that the products represented both hedonic and utilitarian products. The sausage category was very diverse; we found that either all the products (e.g., sliced ham/chicken/roast beef) complied with the salt targets or none did (e.g. salami/chorizo); therefore, this category did not meet the criteria. Our final choice of products included sliced rye bread, meatballs, yellow cheese, cake, potato chips, cornflakes, and cheese crackers. All of these categories met the criteria of having products both below and above the recommended salt targets for the respective categories. We also checked whether it was possible to purchase all seven product categories for approximately DKK 200 (equivalent to 27 EUR); we found that amount to be suitable. As the experiment was conducted in a real store, it was not possible to manipulate products available for sale.

Respondents whom we allocated to the groups that received priming read an information sheet that included information about health risks related to excess dietary salt intake. They also answered two

questions related to salt in a questionnaire that we administered prior to the in-store experiment.

We conducted the in-store experiment in a Danish MENY grocery store. Table 5 shows the allocation of respondents to the various treatments. Our data set combines each shoppers sales data with his/her questionnaire responses. All data collections took place in April and May 2017.

We recruited 190 people for the experiment. Recruitment took place during a whole week, using a message on the message board in MENY, flyers on the counter at the bakery/kiosk, and personal contacts (see Appendix 3/Flyers). We randomly assigned all recruited participants to one of the four experimental groups shown in Table 4. In some cases participants had preferences for group membership, due to prior engagements in which case we accommodated participants inquires. The allocation of participants was meant to be equal; 1 : 1 : 1 : 1. However, we underestimated the “no show” on the first day of experiment, “control” thus having fewer in this group than planned. Prior to the next days, we attempted to overbook in order to have approx. 50 participants per day.

Table 4: Experimental groups and distribution of respondents, Study 2

Participants	Priming	Shelf label
Group 1 N = 39 (control)	-	-
Group 2 N = 52		X
Group 3 N = 49	X	
Group 4 N = 50	X	X

During the recruitment for the experiment in front of MENY, participants gave their names, telephone numbers, and e-mail addresses. They were invited to sign up by sending an email to the project manager. We asked participants to join the experiment on specific days, between 12:00 and 18:00, by contacting the project manager on arrival at MENY. All respondents first completed a questionnaire on demographic variables, as well as questions about how often they shopped at MENY, how far away from the shop they lived, the share of household budget they used in the store, and whether they were mainly responsible for purchasing groceries in their households. We assigned ID numbers to the questionnaires and added them to complete a document that connected the questionnaires with items purchased and personal data. Participants received and filled out written consent forms and all data were anonymized immediately after data collection, making sure that no data are traceable to any individuals. After they completed the first part of the questionnaire, they received a shopping list containing the seven product categories. We informed them that they should shop as usual; if there were items on their lists they would not normally purchase, they should purchase the product they most preferred. Table 5 displays the demographic characteristics of the in-store sample.

Table 5: Demographic composition of sample, Study 2

Gender	%
Female	37.9
Male	62.2
Marital status	
Married/cohabitating	76.8
Single	23.2
Children under 18	
0 children	52.1
1–2 children	40.0
> 2 children	7.9
Education	
Primary school	4.8
Secondary school/vocational training	28.3
Higher education	66.8
Age	

(years)	
18–27	6.1
28–37	15.0
38–47	27.2
48–57	25.0
58–77	26.7

After respondents had picked up all items and paid, they were reimbursed with 200 DKK for their purchases. If the purchases cost less than 200 Danish krone (DKK), we allowed the participants to keep the money. If the items cost more than DKK 200, the participants had to cover the additional costs. All participants was made aware of this prior to accepting to participate.

After respondents had purchased their items, they handed in their receipts and received the last part of the questionnaire. This questionnaire contained a number of measures not relevant for this paper and specific questions about the DFA salt-content label, whether the respondents had seen it in the store, and what it meant). All four experimental groups answered the same questions. However, we presented the control group and the label group with questions about motivation to reduce salt intake and willingness to purchase salt-reduced products after the shopping trip. We presented the priming group and label/priming group with questions about motivation to reduce salt intake and willingness to purchase salt-reduced products before the shopping trip, as a part of goal priming that also included general information about the purpose of the study and the effects of dietary salt on cardiovascular disease.

We carried out the experiment over six consecutive days. For all six days, we collected scanner data related to purchases made within the categories to determine whether shelf labels had any effect on regular shoppers who were not participating in the study but were shopping in the store at the time of data collection.

Not related to the shopping experiment conducted in 2017 we collected scanner data for the seven

product categories in April 2018. The seven products categories carried no salt labels during this period. In May 2018, we manipulated the in-store environment with the same salt-related shelf labels as was used for the shopping experiment I 2017, but we did not recruit participants or conduct any in-store priming. Our purpose was to collect additional sales data to investigate whether the salt-content shelf labeling had shifted sales from conventional to salt-reduced products.

#### 4.3.2 Analysis

We conducted all analyses in SPSS 24. First, we examined the effect of the experimental manipulations of salt-reduced product purchases on the participants recruited for the experiment. We also examined the effect on overall sales, according to scanner data.

#### 4.3.3 Results

Figure 2 shows the percentages of purchase of salt-reduced products across all product categories, across the four experimental manipulations. The proportion of purchases of salt-reduced products tends to be higher in the presence of salt-content labeling, but the trend is not statistically significant based on the N-1 Chi squared test (Richardson, 2011).

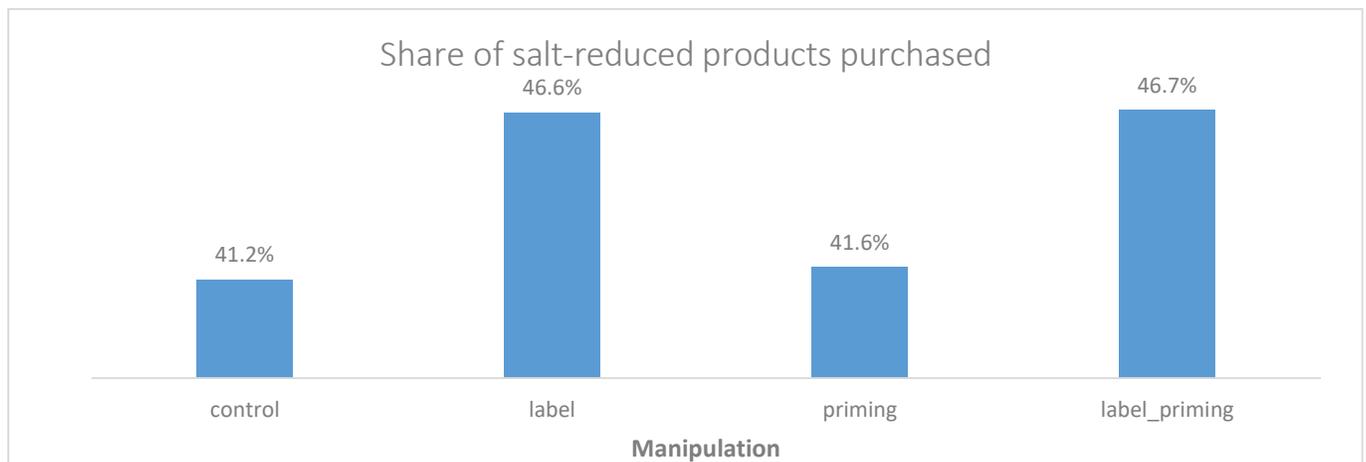


Figure 2: Share of purchase of salt-reduced food products.

Figure 3 shows the same data but split into hedonic and utilitarian product categories. Compared with the utilitarian category (Figure 3), respondents chose significantly fewer salt-reduced hedonic products, regardless of priming or labeling. In the hedonic product group, choice of salt-reduced

products was significantly higher in the labeling+priming group compared to the control group based on N-1 Chi squared test ( $p < 0.05$ ); in the utilitarian product group, neither labeling nor priming had significant effects.

