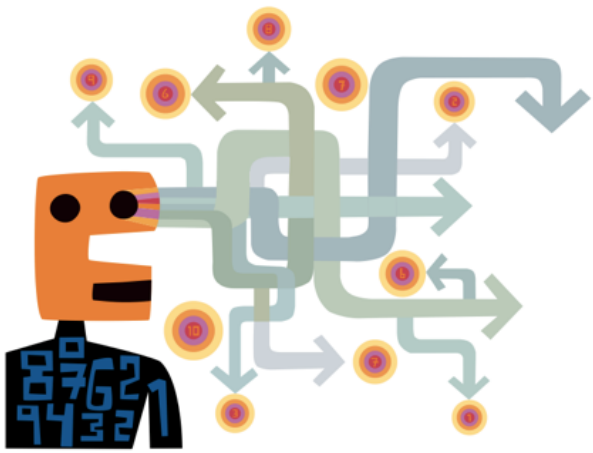
Nordic Council of Ministers

The behavioral insights of health choices

How contextual interventions can influence people in the Nordic countries to eat healthier, exercise more and consume less alcohol and tobacco



Knut Ivar Karevold, Helena Slapø & Samira Lekhal

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2 Management summary

Background: health challenges in the Nordic countries

Today non-communicable diseases (NCDs) such as diabetes, cardiovascular diseases, cancer, chronic respiratory diseases and mental disorders account for the largest part of the disease burden in the world [5]. The European Region has the highest burden of NCDs totaling 77% of within this region and resulting in almost 86% of premature deaths [7].

In Sweden, Denmark, Finland, Norway and Iceland, the four risk factors, namely unhealthy diets, tobacco smoking, excessive alcohol consumption, and physical inactivity [8] - are the main causes of the disease burden [11]. Unhealthy diets are the main risk factor (ranked #1-2), followed by tobacco smoking (ranked #1-4) and alcohol consumption (ranked #3-7). Physical inactivity is ranked relatively low (ranked #8-9).

Behavior plays an important role in public health. Unhealthy food choices, smoking, extensive alcohol consumption, and inactivity are all behaviors that people can choose to engage in or not. NCDs are therefore preventable, and interventions that change behavior have a substantial potential to alter the current patterns of disease. The problem is that people often fail to make better health choices.

Recently we have seen a growing interest in and optimism about how behavioral economics and contextual interventions can influence health related behaviors at a national level. Several publications from the United Nations, the World Health Organization, the World Bank, the OECD and the European Commission focus on how altering the environment can encourage healthier behaviors. This report reviews the empirical evidence on how dietary choices, exercise, tobacco and alcohol consumption can be influenced by such approaches.

Focus: How contextual factors can promote healthier choices

The objective of this report is to analyze how behavioral and contextual interventions can serve as solution strategies to improve dietary choices, tobacco and alcohol consumption, and physical activity. We provide an overview of the empirical evidence suggesting that people's health choices can be swayed in a healthier direction by applying behavioral economics and contextual interventions. The report outlines suggestions on how Nordic policy authorities and cooperation with commercial business organizations can implement solutions that promote healthier choices.

Behavioral change strategies and health-promoting contexts

The report summarizes scientific research on how contextual factors can influence people to make healthier choices. It provides research-based evidence for behavioral health policies, and links general health policy recommendations with research which examines specific alterations of the context that most effectively seem to sway people's choices in a healthier direction.

Behavioral and contextual interventions may be promising strategies for improving the national health. Since these interventions are often designed to impact a broad part of the population, they may be particularly effective in targeting vulnerable, lower-income population segments. Contextual interventions may therefore reduce health inequalities.

The behavioral economics of health decisions: How context can change choices

As many everyday health choices are made quickly, intuitively, and impulsively, changing the context of decisions may sway people in a healthier direction. Contextual interventions build on the principles of behavioral economics and the dual-system cognitive framework.

The five most studied health-promoting contextual interventions are placing, prompts, price, portioning and availability.

The report discusses the opportunities and limitations of behavioral interventions and suggests how behavioral policies can be integrated with other policy measures to promote health.

Randomized control studies on the behavioral insights of health choices

The report identifies and analyzes 53 scientific review studies, based on 1250 original empirical studies, which evaluated how contextual interventions can change health choices. All studies have been published in peer-reviewed scientific journals. The analysis and conclusions in this report are based on these review studies.

Food choices are the most studied health-related behavior with a total of 29 review studies, followed by tobacco smoking (11 reviews), physical activity (7 reviews), and alcohol consumption (6 reviews). Across the four health outcomes, price (12 reviews), prompts (12 reviews), and portioning (8 reviews) were the most studied contextual interventions.

How diet and food choices can be influenced by contextual interventions

The included review studies on dietary choices evaluated the impact of placing, prompts, price and portioning. In this context, placing has the most consistent influence on people's choices: adjusting the distance, order and selection of healthier options significantly influences food selection in 60-100% of the included studies. Prompts influence food choice in about 50% of the studies: simple signs and symbols work best and influenced consumers in 61% of the studies, while more detailed information-rich signs sway choices in 25% of the studies. The evidence shows that price and price-changes significantly alter consumption in about 60% of the studies. Portioning influences consumers to choose less or healthier foods in nearly 70% of the studies. The impact of contextual interventions seems to be quite similar across the three food contexts, namely supermarkets, restaurants and schools.

How physical activity level and exercise can be influenced by behavioral interventions

The review articles on physical activity and exercise focused on how prompts and price can boost active travel, such as walking and cycling, to get people to exercise more. One review evaluated the effect of prompts to encourage the use of stairs: the results show a significant but small increase. About 20% of the review studies on price found a significant effect of this on exercise behavior. However, the study only evaluated short-term effects. Conclusively price has an inconsistent effect on physical activity and exercise behavior.

How tobacco smoking can be influenced by contextual interventions

The included review studies on tobacco smoking test how prompts, price, portioning and availability can limit smoking. These show that the empirical evidence supporting that people's tobacco consumption can be influenced by contextual interventions is inconsistent. Some contextual interventions seem to significantly influence consumption, while the impact of others seems unclear. The studies on prompts found a different effect and the influence of health warnings depended on the design and size of the label. Plain packages show a limited and inconsistent effect. The evidence show that prices and taxes significantly can limit smoking, while positive incentives seem to have a weak effect on quitting. Portioning cigarettes, by making them shorter, does not seem to impact smoking behavior. Some of the studies on restricting consumer's access to tobacco products show significant effects on limiting consumption, but not all of them. For instance, reducing the availability of cigarettes by limiting the display and promotion has on the other hand, reducing availability, by limiting access to smoking at schools and workplaces, however, shows a clear significant effect. In total the studies show inconsistent effects of availability on tobacco smoking.

How alcohol consumption can be influenced by contextual interventions

The review studies on how one can use prompts, price and availability to limit alcohol consumption show inconsistent effects. The review on prompts shows no significant effect of giving people feedback on personal alcohol consumption relative to the social norm. Price strongly and significantly impacted consumption in one of the review studies but not all studies show supportive evidence. Availability might impact alcohol consumption, but we lack evidence of the link between availability and harmful alcohol consumption.

How other health behaviors can be influenced by contextual interventions

A limited number of studies have investigated how contextual interventions can influence other health behaviors such as adherence to health advice, mental health, warfarin adherence, health risk assessments following medical drug plan, influenza vaccination, manage chronic diseases, end-of-life care, health behavior later in life and screening for colorectal, breast, and cervical cancers. One review study evaluating the impact of prompts found a significant effect of giving people feedbacks on health behaviors as cancer scanning. The original articles on price found a significant effect of positive incentives. Defaults significantly impact end-of life care and vaccination rate. To conclude the studies, show that prompts, price and defaults significantly

can influence health related choices but since this conclusion is based on a low number or original articles, we lack evidence to make draw further conclusion.

Evaluation of empirical results

A total evaluation of the studies show that the empirical evidence for the effectiveness of contextual interventions on health behaviors varies significantly.

For diet and food choices, the empirical evidence can be considered sufficient; a high number of review studies that include a high number of original empirical studies demonstrate that contextual interventions can sway food choices in a healthier direction. Placement seems to have the most consistent effect, while the effectiveness of the other interventions seems inconsistent; they work in some cases, but not other.

For physical activity, the empirical evidence is considered weak as the total number of review articles is relatively low, and the observed effects of contextual interventions on improving physical activity levels are also weak.

For tobacco smoking, increased prices seem to have a significant effect and the evidence to support these seams sufficient. The effect of prompts and availability on smoking behavior is inconsistent, and the findings are based on weak empirical evidence. Portioning also has little impact on smoking, and the empirical evidence to support the claim is weak.

For alcohol consumption, the effects of price and availability are inconsistent based on weak empirical evidence, and the effects of prompts weak based on weak empirical evidence.

From empirical studies to policy design and implementation strategies

The empirical studies analyzed in this report showed that altering the context often changes people's health behavior. This knowledge can be applied to policymaking, with the objective to help people make better heath decisions for themselves.

The report suggests an analytical framework where health policy implications are derived from the strength of empirical evidence and the complexity of health decisions. Furthermore, it examines the specific contexts in which the choices can be influenced and who is responsible for implementing the contextual changes, and how they can be engaged to stimulate healthier decisions.

Many of the studies suggest that altering the context can improve health behaviors. However, the report concludes that the empirical evidence supporting broader population level interventions is limited. More scientific research on how behavioral and contextual interventions should be designed, implemented and monitored is needed before they are used in public policy.

Health policy implications for diet and food choices

We recommend implementation of food policies that take into consideration the impact of choice contexts in Nordic countries. Contextual interventions in grocery stores, at workplace buffets, restaurants and schools can sway the choices of food towards a healthier direction since food providers and producers control the design of their outlets and products. Thus, supermarket chains, restaurant businesses and the food industry are the implementation agents that can enable healthier food contexts. These agents are business organizations, motivated by commercial goals as well as their public image, identity and social responsibility. This fact should be taken into account when engaging the food industry to stimulate healthier consumer choices.

Food policies based on principles from behavioral economics require a different set of roles and competencies for public health agencies than those presently in place. Policy design and implementation should be based on dialogue between the food industry and regulators rather than unilateral enforcement of regulatory changes. Health policy design needs to involve food providers in order to create a shared understanding of why this is an important issue; to monitor progress; and reward positive performance and achievements.

Health policy implications for exercise and physical activity

Nordic health policies already focus on promoting physical activity, but this report provides no clear behavioral policy implications for how best to influence exercise behaviors on a national level. The empirical evidence supporting the potential effectiveness of contextual interventions for physical activity is weak. It is unclear what specific contexts one should target, and which agents are best fit to implement contextual changes that stimulate healthier behavior change.

Physical activity is a complex behavior involving a range of decisions in various contexts. Changing transportation mode and exercising more regularly is influenced by a number of different considerations. Multiple organizations and institutions can influence people's physical activity: employers, public health agents, public city bike rental agents, architects, city planners, designers of roads and bicycle paths, owners of exercise facilities etc. Design of effective behavioral interventions depends on a more in-depth understanding of unique contexts and specific decision processes. We therefore recommend obtaining further empirical evidence on how contextual interventions can influence physical activity.

Health policy implications for tobacco smoking and alcohol consumption

Nordic health policies focus on limiting tobacco smoking and alcohol consumption. Despite inconsistent and weak empirical evidence suggesting that contextual interventions can change choices, this report suggests designing and testing behavioral policies. We need more validated knowledge about what specifically needs to be changed; the decision contexts; and who needs to implement contextual changes. In the Nordic countries, consumers are exposed to tobacco and alcoholic products in food stores, and other retail outlets, many of which are the same as

where food products are promoted and sold. It is therefore reasonable to expect that many of the same interventions that influence food choices can be applied to tobacco products and alcoholic beverages.

The implementation strategy used can be similar to the one suggested for influencing food choices and promoting healthier diets. Effective health policy design and implementation needs to involve tobacco and alcohol providers; commit to swaying choices in a healthier direction; to monitor progress; and reward positive performance and achievements.

The Project Group

Knut Ivar Karevold, Project leader

Knut Ivar is the director of GreeNudge and has designed the GreeNudge projects the two recent years. Knut Ivar is an Organizational Psychologist with a PhD on framing of choices and communication. He has also been a Fulbright Scholar at Harvard Business School and works as Associate Professor (II) at the Medical Faculty, University of Oslo, and Associate Professor (II) BI Norwegian Business School.

Helena Slapø, Project associate

Project coordinator and research associate in GreeNudge.
Helena holds a MSc degree in Energy, Natural Resources and the Environment from the Norwegian School of Economics. She has also studied at the Technical University of Berlin and London School of Economics. For her master thesis Helena implemented an environmental traffic light labeling system in a cafeteria that successfully changed consumers food purchase. Prior to joining GreeNudge, Helena has work experience from an environmental NGO and corporate banking.

Samira Lekhal

She is a specialist in internal medicine and has a doctorate on prevention and risk factors for development of heart disease. Over the past 15 years, she has worked with obesity and has since 2011 led the children's section at the Morbid Obesity Centre, Department for children and adolescents, Vestfold Hospital Trust in Norway. Samira is also a member of the European Childhood Obesity Group reference group and chairman of GreeNudge. She leads the interdisciplinary and national project "From Knowledge to Action", aimed at preventing non-communicable diseases and overweight in children and adolescents. Through the "From Knowledge to Action" project, Norway has become the first country in Europe to conduct nationwide courses for the health and education sector, focusing on prevention of overweight in children and adolescents. Furthermore, the project initiated cooperation between several research institutions and the food industry to promote healthier consumer behavior.

About GreeNudge

GreeNudge was founded in 2011 and is an independent organization connected to the Oslo and Akershus University College of Applied Sciences (HiOA). Our academic partners include Cornell University, BI Norwegian Business School and the University of Oslo. Our interdisciplinary team is specialized in psychology, medicine and economics. We are specialized in applied behavioral research and work on encouraging healthier and greener decisions in everyday life. Our customers are private companies and public institutions in the Nordic countries.

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Authors: Knut Ivar Karevold (University of Oslo, BI Norwegian Business School, GreeNudge)
Helena Berz Slapø (GreeNudge)
Samira Lekhal (Morbid Obesity Centre, Department for children and adolescents, Vestfold Hospital Trust, GreeNudge)

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Address: GreeNudge, c/o Mesh Tordenskioldsgate 2, 0160 Oslo, Norway

E-mail: info@greenudge.no

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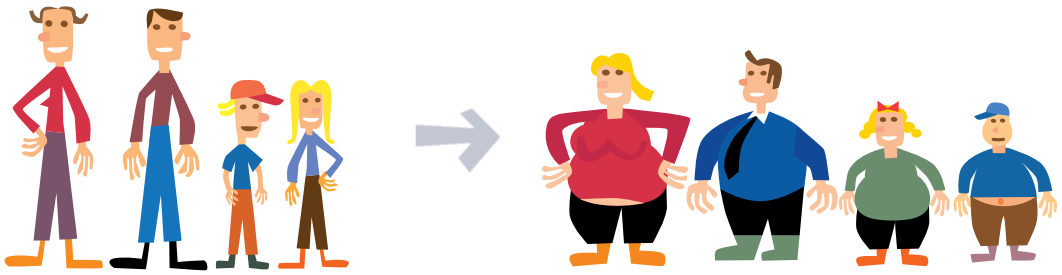
1 Introduction



Main points

This chapter explains the background for the report. The chapter opens with an overview of the health effects of poor diets, inactivity, tobacco smoking and excessive alcohol consumption. These are the four main causes of non-communicable (NCDs) diseases in the Nordic countries. Next, the chapter presents the objectives of the report and defines its target audiences.

Background

- Today non-communicable NCDs account for the largest part of the disease burden in the world and for all Nordic countries
- NCDs can be prevented by reducing the four main risk factors, namely unhealthy diets, tobacco smoking, excessive alcohol consumption, and physical inactivity
- There is growing interest in how behavioral economics and contextual interventions can influence population level health behaviors
- This report reviews the empirical evidence for how peoples' health choices can be influenced by behavioral interventions

Objectives

- Describe the main health risks and disease burdens in the Nordic countries, and how behavioral and contextual interventions can provide relevant solution strategies for these societal problems
- Communicate an overview of the empirical evidence suggesting that people's health choices can be swayed in a healthier direction by applying behavioral economics and contextual interventions
- Suggest how Nordic policy authorities in cooperation with commercial business organizations can implement contextual changes that promote healthier consumer choices

Target audience

- Nordic healthy policy authorities, producers and retailers, researchers and practitioners

1.1 Background

Today non-communicable diseases (NCDs) such as diabetes, cardiovascular diseases, cancer, chronic respiratory diseases and mental disorders account for the largest part of the disease burden in the world [5]. The European Region has the highest burden of NCDs that together account for 77% of the burden of diseases and almost 86% of premature mortality [7].