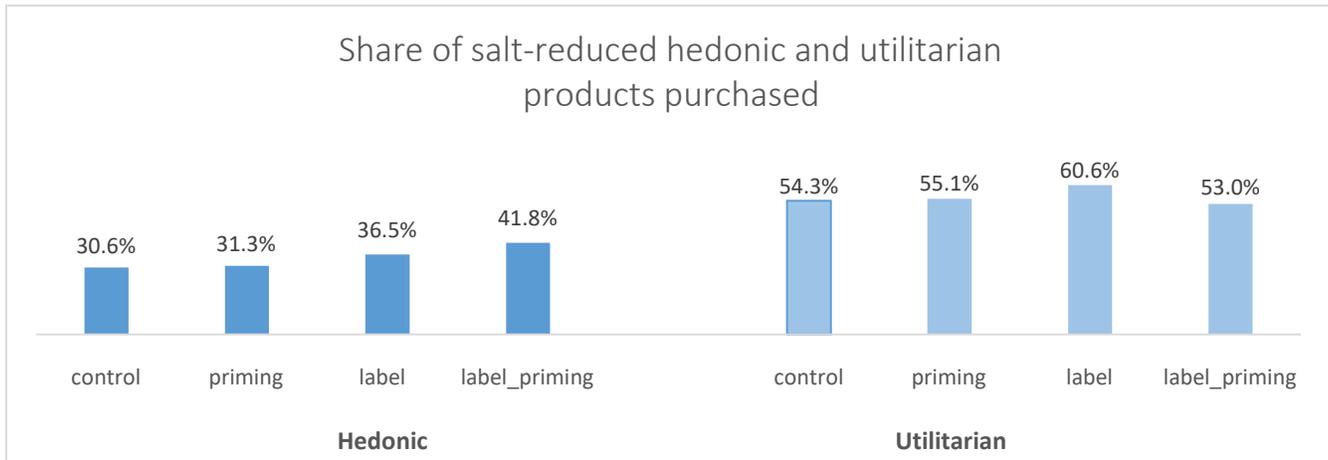


Figure 3: Share of purchase of salt-reduced food products for hedonic and utilitarian categories

Similarly, the scanner data collected in April and May 2018 (Figure 4) showed no effect of salt-content labeling, except for a negative effect for meatballs ( $p < 0.05$ ).

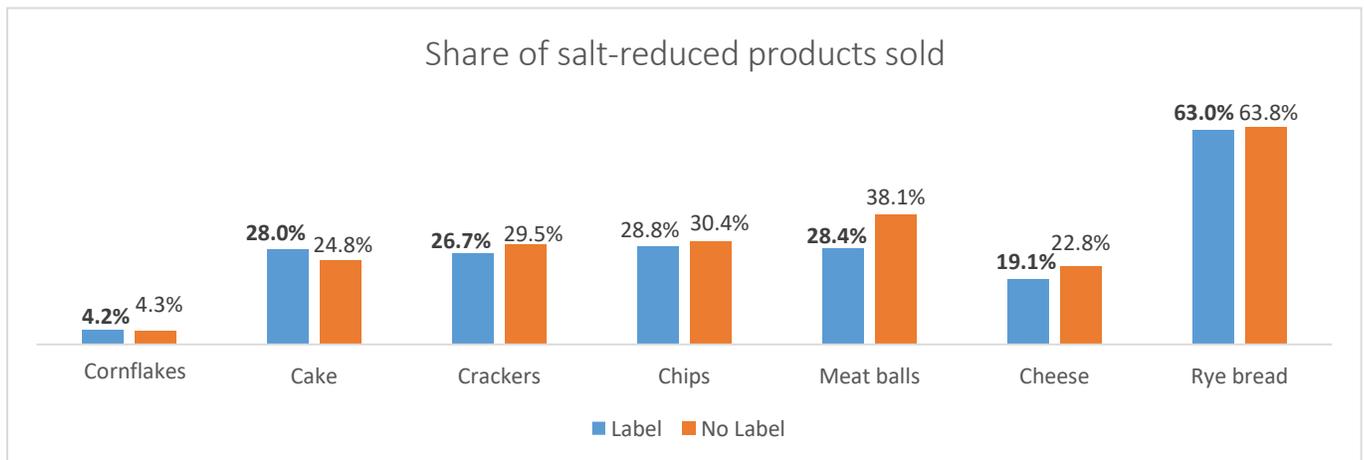


Figure 4: Scanner data from 2018

When we again divided the products into the hedonic category and utilitarian category (Figure 4), we found no again no significant effect.

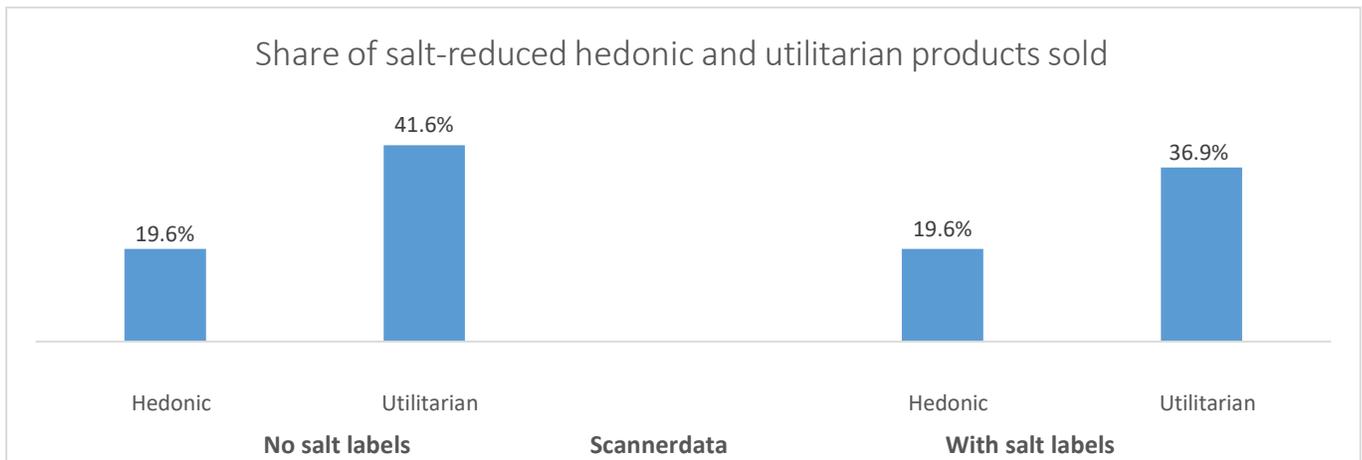


Figure 5: Scanner data from 2018. Share of salt-reduced products sold according to hedonic and utilitarian product categories

#### 4.3.4 Discussion

The purpose of Study 2 was to examine the effect of salt-content labeling and health priming on purchase probability of salt-reduced products. In the in-store experiment, the purchase probability of salt-reduced products from the utilitarian category was significantly higher than that from the hedonic category. This result is in line with the theory of pleasure foods (hedonic) and functional foods (utilitarian) (Bazerman et al., 1998; Dhar & Wertenbroch, 2000; Khan, Dhar, & Wertenbroch, 2005), which suggests that within the hedonic category, people are less likely to compromise on taste. When consumers buy foods from the hedonic category, they seek good—and maybe salty—tastes (Bazerman et al., 1998).