Although the disease burden and NCDs correlate with variables such as education level, social class, age and gender, they can be prevented by reducing the exposure to the four main risk factors, namely, unhealthy diets, tobacco smoking, excessive alcohol consumption, and physical inactivity [8]. In the Nordic countries Sweden, Denmark, Finland, Norway and Iceland these four risk factors are the main causes of the disease burden [11].

These unhealthy behaviors share a common dilemma: although people know that they should change them, they often fail to do so. If tackled health problems and disease burden could be prevented, avoided, modified or reduced.

Recently we have seen a growing interest in and optimism about how behavioral economics and contextual interventions can influence population level health behaviors. This report reviews the empirical evidence on how food and dietary choices, exercise behaviors, and tobacco and alcohol consumption can be influenced by such approaches.

1.2 Objectives of the report

The objectives of the report are to:

- Describe the main health risks and disease burdens in the Nordic countries, and how behavioral and contextual interventions can provide relevant solution strategies for these societal problems

- Communicate an overview of the empirical evidence suggesting that people's health choices can be swayed in a healthier direction by applying behavioral economics and contextual interventions

- Suggest how Nordic policy authorities in cooperation with commercial business organizations can implement contextual changes that promote healthier consumer choices

The report addresses the growing interest in how behavioral and contextual interventions can promote healthier life styles and prevent NCDs. The approach of the report is to review and analyze the empirical evidence suggesting how significantly such interventions might influence people's choices.

Several health organizations and governmental agencies assume that behavioral interventions can influence population health. On the other hand, there is disagreement about the

effectiveness of such strategies and some claim there is insufficient evidence supporting the approaches [13]. To aid future health policy design, this report reviews the scientific studies that have investigated the effectiveness of health oriented behavioral interventions.

To our knowledge, few if any previous reports have specifically investigated and reviewed how healthy choices related to food and diets, exercise behaviors, and tobacco and alcohol consumption can be influenced by behavioral approaches. This report is partly based on the previous GreeNudge report “From Knowledge to Action. The behavioral insights of food choices: Influencing consumer to eat healthier” [14].

1.3 Target audiences

The main target audiences for the report are Nordic health policy authorities.

The report can also be relevant for commercial business organizations that are interested in promoting their customers’ health, researchers and advisors engaged in public health issues.

The report communicates the existing research in a popularized style, making it accessible to all target groups.

2 Health risks and disease burdens in the Nordic countries

Main points

This chapter presents the health risks and disease burdens in the Nordic countries Sweden, Denmark, Finland, Norway, and Iceland. The first section provides an overview of the four most important behavior risk factors for premature deaths in the Nordic countries and how strongly these factors impact public health, namely unhealthy diets, low physical activity, tobacco smoking and alcohol consumption. The remaining sections of the chapter provide a more detailed description of each of the four major risk factors, how these have developed the recent years, how people in the Nordic countries behave, and the recommended changes in people's health choices and behaviors.

Risk factors with the largest impact on health outcome in Nordic countries:

- Poor diets, inactivity, tobacco smoking and extensive alcohol consumption are the main risk factors for NCDs and poor health in the Nordic countries and the rest of the world
- Common for the Nordic countries is that unhealthy diet is the main risk factor, followed by tobacco smoking and alcohol consumption

2.1 Risk factors with largest impact on health outcome in Nordic countries

Table 1 shows how the different risk factors are ranked in relation to how many premature deaths they cause in Sweden, Denmark, Finland, Norway and Iceland.

Table 1. Ranking of the most important risk factors for premature deaths in the Nordic region

	Sweden	Denmark	Finland	Norway	Iceland
Unhealthy diets	#1	#2	#2	#2	#1
Physical inactivity	#8	Not on list	#8	#9	#9
Tobacco smoking	#3	#1	#4	#1	#2
Alcohol consumption	#7	#4	#3	#4	#7

The table illustrates the main health risks in the Nordic countries. The main risk factor common amongst all these countries is an unhealthy diet (ranked #1-2), followed by tobacco smoking (ranked #1-4) and alcohol consumption (ranked #3-7). Physical inactivity is a relatively lower risk factor (ranked #8-9).

2.2 Unhealthy diets

Unhealthy diets are those that are high in fats, sugar and salt content, and insufficient in the consumption of fruits, vegetables and whole grains [15]. The Nordic nutrition recommendations from 2012 advise an increase in the consumption of vegetables, fruits, berries, fish and other seafood, nuts and grains. They also suggest limiting the consumption of processed meat, red meat, sugary beverages and food with added sugar, salt and alcohol [16]. Unhealthy diets are associated with chronic diseases, including cardiovascular diseases, cancer, diabetes and other conditions linked to obesity [8, 17].

Unhealthy diets are the most important risk factor for premature deaths in Sweden and Iceland, and second most important in Norway, Denmark and Finland [18]. Norway and Finland had the lowest proportion of inhabitants with unhealthy diets in contrast with Sweden which had the highest [11].

This means that large parts of the population of the Nordic countries are far from following the official dietary recommendations. The Nordic Council of Ministers found that a large number of citizens have too low an intake of fruits, vegetables, whole grains, fish and a too high intake of saturated and trans-fats [11]. The only positive development overall in relation to diet is a decrease in the intake of sugar-rich foods across the region [11].

The proportion of adults with an unhealthy diet has increased from 18% in 2011 to 22% in 2014 in the Nordic region, and there is a substantial prevalence of overweight individuals and obesity [11].

2.3 Physical inactivity

Physical activity is defined as any bodily movement produced by skeletal muscles that requires energy expenditure [19]. According to WHO and the Nordic Council of Ministers, adults should have a minimum of 2.5 hours of moderate intensity physical activity per week [11, 16, 20]. For children and adolescents the guidelines advise at least 60 minutes of varied daily moderate and high intensity [16, 21]. This can both be achieved through exercise or active traveling (e.g. cycling instead of taking the bus). If one does not reach these recommendations, one is defined as physically inactive [11]. Physical inactivity is associated with non-communicable diseases such as cardiovascular diseases, cancer and type 2-diabetes [22-26].

Physical inactivity has been identified as the fourth leading risk factor for global mortality [27]. The Nordic region is more active than the rest of the world, and for Norway, Iceland and Sweden physical inactivity is ranked ninth, ninth and eighth respectively as a leading risk factor for premature death [27, 28]. However, the number of inactive people has increased in the Nordic region in recent years [16]: one in three adults was defined as physically inactive [11]. The number of active people remained unchanged between 2011 and 2014.

According to Eurostat data (2014), 61% of the population of Iceland exercises 2.5 hours or more per week making it the most physically active country. For Norway, Denmark, Finland and Sweden the corresponding proportion of the inhabitants who exercise 2.5 hours or more per week are 57%, 55%, 55% and 54% respectively [28].

2.4 Tobacco smoking

Tobacco products are those made entirely or partly of leaf tobacco as the raw material and all contain the highly addictive psychoactive ingredient, nicotine [29]. Tobacco use is one of the main risk factors for a number of chronic diseases, including cancer, lung diseases, and cardiovascular diseases. Smoking is especially associated with lung cancer, even for passive smokers [30].

Even though the number of tobacco smokers has declined dramatically over the last century; active tobacco smoking is still one of the leading causes of premature deaths in the Nordic region [11]. Tobacco smoking is ranked as the main risk factor for premature deaths in Norway and Denmark, the second factor in Iceland, the third in Sweden and fourth in Finland. In the Nordic region one out of five people over the age fifteen were daily or occasional smokers [11]. The lowest percentage of smokers was found in Sweden (15%) [11] and Denmark had the highest proportion of smokers (25%) [11]. Additionally, many used scruff, especially in Norway and Sweden [31, 32].