In the in-store experiment, we found that the label "Follows the Food Administration's Recommended Salt Targets" slightly shifted some of the sales toward salt-reduced products. However, this trend was statistically significant only for products in the hedonic category (potato chips, cornflakes, cake, crackers) and only when both salt-content labeling and priming were present. That is, the salt-content labeling, combined with priming, shifted a small portion of the sales from conventional products to

salt-reduced products. This result contradicts the theory of hedonic (utilitarian) food choices and taste (Bazerman et al., 1998), because it shows that there are consumers who are willing to trade off some good/salty taste to achieve dietary salt reduction. Mørk, Lähteenmäki, and Grunert (2019) find that consumers are willing to try salt-reduced products in both hedonic and utilitarian categories if the products are available in supermarkets; even consumers who are uninterested in reducing their dietary salt intake show such willingness to purchase. This finding might explain the discrepancy between the results of Study 2 and the theory of taste preferences for hedonic and utilitarian products, which asserts that consumers are not willing to trade off perceived good taste for less tasty (e.g., salt-reduced) products. However, in Study 2, we find that consumers in the label/priming condition purchase more salt-reduced products in the hedonic category, than the three other groups; the explanation may be that when consumers are questioned about taste preferences for hedonic products, they say they are not willing to trade off taste, but in *actual* choice situations, they are willing to try less tasty products—that is, to adopt a pragmatic consumer view at point-of-purchase. In our next experiment, we therefore expand on specific mechanisms underlying this difference between product categories. We also include the “Reduced salt content” label from Study 1 to explore possible reasons for differences in labeling effects.

#### 4.4 Study 3

##### 4.4.1 Method

Our main purpose in Study 3 is to test how feelings of guilt and taste expectations are related to choice probability of salt-reduced products under different labeling conditions and whether these relationships differ between hedonic and utilitarian product categories. We designed a choice experiment and implemented it in an online survey in Denmark. We used the market research agency Userneeds to collect the data in February 2019. All participants provided informed consent and received a minor, standard reimbursement for their time and effort. The sample recruited was representative of the

population who purchases the products in terms of gender, age, and education. Seven hundred and forty respondents participated. Table 7 displays the demographic characteristics of the sample.

Table 7: Demographic composition of sample, Study 3

Gender	%
Female	49.9
Male	50.1
Marital status	
Married/cohabitating	65.9
Single	34.1
Education	
Primary school	23.7
Secondary school/vocational training	45.2
Higher education	30.6
Age (years)	
18–39	28.5
40–59	38.6
60–75	32.9

In Study 3, we explored possible reasons for the difference in choice impact between the two labels, “Follows the Food Administration’s Recommended Salt Target” and “Reduced salt content.” Our choice experiment (Study 1) showed that participants chose a significantly higher proportion of salt-reduced products when the products bore the label “Follows the Food Administration’s Recommended Salt Target.” We also explored whether guilt and taste expectation explain any of the differences we observe between hedonic and utilitarian products under the different labeling conditions.



Figure 5: Example of choice set for label condition “Follows the Food Administration’s Recommended Salt Target”

We designed a between-subjects choice experiment for four product categories: potato chips, cake, cheese, and rye bread. This choice experiment was a simplified replication of the in-store experiment. It

replicated the goal-priming used in study 2 and used some of the same product categories, representing both hedonic and utilitarian products. Respondents viewed four product categories (potato chips, cake, rye bread, cheese) always with four different choice options within each category. In all categories, there were always two salt reduced options and two normal salt options. Always the products were with one or the other kind of salt label. E.g. the KIMs holiday chips always had the FOP label on and Taffel Salt & Vinegar always have no label. According to the actual salt level (above or below the recommended salt target). The order of the different categories was randomized, as was the order of the four different products within each category. We asked respondents to choose one product from each of the four categories.

There were no labels on the products viewed by participants in the control group, and they saw the questionnaire in the following order: (1) introduction, (2) demographics and inclusion questions, (3) choice tasks related to four product categories, (4) measures related to guilt and expectation of taste, stages of change, willingness to purchase, and (5) more socio-demographic questions.

For respondents assigned to the groups who saw products with labels on, the salt-reduced versions of the products in the choice task contained one of the following labels: “Follows the Food Administration’s Recommended Salt Target” or “Reduced salt content.” Because the in-store experiment (Study 2) showed that labels have an effect only when consumers are primed with health goals, we primed all respondents in the experimental groups with information on health and the risks of consuming excessive amounts of dietary salt and associated diseases; we then asked them to answer questions related to stages of change with regard to salt reduction and willingness to purchase salt-reduced food products, before completing the choice task for the four food categories. Respondents in these groups completed the questionnaire in the same order as the control group.

After respondents had made their choices, we asked them to rate their expected taste for the product

they chose and to measure their perceived guilt in consuming the products. Table 2 shows the measures.

Table 8: Content of questionnaire in study 3

<b>Choice task</b>	If you had to choose one of these four products, which one would you choose? (Pictures of potato chips, cake, cheese and rye bread.)
<b>For each of the four product category choices, measures of taste expectation and guilt were repeated.</b>	
<b>Taste expectation</b>	What are your expectations of the taste of the chosen product? Likert scale: 1, “does not taste good”–7, “tastes extremely good” (Cardello & Sawyer, 1992)
<b>Guilt</b>	How much guilt do you feel about having chosen this product? Likert scale: 1, “no guilt at all – 7, “extremely guilty” (Ruddock & Hardman, 2018)
<b>Motivation to reduce salt intake</b>	We measured stages of change by five statements adapted from Newson et al. (2013): “I am not at all interested in lowering salt in my diet and I have no intention of doing so in the next 6 months.”/“I am interested in lowering salt in my diet and I have the intention of doing that within the next 6 months.”/“I am interested in lowering salt in my diet and I have the intention of doing that in the next month.”/“I am interested in lowering salt in my diet and I have started lowering my salt intake during the last 6 months.”/“I am interested in lowering salt in my diet and I have already lowered my salt intake for longer than 6 months.” (Prochaska & Velicer, 1997)
<b>Willingness to buy salt-reduced products</b>	To measure the willingness to purchase salt-reduced food products we chose 17 food items and asked participants to answer “yes” or “no” to the question “Would you be willing to purchase the following products if they were salt-reduced?” The products they evaluated were biscuits, ready meals, butter, deli products, white bread, cheese, canned fish, sauces (bouillon/soya, barbecue oils), olives, sausages, tomato sauce, rye bread, cornflakes, crisps, meat spread, bacon, and cake. We assigned 1 point for each product the participant was willing to purchase, such that a respondent could obtain a maximum of 17 points and a minimum of 0 points.

We ran all analyses in SPSS 24. We first ran a logistic regression explaining choice of salt-reduced products by label, product category, willingness to purchase salt-reduced products, and willingness to change. We refined the model by removing interactions that had a  $p$ -value  $> 0.05$ ; we considered effects significant when  $p < 0.05$ . We repeated the analysis separately for hedonic and utilitarian products. Then we ran a univariate analysis of variance to test the between-subjects effects of labeling and priming on guilt and taste expectancy.

#### 4.4.2 Results

Table 9 presents the results of the logistic regression explaining choice of salt-reduced products. It shows that authority endorsement significantly increases the probability of choosing a salt-reduced product. It also shows that the four product categories differ significantly in terms of choice of salt-reduced products. Respondents who indicated that they do not intend to lower their dietary salt intake chose significantly fewer salt-reduced products than control-group respondents, regardless of whether the salt-content labeling condition was “Reduced salt content” or “Follows the Food Administration’s Recommended Salt Target.” Respondents who indicated they were willing to try salt-reduced products also chose significantly more salt-reduced products in the choice task, but the effect was small. We found this effect for both label conditions. We did not find any interaction effects for labels or product category.

Table 9: Logistic regression, dependent variable choice of salt-reduced product

Salt-Reduced Choices	B	Standard Error	Wald	df	Sig.	Exp(B)
Control			5.992	2	.050	
Reduced salt content	.199	.317	.296	1	.529	1.221
Authority-endorsed	.750	.307	5.980	1	.014	2.116
Cake			148.703	3	.000	
Chips	2.414	.212	129.771	1	.000	11.180
Rye bread	.416	.196	4.527	1	.033	1.516
Cheese	1.054	.191	30.433	1	.000	2.870
Control * Stages of change			22.266	2	.000	
Reduced salt content* Stages of change	-.238	.079	9.093	1	.003	.788
Authority-endorsed* Stages of change	-.285	.079	13.173	1	.000	.752
Control * Willingness to purchase			23.586	2	.000	
Reduced salt content * Willingness to purchase	.043	.013	11.934	1	.001	1.044
Authority-endorsed* Willingness to purchase	.038	.011	11.651	1	.001	1.039
Constant	-1.062	.144	54.481	1	.000	.346

To determine the influence of the salt-content labels on level of perceived guilt, we ran a univariate analysis of variance. Only the manipulation group and the type of product had significant effects.