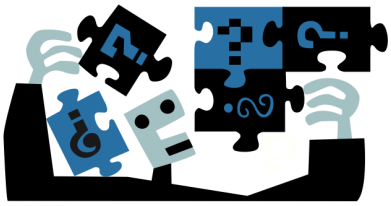
2.5 Alcohol consumption

Harmful and extensive alcohol consumption, defined as drinking that causes detrimental health and social consequences for the drinker, the people around the drinker and society at large, as well as the patterns of drinking that are associated with increased risk of adverse health outcomes, increases the risk of certain types of cancers and injuries, and tends to have a negative effect on diet quality [5]. Some of the Nordic countries have specific drinking recommendations: Swedish guidelines state that men should not drink more than 14 units, and women, not more than 9 units per week [33]; Norwegian guidelines suggest less is better, to avoid binge drinking and women and men should not exceed 10 grams and 20 grams of alcohol per week respectively [34].

The European Union is the heaviest drinking region in the world and alcohol consumption remains steady in the European region [5]. Harmful alcohol consumption is the third leading risk factor for mortality in Finland; the fourth in Norway and Denmark and the seventh for Iceland and Sweden. In 2014 the average alcohol consumption was 1.7 times per week and 45% of the population in the Nordic region binge drank at least once a month [11].

Of the Nordic countries, Denmark has the highest alcohol consumption per inhabitant [11]. According to national estimates alcohol consumption has been stable over the last decade in the Nordic region. Denmark had the largest decline from 11.5 liters in 2000 to 9.5 liters of alcohol consumed per person over the age of 15 in 2014 [35].

3 Strategies and solutions for improving population health behaviors



Main points

This chapter describes strategies and solutions that to influence population health behaviors. First, the chapter describes the policies that already have been implemented in the Nordic countries to improve the public health. Next, the chapter gives a brief introduction to behavioral economics. It is commonly believed that behavioral interventions, also called contextual interventions, can add to policy interventions as they address how people actually make their choices. The next part gives a review of some of the recent reports that have recommended contextual interventions as strategies to improve people´s health. Finally, we describe a simplified model of how behavioral and contextual interventions can sway health behaviors.

Traditional policy interventions

- Traditional policy tools include financial incentives, regulations, and information and education programs
- These build on models of rational decision-making and attempt impacting people's knowledge, beliefs and assumptions about how they could behave

Behavioral economics and contextual interventions

- Empirical evidence suggests that decision-making is strongly influenced by habits and intuition
- It has been argued that knowledge and intentions are overpowered by the impact of the environment and choice-context

Behavioral insights and health policies

- International organizations recommends changing contexts to promote healthier choices
- Governments worldwide are increasingly including behavioral economics approach into policymaking

How behavioral and contextual interventions can sway health choices

- Behavioral economics explains how people make decisions involving limited cognitive and mental effort
- Decisions can be swayed in a healthier direction by changing the decision context and making the healthier options more prominent

3.1 Traditional policy interventions

The general increase in the prevalence of non-communicable diseases has prompted significant action to prevent and change the negative trend. Substantial progress has been made to prevent and control NCDs in the European Region since the adoption of the WHO's Global Strategy for the Prevention and Control of Non-communicable Diseases in 2000 [36].

An important question for policy-makers concerns the interventions and actions that can best lead to a further reduction in non-communicable diseases, by improving diets, increasing physical activity, and reducing tobacco abuse and hazardous alcohol consumption. Traditionally efforts to improve health behavior have included financial incentives, regulation, and information and education programs [37, 38]. Financial incentives include subsidies, taxes and other economic tools.

Almost all countries in Europe have tax on alcohol and tobacco products and the Nordic region additionally taxes non-alcoholic beverages which have a high sugar content [36]. Regulations include restrictions on marketing or use at work and in public places. All Nordic countries have restrictions on unhealthy food marketing directed towards children [36]. The most common types of educational and informational interventions are mass media campaigns, health education in schools or health labeling of products. In Finland, for example, nutrition is taught in schools as part of several courses, including home economics, biology, and environmental and health education [39].

Traditional interventions build on economic theory and models of rational decision-making, assuming that human choices are reason based, rational and logical [40]. People are assumed to seek information on the quality and cost of the feasible options and systematically use this information to maximize their utility—that is, make the choice that is in their best interest [41]. Traditional public health interventions therefore try to impact behavior by influencing people's knowledge, beliefs and expectations about how they should behave.

3.2 Behavioral economics and contextual interventions

Empirical evidence suggests that the effectiveness of providing more information can be limited [42, 43]. People's behavioral intentions can deviate from their actual behavior [44], as they might not assimilate the necessary information or they behave inconsistently with their knowledge and best interests.

Rather than choosing and acting rationally when provided with the right information, research shows that significant decision-making occurs outside cognitive awareness and can be strongly influenced by habits and intuition [45, 46]. Behavioral economics interventions are directed at impacting people's intuitive and quick decisions. Behavioral economics acknowledges that human judgment is biased in systematic ways, and that these biases can make it difficult for people to adopt behavior they want to achieve [47].

It has been argued that the choice-context has a strong impact on people to make unhealthy choices: knowledge and intentions are overpowered by the impact of the environment. Changing the decision context and environment within which people make choices has therefore been recommended as a promising intervention strategy [40, 48-52].

3.3 Behavioral insights and health policies

International organizations such as the World Health Organization (WHO) [7], the World Bank [6], United Nations [9], OECD [10] and EU [12] have stated that they see great potential for insights gained from behavioral economics.

The WHO strategy for the prevention of lifestyle diseases [8, 53] emphasizes that the decision context should make it simple, practical and cost effective to make healthier choices. The strategy suggests that such interventions should be combined with education, incentives and regulation. WHO also addresses the need for more applied research on how to change health behavior, with an increased focus on behavioral economics.

The WHO strategy for Ending Childhood Obesity [54] also emphasizes the influence of health promoting environments, and recommends changing contexts to promote healthier choices, making healthier options more easily available, labeling to make healthier options more salient, and using taxes to increase the price of unhealthy options. WHO also recommends regulations, information, education, and marketing restrictions to promote healthier choices and prevent unhealthy behaviors. WHO emphasizes schools as important for influencing children's consumption and formation of healthy habits: for example, by making fresh drinking water freely available and restricting the access to unhealthy drinks and food. The strategy also emphasizes training of adults and caretakers to present and promote healthier choices for children.

Behavior economics for improving global health

Several recent reports suggest that contextual changes and behavioral economics interventions can enable people to make better and healthier choices. Behavioral interventions include a range of methods for influencing decisions that people make quickly, intuitively and by investing limited mental capacity [1, 2]. In recent years there has been growing interest in how such interventions can stimulate public choices from several sources [3, 4], such as the World Bank [6], United Nations [9], OECD [10] and the European Union [12].

Governments worldwide are increasingly including a behavioral economics approach into policymaking. The U.K. Cabinet Office created the Behavioral Insights Team in 2010, dedicated to testing and designing health interventions based on knowledge from behavior economics [55]. In the U.S. the government established the White House Social and Behavioral Science Team in 2015, dedicated to this type of work [56]. There are similar initiatives in other countries as well.

3.4 How behavioral and contextual interventions can sway health choices

The simplified model in figure 1 below illustrates how contextual factors are assumed to influence health choices. The illustration is inspired by other recent popularized presentations of the psychology of judgment [6, 57, 58], and the dual-system models of decision-making [1, 2, 59, 60].