Compared with respondents who chose the product with the DFA-endorsed label and the control group, respondents who chose from a set of products some of which had the “Reduced salt content” label experienced higher levels of guilt related to the products they chose; this was independent of whether they indeed chose a salt-reduced product or not. Respondents experienced significantly less guilt when they were asked about guilt in relation to their choices of cake and chips, regardless of label or priming.

Table 10: Univariate analysis of variance guilt

Guilt	B	Standard Error	t	Sig.	95% Confidence Interval	
					Upper bound	Lower bound
Intercept	2.461	.074	33.271	.000	2.316	2.606
Control	.093	.074	1.256	.209	-.052	.238
Reduced salt content	.252	.074	3.407	.001	.107	.397
Authority-endorsed	0	.	.	.	.	.
Cake	-.785	.085	-9.194	.000	-.953	-.618
Chips	-.794	.085	-9.302	.000	-.962	-.627
Rye bread	-.101	.085	-1.188	.235	-.269	.066
Cheese	0	.	.	.	.	.

The two salt labels also decreased taste expectations significantly for rye bread. For the other products, we did not find any differences among the three manipulation groups with regard to taste expectation.

Table 11: Univariate analysis of variance for taste expectation

Taste expectation	B	Standard Error	t	Sig.	Lower bound	Upper bound
Reduced * Cake	.116	.181	.641	.521	-.239	.472
Reduced * Chips	.092	.138	.664	.507	-.179	.363
Reduced * Rye bread	-.417	.178	-2.345	.019	-.765	-.068
Reduced * Cheese	0	.	.	.	.	.
Authortity-endorsed * Cake	.132	.169	.782	.434	-.199	.464
Authortity-endorsed * Chips	.100	.139	.719	.472	-.172	.371
Authortity-endorsed * Rye bread	-.604	.173	-3.500	.000	-.942	-.266
Authortity-endorsed * Cheese	0	.	.	.	.	.

#### 4.4.3 Discussion

The purpose of Study 3 was to examine underlying mechanisms of choice of salt-reduced products between different product categories. Choice probability for salt-reduced products increases significantly when there is FOP salt-content labeling on cake and cheese products. Ares et al. (2018), find that three different FOP nutrition-labeling schemes (Nutri-score, Health start rating and Warning label) performs differently in terms of purchase probability. The health star rating system was found to be the least effective in modifying purchase intention while Nutri-score and warning labels were successful in affecting purchase behavior for intermediate healthful products but none of them were successful when applying them on the least healthy option, potato chips, for which they find no decrease in purchase probability. Whereas Balasubramanian and Cole (2002) show that consumers

disregard health information on products they regard as unhealthy, we find that for cake, the DFA-endorsed label increases choice of the salt-reduced variety, and for cheese, both the DFA-endorsed label and the “Reduced salt content” label increase choice of the salt-reduced variety. This discrepancy may be attributed to the difference in labels: The two labels we tested were salt-specific, whereas the labels in (Ares et al., 2018) study were general nutrition labels that included salt and a nutrient specific warning label.

The salt-reduced label induced more guilt in respondents than the DFA-endorsed label. We included measures of guilt to determine whether guilt had an effect on the justification of choice. We assumed that the salt-content labels would make the justification of choosing hedonic products easier (Okada, 2005). However, we do not find that guilt moderated salt-reduced choices; despite our findings that salt-reduced labeling induces more guilt in consumers, such increased guilt does not result in more healthy choices. This increase in guilt could have several meanings. Possibly, because dietary salt is not top-of-mind among most consumers, consumers’ levels of guilt increases because the label confronts them with the issue of salt intake and makes them aware that the product they chose contains salt. We also find no difference in taste expectations among the three manipulation groups, except with regard to rye bread. This finding contradicts the results of the meta-analysis by (Ikonen et al., 2019), who indicate that nutrition-specific interpretive labels hurt consumer acceptance of both hedonic and utilitarian products.

## 4.5 General Discussion

### 4.5.1 Research contribution

The literature on the effect of FOP nutrition labeling on consumer choice has shown contradictory results (Grunert & Wills, 2007). An important distinction between our work and other studies is that the labels we use are interpretative nutrition labels that are *salt-specific*, whereas labels used in previous studies have covered a variety of nutrients, including salt. Currently, only Chile, Peru, Israel, and

Finland (for a few products) have specific FOP labeling (" Food Label and Nutritional Labeling," 2018; Ikonen et al., 2019; Reyes et al., 2019) in the form of *warnings* on food products that contain high levels of salt. Currently, there are no FOP salt-content labels that endorse products according to their salt levels. Accordingly, in three studies, we test such labels after establishing consumers' general interest in purchasing salt-reduced-labeled food products when they are available (Mørk et al., 2019)

In study 1, we found that the DFA-endorsed label increased the purchase probability of salt-reduced products more than the "Reduced salt content" label. In study 2, we found that the product choice increased for the hedonic category when consumers' health goals were primed. For study 3, we found that the DFA-endorsed label increased choice probability significantly when respondents were health primed. Moreover, we find that people who indicate that they are not interested in lowering their dietary salt intake choose significantly fewer salt reduced products, regardless of the wording of the label. This finding is somewhat in line with that of (Ikonen et al., 2019), whose meta-analysis shows that interpretive nutrient-specific FOP labels increase purchase probability for utilitarian products, but they find no type of label (warning, "traffic light," or reduction) that lowers consumers' interest in hedonic products. When comparing these results with results of our studies, it is important to note differences in labels and primes. One of the labels we used offered authority *endorsement* rather than a warning. In addition, our label does not say anything about a products overall healthiness, like the evaluative summary labels that were included in the meta-analysis. However, we can say that such a government- endorsed salt-specific label, as we have applied in these three studies, increases choice probability for salt-reduced products depending on the product category and the availability of a health prime. Ikonen et al. (2019) find that all types of FOP labels offer some positive effect but that none of the labels decreases consumer's interest in the least healthy products. With the use of health priming and our DFA- endorsement label, we find that some consumers do react as intended on the

health prime and the DFA- endorsement label and choose the salt reduced variant.

Our three studies have shown that although consumers do choose more salt reduced food products when they are primed and products carry a FOP salt label, this is not true for all types of products. We have found that in a real-life purchasing situation, labeling that stands alone does not result in a successful salt-reduction strategy; it needs to be combined with other communication that has a priming effect before it will influence consumers' purchase behaviors related to salt-reduced products. These findings are in line with Ikonen et al. (2019) conclusions; they confirm that current FOP labeling schemes do not succeed in positively influencing perceptions of healthiness of healthy products or negatively influencing perceptions of unhealthy products (Ikonen et al., 2019). We believe that further research on DFA-endorsed labels could provide better, more detailed understanding of consumers' reactions to DFA-endorsed labels.

In their meta-analysis, Ikonen et al. (2019) find that FOP nutrition labels that highlight product healthiness result in lower taste-expectation scores. Their findings are in contrast to the findings of our study 3, where we found no change in taste expectation, except for the case of rye bread. Also in sensory research, labels indicating a lower salt content with wordings such as "Reduced Salt" and "Low salt", in the product have shown to affect taste perceptions negatively (Liem et al., 2012), but we find only limited evidence for this decrease in taste perception in our studies.

Our findings have implications for the literature on hedonic and utilitarian consumption (Dhar & Wertenbroch, 2000). We find that consumers disregard the cue of salty taste for both hedonic and utilitarian products (except for rye-bread); the cue does not influence their taste expectation for the products. In our in-store experiment, the DFA-endorsed label caused consumers to shift from conventional products to salt-reduced products in the hedonic category only when we primed them with regard to health goals. This result may indicate that for some consumers, salt is not as strong a taste

cue, or it may indicate that consumers are more willing to risk trying products before deciding whether to repurchase. The rationale for having salt-content warning labels instead of a DFA-endorsed label could stem from both the literature on taste expectations related to hedonic and utilitarian products (Batra & Ahtola, 1991; Dhar & Wertenbroch, 2000) and literature on sensory testing and taste expectations related to salt-reduced food products (Grimes, Riddell, & Nowson, 2009; Liem et al., 2012).

We tested if justification theory could help us explain consumers' higher likelihood of choosing salt-reduced products in the utilitarian category. We hypothesized that consumers have difficulties in justifying choices within the hedonic category because they feel more guilt purchasing products that are consumed more for pleasure than for functionality (Okada, 2005). As justifiable choices are easier to make (Hsee, 1995), we proposed that this could explain the tendency to choose hedonic salt-reduced products when they carried a salt-reduction label. However, we did not find that salt-content labeling was used to justify hedonic purchases, as we did not see that the purchase probability of salt-reduced products was related to levels of measured guilt.

#### 4.5.2 Policy implications

Our studies have several implications for public health and food policy. By providing a better understanding of the possible effects of various FOP salt-content labels, our results are useful to public policy makers. Despite efforts to help consumers make healthier choices through interventions, regulations, and policy changes (EUFIC, 2018), as well as worldwide interest in FOP labels (Kanter, Vanderlee, & Vandevijvere, 2018) and increasing industry willingness to reformulate food products (Buttriss, 2012; Webster, Trieu, Dunford, & Hawkes, 2014), people still consume excessive amounts of salt (WHO, 2016). Our findings have practical implications for public policy makers with regard to utilizing consumers' trust in authority-issued label schemes to frame public health messages. Our research shows that the DFA-endorsed label increased choice more than the "Reduced salt content"

label. This finding may indicate that the positive endorsement from an authority induces trust in the message, increasing the likelihood of changing choice. This is in line with research from Canada on government endorsed messages in relation to high levels of sugar in beverages (Acton et al., 2018). Additionally, it might indicate that for consumers who lack the ability to decipher the meanings of traditional food labels and evaluative interpretive labels, or for consumers who are un-motivated, the DFA-endorsed label adds a cue that is easier and more actionable than other FOP labels. In response to the criticism that FOP labels alter behavior only of consumers who are already informed and motivated to change their salt habits, research shows that having an interest in changing dietary salt habits does not necessarily predict willingness to purchase salt-reduced products (Mørk et al., 2019). Although research has shown that most FOP labels help consumers better identify healthier options, they do not necessarily translate into healthier choices (Ikonen et al., 2019). Salt is a hidden problem that is not easily detected in many everyday food products. Mørk et al. (2019) found a high willingness among consumers to purchase food products with reduced salt content if such products were available and identifiable. To this day, no such FOP label exists worldwide. An interpretive FOP salt label would make products that are low in salt much more identifiable. In addition, at present, producers of traditional hedonic products, such as potato chips, cake and confectionery, cannot obtain an interpretative endorsement or summary label because such labels (at least for the Keyhole) only can be awarded to products that contribute to a healthy daily diet. With an interpretive FOP salt label, producers would be able to reformulate these products and thus differentiate the product from other hedonic products with a salt content that is above the recommended target.

However, to achieve the best result with regard to dietary salt reduction on a population level, many stakeholders need to be involved in the various strategies. A comprehensive multi-component strategy whereby authorities regulate the market for processed foods, demand mandatory reformulation and agree on an effective food labelling system will be the most effective (Hyseni et al., 2017). However,

much emphasis has traditionally been placed on the consumer to take responsibility for a healthier diet. This has been attempted through consumer awareness campaigns, with the goal of leading the consumer to create demand for low-salt options (Zandstra, Lion, & Newson, 2016). Research demonstrates that because so many consumers do not have top-of-mind awareness with regard to dietary salt intake and may not be willing to change their dietary salt habits, but are willing to purchase a wide variety of products with reduced salt, it makes more sense to let the industry drive this change by developing low-salt products (Mørk et al., 2019). This is in line with findings by Hyseni et al. (2017).

#### 4.5.3 Limitations

Our studies have several limitations. Studies 1 and 3 deal with hypothetical choices; our participants were not facing real purchasing environments that exposed them to the variations of a real store. Instead, they were presented with generic pictures of food products (Study 1) and only four brand-specific choices (Study 3) on a computer screen. Therefore, our results may not reflect actual consumer purchase behavior in real-life settings. To compensate for the lack of a real-life setting, we conducted an in-store experiment (Study 2). Although the external validity of Study 2 is much higher, it is still an experiment, and respondents were aware that they were participants in a research project. Moreover, respondents were limited to purchasing products from certain categories, and in some categories, their brand choices were limited. Finally, we conducted all three studies with Danish consumers, which affected external validity; future research could examine the purchase probabilities associated with authority-endorsed food labels in other countries, outside of Scandinavia.

#### 4.5.4 Future research

Our finding that authority-endorsed salt-reduced labels tend to shift sales from conventional products to salt-reduced products, and that such labels do not influence consumers' taste expectations negatively, warrants additional research. Especially because we found that this specific positive DFA-endorsement

label succeeded in moving consumers within the category of the least healthy products, where Ikonen et al. (2019) did not find that any other labeling system had that effect. From a policy perspective a label such as the one presented in this paper could be considered as a handle to apply for the least healthy products. This area would benefit from further research; most FOP nutrition labeling is voluntary, and policy-makers have important policy decisions to make. We expect that industry will not object to such a label as fiercely as it objects to warning labels (Velasco, 2018) and that use of an endorsement label might facilitate better collaboration between policy regulators and industry.

Because we do not find that FOP salt-reduced labels affected taste expectations (except for rye-bread), additional research is needed to explore the possibilities of labels that endorse salt-, fat-, and sugar-reduced products. Before introducing a new FOP label, we would need to determine whether positive endorsement labels promotes the purchase of unhealthy products by leading consumers to believe that hedonic products are healthy because they have FOP salt-reduced labels; we did not examine such halo effects in our studies.

#### 4.6 Conclusion

The objective of this paper was to investigate whether different versions of a FOP salt-reduced label increase or decrease consumers' likelihood of choosing salt-reduced products. Although a wide range of FOP nutrition labeling has been studied, ours is the first investigation of the effects of a specific interpretive, authority-endorsed salt-reduced label. Our findings suggest there is an important distinction between authority-endorsed salt-reduced labels and simple salt reduction labels, and that authority-endorsed salt-reduced labels increase likelihood of consumer choices of salt-reduced products under certain conditions. These conditions relate to a) the type of product, suggesting that effects are more likely for hedonic than for utilitarian products, and b) to whether consumers were primed with a health-related goal, suggesting that such a prime is often a prerequisite for a label effect.

### **Data Collection Information**

The first and last authors contributed to the design of all studies. The first author was responsible for data collection and was primarily responsible for the data analysis in each study. Data for Study 1 were collected online in 2016 via Qualtrics. Study 2 was carried out in an in-store environment during Spring 2017, with the assistance of three undergraduate students under the supervision of the first author. Data for Study 3 were collected during February 2019. The first author drafted the paper, and the second author reviewed and edited the manuscript.

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## Appendix 1: Priming

### **Dear participant**

Welcome to this study on foods, conducted by the University of Aarhus.

The study aims to gain insight into the purchasing habits of Danes by studying the attitudes and motivations that cause a consumer to choose certain products over others, with a particular focus on salt and salt-reduced products.

The vast majority of the salt we consume comes from processed foods and it has been found that high levels of salt in the diet increase the risk of high blood pressure, which can lead to cardiovascular disease.