Figure 1. Model for how contextual intervention impact health behavior

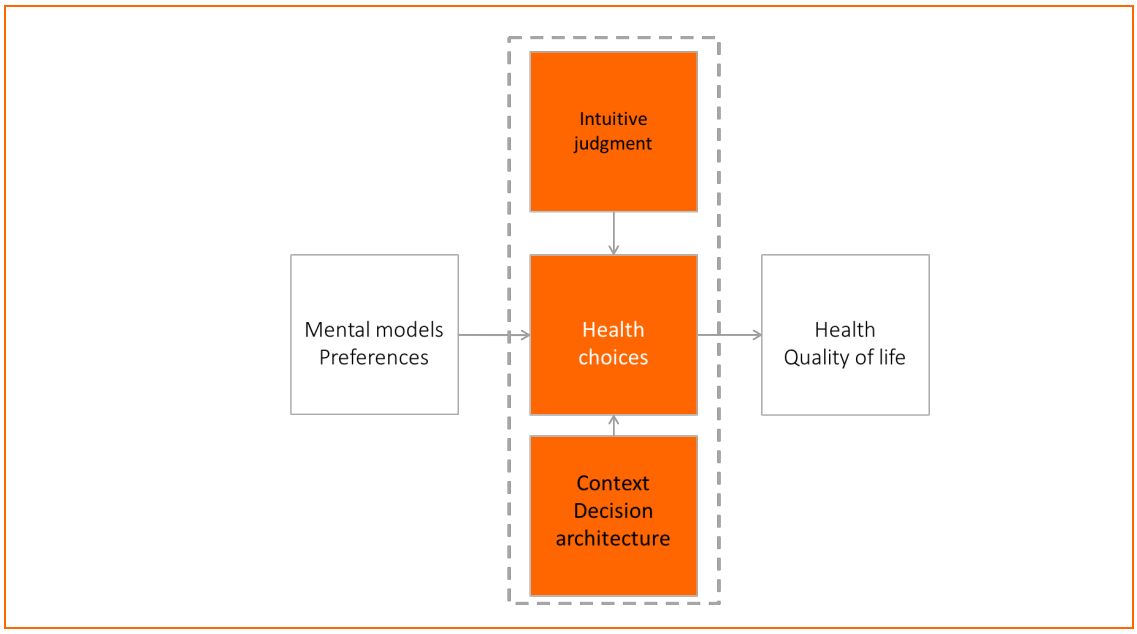


Figure 1 shows that health choices are influenced by the design of the context [61] and intuitive psychological judgments [59, 62-67], in combination with people's mental models, preferences and habits [68]. Mental models and preferences influence how people intuitively judge the decision contexts.

The dual system model of decision-making [1, 2, 59, 60] suggests that the human mind has two modes of operation. System 1 is fast, intuitive and impulsive, while System 2 which works slower, deliberately and analytically.

It is assumed that System 1 guides many everyday decisions that require people to invest limited mental effort [69], such as consumption choices [70, 71]. For example, recent research on food choices indicate that consumers invest limited resources in planning what to eat, have

difficulties judging exactly how much they eat, and do not know what they have consumed [64, 72].

By understanding the principles of System 1, choices can be swayed by redesigning how the options are presented [73]. As System 1 works automatically and associatively with limited conscious control, people are typically unaware how they are influenced by contextual stimuli. Important principles that guide System 1 decisions are selective attention, simplification of options, categorization, framing relative to reference points, and sensitivity to negative changes [58, 60, 74].

Based on the principles of the dual system model and principles of fast, intuitive decisions, we can design contextual interventions focused on changing how people actually choose and behave. The concept of a nudge [57, 73, 75] is based on System 1 decision principles. Swaying choices is based on how the options are presented, the order of options, and the available information about the options. Environments that enable healthy choices by presenting them as simple, accessible and affordable can thus stimulate behavior change. Contextual interventions have therefore been recognized as a central public health strategy [40, 48-52].

In this report we use the term ”contextual interventions” synonymously with nudges as both concepts refer to designed changes in the situation where the choice is made. These are examples of generic nudges recently suggested by Cass Sunstein [76]:

- Default rules
- Require active choosing
- Prompting choice
- Simplifying active choosing
- Providing reminders
- Priming
- Eliciting implementation commitments or commitments
- Social norms
- Ordering effects
- Convenience
- Framing
- Anchoring
- Warnings
- Visual effects
- Check lists

For complete list, please see page 718 in [76].

4 Method

Main points

This chapter presents the method and analytic strategy. First the search strategy and criteria used to find relevant review studies are described. Then the inclusion and exclusion criteria for the studies, explaining which studies that were selected for further analysis. The analysis was done indendently for food choices, physical activety, tobacco smoking, and alcohol consumption. We describe the the effects of the interventions were categorized, and how we defined the different contextual interventions.

Research strategy

- Open search for review studies and snowballing based on keywords and search criteria for health behaviors food choices, physical activity, tobacco and alcohol consumption
- Open search to find articles related to other health behaviors

Search criteria Inclusion and exclusion criteria

- Primary outcomes of contextual interventions: objective impact on food and diet, physical activity, alcohol or tobacco smoking, or other health behavior
- Randomized experimental studies published in peer-reviewed journals between 2007 and 2017 - on how changes in the choice-context influence consumption choices and behaviors
- Studies of the normal population in western countries
- Criteria for healthier choices based on public Nordic guidelines

Number of selected reviews

- The report is based on analysis of the most recent scientific review studies
- Healthy food choices: 29 review articles
- Physical activity: 7 review articles
- Tobacco smoking: 11 review studies
- Alcohol consumption: 6 review studies
- For other health behaviors: 1 review study and 6 original studies

Analysis of the selected review and original articles

- The results were coded based on three effect levels: statistically significant effects, non-significant effects, and interventions with “inconsistent” effects
- Across the four health outcomes, price (12 reviews), prompts (12 reviews), and portioning (8 reviews) and Availability (5 reviews) were the most studied interventions.

4.1 Research strategy

We summarize and analyze the empirical evidence of how contextual interventions can stimulate healthier choices based on a rapid review approach [77-84]. This approach is suitable for providing an overview of a knowledge area, particularly for decision-making, designing interventions, and for communication purposes.

The main steps in the rapid review approach are systematic searches in relevant data bases using key words; selecting the most relevant studies; qualitative assessment of the results; and qualitative summary of the conclusions and recommendations.

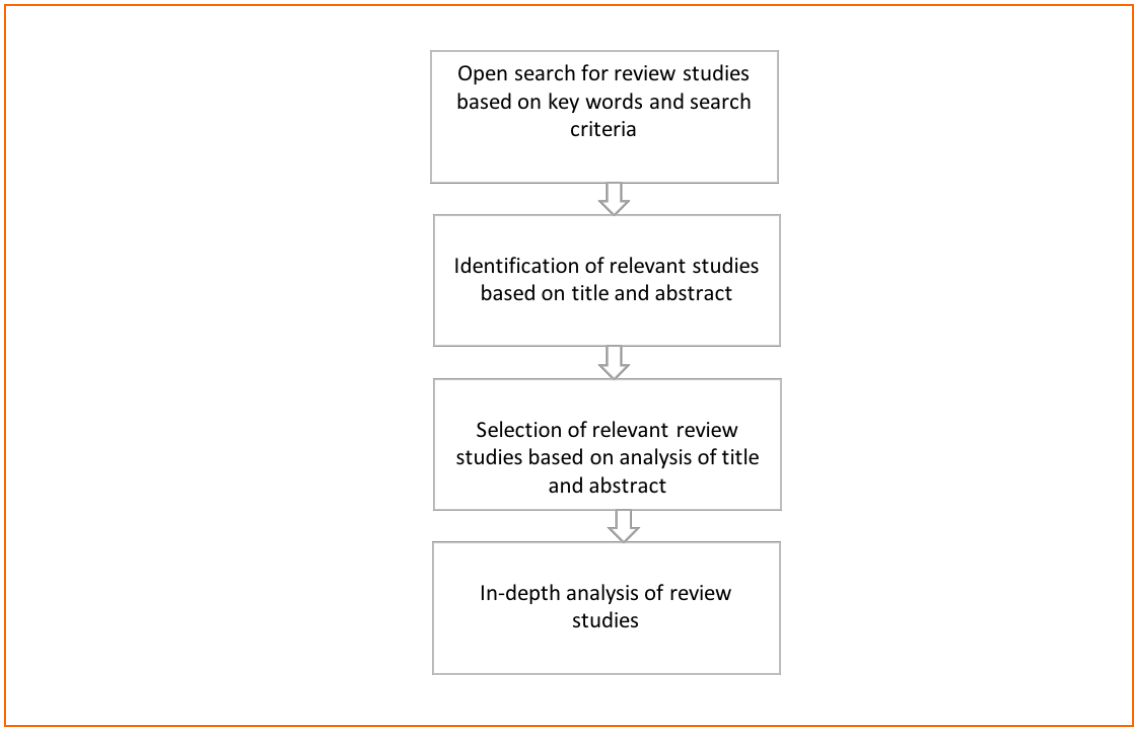
We used two complementary search strategies to find relevant articles and studies, namely open search and snowballing [85]. The snowball approach involves identifying the most recent reviews and further searching the most relevant references in these. An open search involves identifying studies based on defined key words in designated databases (see [85-88]).

This search strategy provides a systematic and complementary overview of the empirical studies. This report is, thus, mainly based on the most recent scientific review articles.

The review articles provide an overview of the current scientific knowledge, based on a critical selection of the most relevant original studies, the most consistent empirical results and conclusion-based judgments of several studies.

Figure 2 below illustrates the research strategy.

Figure 2. Search strategy



4.2 Search criteria

The primary outcomes of the studies were health behaviors related to food and diet, physical activity, alcohol or tobacco smoking, and other health behaviors. Included studies needed to report a behavioral outcome relating to one of these dimensions, or a measure of a proximal direct consequence (e.g. dietary intake, energy expenditure, tobacco or alcohol intake) or determinants of such behavior (e.g. food, alcohol or tobacco purchasing).

For food choices, we used the same search terms and inclusion criteria as in a previous report ”From knowledge to action: The behavioral insights of food choices: Influencing consumer to eat healthier” (reference). These search terms were “review, summary, food choice, health, decision architecture, nudge, supermarket, grocery, restaurants, schools, products”. The search gave 11300 hits from Google Scholar.

For tobacco, the search terms were “tobacco, smoking, behavioral economics, interventions, incentives, review” which lead to 1660 hits in Google Scholar and 12 hits in PubMed.

For alcohol use, the search words “alcohol, drinking, behavioral economics, interventions, incentives, review” lead to 2560 hits in Google Scholar and 7 in PubMed.

For physical activity, we used the search terms ”physical activity, exercise, behavioral economics, interventions, incentives, review”. This led to 9700 hits in Google Scholar and 33 hits in PubMed.

Snowballing was used as a search strategy to find articles related to other health behaviors. The identified articles were taken from the report “Nudge database v.1.2.” and similar reports identified through a systematic web search.

Context was defined environment, surroundings or situation where the food items were purchased or consumed, consistent with the definition of “micro environment” [86].

4.3 Inclusion and exclusion criteria

The inclusion criteria were:

- Review article
- Published in English
- Randomized experimental studies
- Studies of objectively verifiable information about actual change in behavior (not knowledge, beliefs or attitudes)
- Studies published in scientific publications with peer review
- Studies where healthier choices were defined as an increased number of healthier decisions and reduced number of less healthy decisions, or studies where the

proportion of healthy versus decisions changed, or where more healthy or less unhealthy options were selected. [85].

- Studies on a normal population and the general public, and excluding interventions focused on particular groups of consumers or particular consumer segments
- Studies on populations in western countries, mainly USA and Europe, but also Australia and South Africa
- Studies published during the last 10 years, from 2007 to 2017

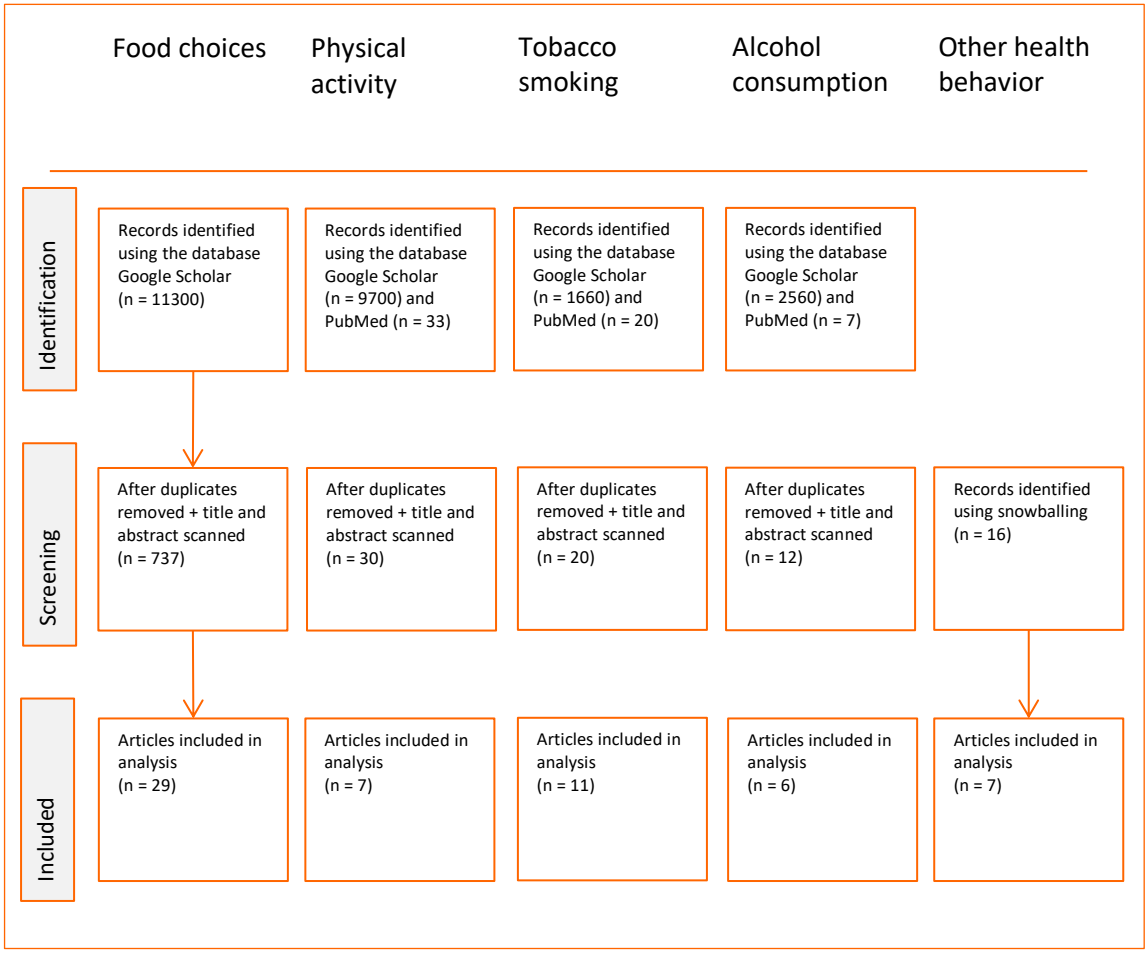
We excluded articles that looked at obesity and overweight preventions and weight loss since these conditions are related to multiple behaviors (e.g. both diets, physical activity and alcohol consumptions may lead to obesity). Additionally, articles that looked at the impact of interventions on certain sub-groups, specific populations, segments of consumers or specific patient groups (e.g. diabetes, overweight, addicts) were excluded. We only selected studies that looked at the impact of interventions on the population in general. We also excluded studies from in non-Western countries that were not comparable to a Nordic context.

There were no restrictions on what categories or types of contextual changes should be included, as long as the changes were made within the actual decision context where the choice was made.

4.4 Selected review and original studies

Figure 3 below shows the number of review articles selected for further analysis.

Figure 3. Review and original studies selection strategy of the identified review articles included for further analysis and reviewed in full



For the final analysis the number of selected studies were as follows: healthy food choices 29; tobacco smoking 11; alcohol consumption 6; and physical activity 7. One review looked at both smoking and alcohol consumption. For other health behaviors 7 articles were added to the analysis through snowballing.

Table 2 gives an overview of the number of selected review articles for food choices, physical activity, tobacco smoking, and alcohol consumption. For other health behaviors, both review and original studies are described. Many of the review articles were based on some of the same original articles. Therefore, the table gives an overview of how many original articles the reviews included before and after duplicates were removed. The references to the review and original articles included in the analysis are given in Appendix B-F.

Table 2. Overview of selected review articles, number of total and unique original articles included in reviews

Health choices and health behaviors	Number of included review studies	Number of original articles included on selected reviews	Number unique original articles
Food choices	29	710	409
Physical activity	7	100	92
Tobacco smoking	11	425	403
Alcohol consumption	6	399	338
Other health behaviors	1 review 6 original articles	16	15

The analysis did not include an in-depth analysis of the original articles included in the reviews, but conclusions were drawn from the review articles alone. For food choices the analysis was based on 29 review articles; for physical activity 7; for tobacco smoking 11; and for other health behaviors 1 review and 6 original articles.

4.5 Analysis of the selected review and original articles

"Effect" refers to whether the intervention was associated with a statistically significant change in health behavior.