In 2005, cardiovascular disease was the second most frequent cause of death in Denmark, accounting for 30% of all deaths.

The study takes approx. 15 min to complete.

If you have any questions about the study, please contact:

PhD. student Trine Mørk by email: [tmork@mgmt.au.dk](mailto:tmork@mgmt.au.dk)

In advance, thank you for your help!

Yours sincerely

The MAPP Center

Aarhus University



# 5

## Discussion and Conclusion

The purpose of this last chapter is to summarise the work that I have completed and to present the contributions and implications of the entire dissertation. Firstly, I present a summary of the three papers. Secondly, I discuss the dissertation's theoretical contributions and its implications for practice. Thirdly, I present what I consider to be the main limitations of this work and suggest how to proceed with future research in this area. Lastly, I outline the key outcomes of this work in a brief concluding statement.

### 5.0 Summary of Main Findings and Contributions of the Three Research Papers

*The first paper* investigated consumers' intention to change their dietary salt habits and their willingness to purchase reduced-salt food products and the determinants of these behaviours. We did this by the use of an online web survey distributed to 1,030 respondents in Denmark. We found that the majority of respondents (66.8%) did not intend to reduce their dietary salt intake. However, we also found that the general willingness to purchase reduced-salt food products was high. We predicted that the intention to change dietary salt intake would predict willingness to purchase, but instead, we found an asymmetrical relationship between the two measures, meaning that having an intention to change dietary salt intake does not predict a consumers willingness to purchase salt reduced food products. We found that social and personal norms influenced consumers' intention to change the most, while personal norms, knowledge and awareness of health consequences influenced their willingness to purchase the most. Overall, this study made two important contributions. Firstly, these results indicate that there is a market for reduced-salt food products even if consumers have not formulated a specific salt-reduction goal. This discrepancy between intention to change and willingness to

purchase suggests that health authorities might be successful in lowering a population's salt intake if they focus on the point-of-purchase in stores. Because intention to change dietary salt intake was not a prerequisite for willingness to purchase, it was of interest to identify what influenced willingness to purchase, and we found that knowledge and awareness of salt-related diseases predicted willingness to purchase. This means that the second contribution is that in addition to influencing consumers at the point-of-purchase, designing campaigns that educate consumers regarding dietary salt and its influence on health might be effective in changing consumers' behaviour.

*The second paper* investigated the effect of information in the form of FOP salt labels and the priming of salt-reduction goals on consumers' choice of reduced-salt products. For this purpose, an online choice task and questionnaire were developed and distributed in Norway (n=1025) and Denmark (n=1074), where participants were divided into four manipulation groups: Priming, Label, Label/Priming and Control. The Priming and Label/Priming groups received health information on dietary salt prior to the choice task, while the Label and Label/Priming groups conducted choices between product images some of which featured salt-reduction labels.

The study showed that priming and labelling significantly increased the probability that participants choose reduced-salt product alternatives within the utilitarian category in Denmark and within the hedonic category in both countries.

These findings demonstrate that product labels "Follows the Food Administrations Recommended Salt Target" that indicate DFA (Danish Food Administration) or NFA (Norwegian Food Administration)-endorsement labels, combined with health information at point-of-purchase, may successfully prompt consumers to choose reduced-salt products in both countries. We also found that Norwegians choose more reduced-salt products in both

categories than Danes do. This might indicate that the Norwegian participants already knew about excess dietary salt intake from national campaigns or that the Norwegians trusted official recommendations more than the Danes did and thus followed guidelines to a greater extent. The study contributed with insights regarding how the label worked across borders and knowledge regarding utilitarian and hedonic products and the potential for a successful labelling scheme. It showed that the priming and label used in this study could help to increase some of the salt-reduced utilitarian and hedonic products in both Norway and Denmark. These results are relevant for public policy regarding the potential introduction of such a label, as well as for the food industry, where this evidence can be used to make decisions regarding what information to declare on products' front-of-pack.

The objective of *the third paper* was to investigate whether different versions of a FOP salt label increase or decrease consumers' likelihood of choosing a reduced-salt product. We first investigated the effect of two potential salt labels in a hypothetical choice experiment. We then investigated whether the label that was the most effective in the hypothetical choice experiment was also effective in real life by conducting an in-store field experiment. In the in-store field experiment, we also tested whether goal priming of consumers increased the effect of the label. As a final study, we tested the two different salt labels and their effect on choice in four product categories in order to see whether felt guilt and taste expectations were affected by FOP labels about salt content. These three studies demonstrated that although some consumers chose more reduced-salt food products when they were primed and products carried an FOP salt label, this was not true for all types of products and in all situations. We found that labelling cannot stand alone in a successful salt-reduction strategy and that priming of a health-related goal at the point of sale will be a prerequisite for changing consumers' purchasing behaviour regarding reduced-salt products. We thought that there was an important distinction between traditionally hedonic and utilitarian products; however, we

found that choice probability increased significantly when FOP salt labelling was on cake and cheese products. We found that for cake, the DFA-endorsement (Follows the Food Administrations Recommended Salt Targets) increased the likelihood of choosing the salt reduced product and for cheese both labels (“Reduced Salt Content” and ”DFA-endorsement” increased consumers’ probability of choice of the salt reduced product. We found no change in taste expectation except for in the case of rye bread. We assumed that the salt labels would make the justification of choosing a hedonic product easier (Okada, 2005). However, we did not find that guilt moderated the consumers’ choices of reduced-salt products, so despite our findings that the phrase ‘Reduced Salt Content’ induced more guilt in the consumers, this increased guilt did not result in more healthy choices.

#### 5.1 Contribution to Theory on Hedonic and Utilitarian Consumption

Our findings have implications for the literature on hedonic and utilitarian consumption (Dhar & Wertenbroch, 2000). Consumers may be less willing to purchase a hedonic product with less salt if they expect a decrease in taste, due to the notion that hedonic purchases are often purchased for fun, enjoyment and pleasure and that a salt-reduction label could negatively influence the expectation of a good taste (Batra & Ahtola, 1991; Kahn, Dahr, & Wertenbroch, 2004). Across all studies, both in Denmark and Norway, we found that our label moved consumers from conventional products to low-salt products in the hedonic category. This might indicate that at least for some consumers, salt is not as strong a taste cue as previously thought or that those consumers are more willing to ‘take a risk’ and try a product before deciding whether to re-purchase the product.

Until now, no salt label like the one developed for the purpose of this dissertation has been implemented. Several countries have developed warning labels, as previously described. The reasoning behind having warning labels instead of an authority-endorsed salt label stems

from the literature on taste expectations for hedonic and utilitarian products (Batra & Ahtola, 1991; Dhar & Wertenbroch, 2000), but also from the literature on sensory testing and taste expectation for reduced-salt food products (Grimes, Riddell, & Nowson, 2009; Liem, Miremadi, Zandstra, & Keast, 2012). However, we did not find that taste expectation was negatively affected by FOP salt labels (except for rye bread). This indicates that with the right wording on a label and the use of health priming, the labels do not affect taste expectations for either hedonic or utilitarian food products.

## 5.2 Contributions to Goal Implementation Theory

When analyzing the data from study one, it made me read up on Goal Implementation Theory and found that this could provide me with an interesting way of discussing what I had found. Goal implementation theory predicts that people transition from having a general goal to forming intentions about performing a specific action (Gollwitzer, 1999). The goal implementation theory literature predicts that implementation intention is a necessary mediator between goal intention and actual action, meaning that an implementation intention cannot exist without a prior goal (Gollwitzer, 1999; Gollwitzer & Brandstatter, 1997; Gollwitzer & Moskowitz, 1996). In this dissertation, I found that most people had not formed specific goals about reducing their dietary salt intake, while at the same time, they reported that they would be willing to try reduced-salt food products. These findings contradict goal implementation theory.