We used three codes: statistically significant effect, non-significant effect and interventions with "inconsistent" effects. Some studies tested several interventions, several versions of the same intervention, or the effects on different segments or locations of consumers. Where the studies reported interventions with some statistically significant effects and some non-significant effects, this was coded as "inconsistent".

When we started this analysis, our plan was to extract information about objective changes in consumption (i.e. how much more or less was chosen), but this information was not available in the majority of the included studies. As part of the scientific publication process, all of the included original studies have been peer reviewed and evaluated to have sufficient scientific quality. Furthermore, all of the review articles noted several concerns and limitations with respect to the research quality of the original studies. It is beyond the scope of this report to provide an additional independent and systematic evaluation of the quality of the included studies. We have registered that the review papers note a significant variation in study quality which can limit the validity of the research findings.

To ensure the scientific quality of our review and analysis, we sought assistance from international and Norwegian researchers in the field of psychology, food, health, policy, and nutrition.

4.6 Definitions of contextual intervention categories

To clarify how contextual changes can influence consumers to make healthier choices, we first reviewed what changes were reported in the empirical studies.

Since we wanted the interventions to be comprehensible to a broader audience, we decided to formulate the interventions that focused on actual observable changes in the choice contexts rather than describe the interventions in terms of psychology, behavioral economics or other terminology.

We also aimed to identify common categories of interventions that could be relevant across the four different health behaviors – i.e. food choices, physical activity, alcohol consumption and tobacco smoking. The intervention categories are therefore defined quite broadly, and the specific design may vary across contexts and categories.

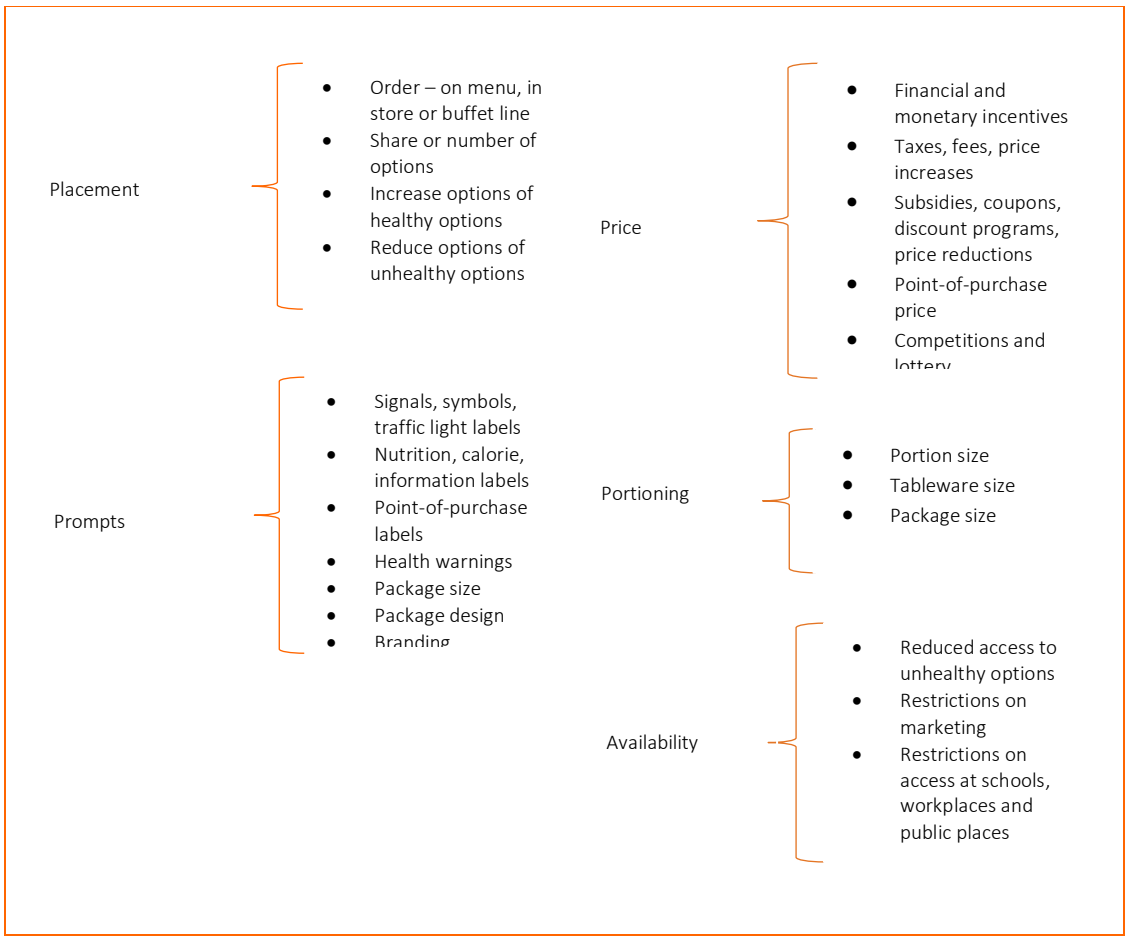
We applied a qualitative approach to define the main and sub-categories of interventions and started by analyzing concepts and definitions in the review articles. We observed significant conceptual variations: similar interventions were named differently, or clearly different interventions were named similarly. Some definitions focused on how the context was changed, while others focused on the psychological mechanisms. Two independent researchers worked to produce their lists of interventions, and these were compared and coordinated. We re-read the review articles, adjusted and updated the list.

We also reviewed concepts and terminology in popularized textbooks, such as the P's of marketing "Product, Price, Promotion & Place" [64, 71, 72, 87]; Professor Brian Wansink's CAN-framework ([72]): Convenient, Attractive and Normal, Thaler and Sunsteins "Nudge" book [73]; and Cass Sunsteins examples of nudges, synonymously with contextual interventions, from the paper "The Council of Psychological Advises" [76].

To simplify the communication of interventions, we adjusted the P-framework and the list of contextual interventions suggested by Wansink [47] and Sunstein [76] based on the findings in the review articles. We ended up with nine main categories of contextual interventions: placement, prompts, price, portioning, availability, priming, social norms, feedback and default options. These are the nine most tested and evaluated interventions in the literature we have analyzed.

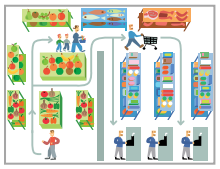
In the articles, different concepts were used to describe the interventions. The analysis of the review articles was thus based on these categories of contextual interventions shown in figure 4. The text box "Contextual interventions used in the analyzed reviews and original articles" defines the interventions used in the analyzed literature.

Figure 4. Categorization of the contextual interventions

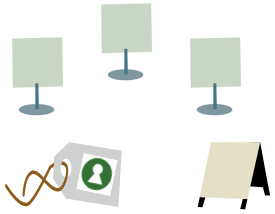


Definitions of contextual interventions

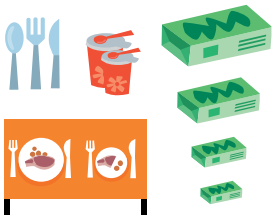
Placement refers to how and where options are placed and how the placement makes some options more or less attractive or accessible for consumers. Placing impacts how easy it is to find the healthier and unhealthy options. For food products the healthiest options can be more available and salient by placing them first in a grocery store, restaurant, or menu - or by adding healthier options to the mix.



Prompts refer to signs, labels and emblems placed on or beside the options or presented just before the consumers enter an area. There are two main categories of prompts: signs and symbols, and information-rich labels and emblems. For food products the keyhole symbol can be used to encourage consumers to choose the healthiest options. For tobacco or alcohol products one can use health warnings to make a product less attractive. Prompts can also include information about social norms or feedback about healthy choices.



Portioning refers to how the consumer is guided to select or consume certain amounts of a product. It relates to the overall amount of a product that is presented. A portion is closely related to the products' physical dimensions such as the volume, shape and how a specific portion is packaged. Portioning can also refer to how a product is composed or designed in terms of colors, size, logo or brand names that are used. Portioning interventions can also be changes in the unit of tableware used to consume a food product. For tobacco and alcohol products, one can alter the size of packs or units. Examples may be to serve alcohol in smaller glasses or to reduce the size of cigarettes.