There are several explanations for this contradiction. Firstly, salt is for most consumers' not top-of-mind, which leads to unengaged consumers and thus to consumers who do not form salt-specific goals. However, after being primed, many participants across all studies in this dissertation were willing to try the reduced-salt products when asked about it or when they had the opportunity to choose between products either in the in-store experiment or in the online experiments. This pragmatic attitude towards reduced-salt products could be linked to the fact that purchasing a reduced-salt product is considered a small, low-risk

investment. Therefore, if consumers do not like the product, they will simply buy the conventional product at the next opportunity. This result testifies to the power of cues in the environment, that although people/consumers (or perhaps *because* people/consumers) shop without a salt specific ulterior goal, they are able to or willing to be persuaded to purchase or try products that were not part of their initial plan. Up to 82% of decisions in supermarkets are made at the point-of-purchase (Point of purchase advertising international 2014). This high percentage of in-store decisions suggests that reduced-salt products should be made available and visible by offering consumers cues that can simplify their decisions (Bettman, Luce, & Payne, 1998) and persuade them to make a healthy choice, even if it is not a part of an overall goal.

### 5.3 Contributions to Transtheoretical Approach

The transtheoretical approach (Prochaska & Velicer, 1997) has been widely used within public health research and community initiatives (Bunton, Baldwin, Flynn, & Whitelaw, 2000), suggesting that the cost of changing a behaviour outweighs the benefits when a person or a population is in the pre-contemplation stage. I did not find support for this with regard to salt reduction in food choices. On the contrary, I found that being in the pre-contemplation stage did not mean that people could not form intentions to purchase reduced-salt products. This discrepancy between being in the pre-contemplation stage of the model (i.e., not interested in change) and still be willing or interested in purchasing reduced-salt food products can be attributed to the lack of urgency in the case under investigation: dietary salt. If nothing else, our study 1 has shown that there is good reason not to place too much emphasis on the stages of change measure as a predictor of consumers' desire to reduce salt intake, because our research has shown that people in the pre-contemplation phase may plan to perform a specific action related to salt reduction.

#### 5.4 Contributions to Decision-Making in Food

A large body of literature on decision-making is well-established, and decision theory is being applied in an increasing number of publications that examine the predictors of decision-making within the food domain (Symmank et al., 2017). This area has proven to be highly interdisciplinary and complex, resulting in contributions to decision-making in the food area from many different perspectives (Symmank et al., 2017). However, there is a consensus that food choices are mostly the consequence of heuristics, which only involve limited processing of the available information (Bettman et al., 1998; Cohen & Babey, 2012; Gigerenzer & Gaissmaier, 2011) these heuristics are mental shortcuts made by our System 1 to preserve mental surplus or when mental surplus already have been depleted (Kahneman, 2011). On this basis and knowing that the vast majority of consumers' purchasing decisions are made at the point-of-purchase (Point of Purchase Advertising International, 2014), we also know that it is at the point-of-purchase that we will have the greatest success in influencing consumers' choices. However, the supermarket is a complex environment comprised of many food cues that often lead the consumer to respond automatically by purchasing products that are both high in calories and is not part of a normal and healthy diet (Cohen & Babey, 2012). Over the course of four out of five studies, we have found that *not* having a salt reduction goal is no limitation for choosing salt-reduced food products. People might decide to choose the low salt option anyway. In addition, we found that even though dietary salt is not "top of mind" for most consumers, consumers were for some products (both hedonic and utilitarian depending of context) both able and willing to decide on choosing/purchasing a low salt option. This adds to the literature on FOP and decision-making showing that interpretative nutrient specific FOP labels do show positive impact on decision making/purchase intentions when it comes to utilitarian products, but that no existing labels lower the purchase intention for hedonic products (Ikonen, Sotgiu, Aydinli, & Verlegh, 2019).

## 5.6 Priming

The collected works of this dissertation show that FOP nutrition labels face a difficult task in attracting consumers' attention. Research have found that nutrition labels and warning label did not succeed in lowering consumer interest in the least health hedonic products (Ares et al., 2018). As Ares et al. (2018) did not use any kind of primes and results differ from what we found, it might indicate that a prime close to the purchasing/choice decision is what makes the difference in a labels success. Research show that goal primes need to be presented close to the situation for it to affect behaviour (Papies & Veling, 2013). It seems that this needs to be taken very literally, as closeness could be an alternative explanation for why the goal prime and salt label were able to increase purchase probability more for the hedonic category than for the utilitarian category. In our in-store experiment the shopper received health, goal priming before entering the store and the three first shelves they met was; cake, crackers and chips. All hedonic products (except cornflakes) were closest to the activation of the health goal prime. In the web-studies we randomized the order of appearance so that also the order of hedonic and utilitarian products was randomized and we found less uniform results. As paper two showed priming had an effect on salt-reduced choices in both the hedonic and utilitarian category for the Danish sample and study two in paper three showed an effect of label/priming for cheese and cake, representing utilitarian and hedonic product categories. These findings seems to emphasize the importance of a goal prime to be presented at the same time or very close to the time where the decision is made.

## 5.6 Implications for Public Policy and Industry

The research papers that form the foundation of this dissertation provide important contributions for public policymakers and industry. Our results can allow policymakers and product designers/innovators in the food industry to understand different kinds of FOP labels and their effects on purchasing behaviour, as well as to gain insights into the underlying reasons for why products are chosen. The insight about that the intention to change dietary

salt intake does not predict a population's willingness to try out salt-reduced food products, can prove to be useful in the decision process when planning campaigns for public health or when deciding how and to whom to communicate a product reformulation on the FOP.

The work presented in this dissertation has practical implications for marketing strategies and public health messages. Our findings suggest that when employing a FOP label it is important to be aware of the strengths and weaknesses of the different types of labels. If an interpretative endorsement FOP label regarding salt reduction will be developed and used on commercial food products, marketers should be aware of the product category (i.e., hedonic vs. utilitarian), but also possibly the specific wording, as some products also benefit from the label 'Reduced Salt Content'. Ikonen et al. (2019) found that salt warning labels persuade consumers to make healthier choices, however not for the least healthy products (hedonic).

Moreover, the present findings have practical implications for public policymakers in utilising the consumer acceptance of authority-issued label schemes for the planning of public health initiatives. Our research shows that using an authority as an endorsement for the salt content of a product increases the likelihood that consumers will choose the product.

Furthermore, we showed that an interpretative endorsement salt label has a positive effect on purchasing behaviour, in addition to the effect of the Keyhole logo label. This could indicate that for consumers who lack the ability to decipher the meaning of traditional food labelling or evaluative interpretive labels, this salt label adds an understandable cue. It could also mean that the label's simplicity communicates with consumers' System 1, making it easier and more intuitive for the consumer to choose the salt-reduced product. It seems that the presence of our label does not compromise the effectiveness of other nutrition labels. In addition, our research in paper 1 found that having an interest in changing dietary salt habits did not predict willingness to purchase reduced-salt products. Although research has shown that most FOP labels help consumers to identify healthier options, research has also demonstrated that

identifying such options is not a guarantee that consumers will choose to purchase healthier products (Ikonen et al., 2019).

There are important policy decisions to make when considering that the vast majority of FOP nutrition labelling is voluntary. We believe that employing an interpretative endorsement label, such as the one tested in our four studies, would encourage industry to re-formulate their products in order to be able to obtain such a FOP label. In addition, we expect that the food industry will not object to such a label as fiercely as it does other types of FOP labels (Velasco, 2018), which might facilitate a much needed and effective collaboration between policy regulators and the industry.

#### 5.7 Limitations

There are limitations to the studies, which are discussed below.

All three of the web-surveys that are reported in this dissertation are subject to the usual limitations of survey research. This holds specifically in relation to behaviour and intentions based on self-reports. The respondents' replies about their purchasing intentions for reduced-salt products and about their behaviour and reflections regarding salt might reflect a social desirability bias, whereby respondents answer more positively in a survey because there are no immediate consequences (e.g. reduced taste, altering of habits) associated with these replies.

The samples used in the surveys were close to representative of the general population in terms of demographic characteristics. The limitation in relation to the samples was that except for participants in the second paper, all of the participants were Danish. In the second paper, we included samples from both Denmark and Norway. Because we measured purchase probability with/without an authority label, we expect that the trust and increased purchase probability that we found in our studies might be different in countries where trust in authority is lower than in the Scandinavian countries.

We found that the in-store study was probably underpowered. Observing how the choice probabilities of salt reduced products in the web studies were similar to the purchase decisions made in the experimental in-store study, we believe that the size of the in-store sample imposed a limitation and that had the sample been double the size, we would have obtained more significant results.

In the first study in paper three, all products were displayed as generic pictures with no other information except price, salt labels to indicate organic and whole-grain products, or a Keyhole logo. In study two and the third study in paper three, all products were displayed as in a store but with salt labels and without price. Only in the in-store experiment was all information and pricing visible. This difference in how products were displayed and how many information were available pose a limitation in terms of comparing results across studies as other attributes than the salt labels could have influenced the choice of the respondent.

Finally, the last survey and choice task used self-reported measures of guilt, sense of control and taste expectations. Self-reported explicit measures have significant limitations when it comes to insights into complex emotions and sub-conscious and psychological processes.

## 5.8 Future Research

The study of consumer decision-making and its underlying processes is a complex matter and the outcome depends to a high degree on the perspective and methods one applies to the research. With this work, we did not fully succeed in capturing and explaining why we find a difference between hedonic and utilitarian salt reduced choices. This means that future work should aim to increase the complexity of measures and attempt to follow the underlying processes that prompt consumers to choose one product over another. Exploring such underlying processes could entail focusing on measures of sub-conscious and psychological processes by the use of implicit measures. We did not use these measures in our studies.

Furthermore, I recommend conducting further research into goal priming and its proximity in space and time to the products. Specifically testing if the hedonic effect we found in the in-store study can be explained by the hedonic products proximity to the health goal prime. In addition, further research should investigate how and why a positive endorsement label like the one that we tested in these studies seems to increase choice probability more than warning labels and how this endorsement label would perform in comparison to warning and evaluative labels. Moreover, research is warranted on exploring the possibilities of endorsement labels of low-salt products and perhaps also on fats and sugars and whether these positive endorsement labels make consumers purchase healthier products within the specific category. In addition, research could determine whether the endorsement labels make consumers purchase, for example, cake or potato chips (because of the salt endorsement), when in fact they set out to purchase fruits or other utilitarian products. We speculate that that the endorsement label is a more effective label, because consumers trust this label more than the reduced salt label. However, we did not measure trust in any of our studies. Future research should investigate if trust is the reason. Our study that considered guilt and taste expectation could benefit from replication, but with the use of implicit measures for the psychological variables. In addition, we did not take the price of products into consideration in all studies. This could possibly be interesting to include in future research. For example, future research could consider purchase probability when labelling food products with the authority label from this dissertation by including other countries, preferably outside of Scandinavia. We found that both Danes and Norwegians responded positively to this endorsement label; however, trust in authority varies between countries and, as such, consumers from other countries might not respond equally positively to the same endorsement label. Replicating these studies but including countries across Europe would increase the transferability of the results.

## 5.9 Conclusion

I have argued that it is feasible to consider introducing an endorsement FOP salt label for use on both hedonic and utilitarian food products. I argue for this because I have found across four different studies and in two different countries, that such a label has the potential to move some of the sales from conventional products to reduced-salt products.

I also argue that an endorsement label will experience less resistance from industry than the warning labels that are becoming prevalent in some countries. I have found that consumers are willing to try reduced-salt products in both the hedonic and utilitarian categories, with the greatest potential probably in the hedonic category. This is contrary to the general perception that hedonic products are not usually the most suitable category for salt-reduction strategies, as they are normally purchased for pleasure and fun, thus making the utilitarian category more sensible to strategies that might reduce taste. I have shown that products that are not normally accepted by consumers in a reduced-salt variant (e.g., cheese) can be accepted as long as the wording is suitable and taste expectancy is not diminished when there is an FOP salt label. Based on these results, I argue that there is a market for a wide variety of reduced-salt food products and that industry could drive the population to reduce dietary salt intake together with other stakeholders in particular health agencies conducting informational campaigns. The collected evidence that this thesis offers holds promising potential for the market success of reduced-salt products with an FOP endorsement salt label to differentiate these products from those with high salt content. Although the evidence is promising, further research is required to explore the ecological validity of the findings.

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## Co-Author Statements

**Paper 1:** Determinants of intention to reduce salt intake and willingness to purchase salt-reduced food products: Evidence from a web survey

**Paper 2:** Choice of salt-reduced products in the hedonic and utilitarian product categories: A cross-country comparison of Denmark and Norway

**Paper 3:** The effect of labeling on purchase probability of salt-reduced food products and the roles of guilt and taste expectations in choice.



**Declaration of co-authorship\***

Full name of the PhD student: Trine Mørk

This declaration concerns the following article/manuscript:

Title:	Determinants of intention to reduce salt intake and willingness to purchase salt-reduced food products: Evidence from a web survey
Authors:	Trine Mørk, Liisa Lähteenmäki, Klaus G. Grunert

The article/manuscript is: Published  Accepted  Submitted  In preparation

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Has the article/manuscript previously been used in other PhD or doctoral dissertations?

No  Yes  If yes, give details:

The PhD student has contributed to the elements of this article/manuscript as follows:

- A. Has essentially done all the work
- B. Major contribution
- C. Equal contribution
- D. Minor contribution
- E. Not relevant

Element	Extent (A-E)
1. Formulation/identification of the scientific problem	A
2. Planning of the experiments/methodology design and development	B
3. Involvement in the experimental work/clinical studies/data collection	A
4. Interpretation of the results	B
5. Writing of the first draft of the manuscript	A
6. Finalization of the manuscript and submission	B

**Signatures of the co-authors**

Date	Name	Signature
	Klaus G. Grunert	
	Liisa Lähteenmäki	

Date: 5.11.19

In case of further co-authors please attach appendix

\_\_\_\_\_  
Signature of the PhD student

\*As per policy the co-author statement will be published with the dissertation.



**Declaration of co-authorship\***

Full name of the PhD student: Trine Mørk

This declaration concerns the following article/manuscript:

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Authors:	Trine Mørk, Klaus G. Grunert, Mari Øvrum Gaarder and Valérie L. Almli

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3. Involvement in the experimental work/clinical studies/data collection	A
4. Interpretation of the results	C
5. Writing of the first draft of the manuscript	A
6. Finalization of the manuscript and submission	C

**Signatures of the co-authors**

Date	Name	Signature
	Klaus G. Grunert	
	Mari Øvrum Gaarder	
	Valérie L. Almli	

In case of further co-authors please attach appendix

Date: 5.11.19

Signature of the PhD student

\*As per policy the co-author statement will be published with the dissertation.

## Declaration of co-authorship\*

Full name of the PhD student: Trine Mørk

This declaration concerns the following article/manuscript:

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Authors:	Trine Mørk & Klaus G. Grunert

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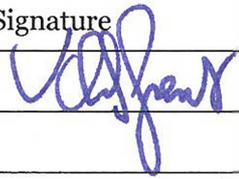
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The PhD student has contributed to the elements of this article/manuscript as follows:

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- C. Equal contribution
- D. Minor contribution
- E. Not relevant

Element	Extent (A-E)
1. Formulation/identification of the scientific problem	A
2. Planning of the experiments/methodology design and development	B
3. Involvement in the experimental work/clinical studies/data collection	A
4. Interpretation of the results	B
5. Writing of the first draft of the manuscript	A
6. Finalization of the manuscript and submission	B

### Signatures of the co-authors

Date	Name	Signature
	Klaus G. Grunert	

Date: 5.11.19

In case of further co-authors please attach appendix

  
Signature of the PhD student

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