Price refers to price level, reductions or increases. Monetary and financial incentives are also categorized as price interventions. Positive price changes for healthy options can be subsidies, coupons, lottery incentives, cash payments, rewards, or that a healthy behavior is free of charge. A negative price change means that the price of an unhealthy behavior becomes more costly or expensive, by adjusting the price through taxes, fees, and incentives. Price strategies can thus involve absolute price levels, relative pricing of comparable options, and price changes.

Availability refers to how available and accessible a product is. Availability is related to regulations that make a tobacco and alcohol product less available by restricting the density or number of stores that are allowed to sell certain products; restricting certain behaviors in public places, workplaces and schools; or restricting advertising. An example of reduced availability is the smoking law in Norway that has made it illegal to smoke inside public buildings and restaurants.

4.7 Overview of number of review studies on contextual interventions

The purpose of this report is to provide an overview of which contextual interventions are most studied, and to what extent they have been applied to influence the four different categories of health behaviors – diet, exercise, and use of tobacco and alcohol. The results are described in Table 3, which shows the number of review articles for food choices, physical activity, tobacco smoking, alcohol consumption and number of original articles for other health behaviors (e.g. medical drug plan and influenza vaccination) identified in this report.

Table 3. Intervention types and number of review studies

Contextual Interventions	**Number of review studies n = 53**			
Intervention Categories	Food choices n = 29 (55%)	Physical activity n = 7 (13%)	Tobacco smoking n = 11 (21%)	Alcohol consumption n = 6 (11%)
Placement	2			
Prompts	7	1	5	1
Price	4	6	2	2
Portioning	3		1	
Availability			2	3
General	2			
Contexts: supermarkets, restaurants, schools	14			

Table 3 shows that food choices is are the most studied with a total of 29 review studies, followed by tobacco smoking (11 reviews), physical activity (7 reviews), and alcohol consumption (6 reviews). There most empirical studies of how food choices can be influenced by contextual changes, and fewer studies on the other categories.

Across the four health outcomes, price (12 reviews), prompts (12 reviews), and portioning (8 reviews) were the most studied interventions. There is some overlap between availability and placement interventions, as both refer to how accessible and convenient it is for the consumer to find and choose the healthiest options. The most studied prompting interventions for food products were calorie and nutrition labels. In the case of physical activity, labels that encouraged active transportation, and for tobacco and alcohol, health warnings. In terms of price, food price increased for unhealthy options and reduced for healthy options were studied. For physical activity most studies showed price intervention was monetary rewards and incentives. For tobacco and alcohol, price interventions were tax interventions.

5 Results: review of empirical studies

Main points

This chapter offers an overview of the current empirical evidence indicating to what extent contextual interventions can influence people´s health choices. The chapter describes analysis of influencing food choices, physical activity, tobacco smoking, and alcohol consumption.

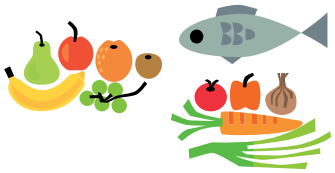
The most studied contextual interventions

- The most studied interventions for food choices are prompts, signs and labels (39%), placing (15%), price (12%), and portioning (12%)
- The most studied interventions for physical activity are price (86%) and prompts (14%)
- The most studied interventions for tobacco smoking are prompts (50%), price (20%), availability (20%) and portioning (10%)
- The most studied interventions for alcohol consumption are availability (50%), price (33%) and prompts (16%)
- For other health behaviors we identified studies that looked at the effects of prompts, price and default options

How strong is the empirical evidence for contextual interventions?

- For food choices, we consider the evidence for all of the interventions as sufficient and the effects inconsistent
- For physical activity the evidence and observed effects is considered weak
- For tobacco smoking the evidence is weak. Price seems to have a significant effect, but the other interventions have inconsistent effects
- For alcohol consumption the evidence is weak, and the effect of price and availability are inconsistent
- For other health behaviors the evidence and observed effects are considered weak

5.1 Food choices and dietary behaviors



This section provides an overview of the research on behavioral and contextual interventions for healthier food choices for the settings supermarkets, restaurants and schools.

Food choices were considered healthy if they increase the intake of fruits, vegetables, whole-grain products and fish, reduce the intake of saturated fat, sugar and salt or ensured the right amount of food intake.

We identified 29 reviews that evaluated the effect of contextual interventions on food choices. Out of these 29 reviews 14 focused on the effects of contextual intervention in specific food contexts. The four most studied contextual interventions are placing, prompting, price and portioning.

5.1.1 Overview of effects of contextual interventions

Table 4 summarizes how many of the included studies show a significant effect of the contextual interventions. The table provides an overview of the proportion of studies that demonstrate a statistically significant effect and the proportion of studies that show a variable effect of the contextual interventions. The table distinguishes between studies with one single intervention and studies with combinations of two or more interventions.

A significant effect refers to a statistically substantial change of choice. Inconsistent effects are where some but not all versions of the intervention had a substantial effect, or where some groups of consumers were notably influenced to change choices, but others were not affected.

Table 4. Percentage of studies that show significant effects of contextual interventions for food choices

	Single intervention		Combination interventions	
	Significant effect	Inconsistent effect	Significant effect	Inconsistent effect
Placement				
• General	80% (4)			
• Distance	100% (10)		100% (1)	
• Order	79% (11)		100% (2)	
• Selection	63% (23)		54% (13)	
		14% (5)		8% (2)
Prompting			26% (6)	35% (8)
• General	53% (9)	12% (2)	56% (5)	11% (1)
• Sign/symbol	61% (17)	7% (2)		
• Information	25% (25)	30% (30)		
• Priming	50% (1)			
Price	54% (9)			
• General	63% (8)	13% (2)	67% (10)	27% (4)
• Reduction	67% (10)	5% (1)	73% (8)	9% (1)
• Increase		13% (2)	100% (1)	
Portioning	67% (40)	14% (8)	60% (3)	40% (2)

Comment: The first column displays the proportion and number of studies that show significant and inconsistent effects for one single intervention. The proportion of studies showing non-significant effects is not reported. The second column displays the proportion and number of studies that show significant and inconsistent effects for combinations of two or more contextual interventions. The proportion of studies showing non-significant effects is not reported.

Table 4 shows that placing has the most consistent influence on consumers' choices as a single and a combination intervention. Adjusting the distance, order and selection of healthier options can influence consumers to choose healthier options. Placing influenced consumers in 60-100% of the included studies.

Prompts influenced choice in about 50% of the included studies. Signs and symbols seem to work best and influenced consumers in 61% of the studies, while more detailed information rich signs swayed preferences in 25% of the interventions. In combination with other interventions, information dense signs seemed to have a greater effect, and influenced choices in 56% of the studies.

Price and price changes influenced consumers in about 60% of the included studies. Price also influenced in combination with other contextual interventions.

Portioning influenced consumers to choose less or healthier foods in nearly 70% of the included studies, and also worked in combination with other interventions.

Table 4 shows which behavioral interventions can influence consumers independent of which food context is applied. Placing shows the most consistent effect across all included studies. Although many studies have investigated the impact of signs and labels, relatively few found that information dense signs can sway consumers in a healthier direction.

Table 5 below shows the proportion of studies that found significant effects of contextual interventions in supermarkets, restaurants and schools. We found most studies of interventions in supermarkets.

Table 5. **Percentage of studies that show significant effects of contextual interventions in supermarkets, restaurants and schools for food choices**

	Proportion of studies	
	Significant effect	Inconsistent effect
Supermarkets	46%	17%
Restaurants	60%	20%
• Cafeterias	60%	17%
• Buffets		22%
• Menu	56%	27%
• Cafes	46%	
	-	20%
Schools	60%	26%

Comment: The table displays the proportion of studies that show significant and inconsistent effects for contextual interventions. The proportion of studies showing non-significant effects is not reported.

Table 5 shows that nearly half of the studies in supermarkets (46%) observe a significant effect whereas 17% found inconsistent effects of contextual interventions.

In menu-based restaurants, 50% of the studies reported significant effects. However, in restaurants generally, cafeterias and buffets, about 60% of the studies reported significant effects. Furthermore, in schools, 60% of the interventions reported a significant influence on the food choices of children and adolescents.

Table 5 shows that the impact of contextual interventions seems to be quite similar across the three food contexts, namely supermarkets, restaurants and schools.

The following sections summarize the main conclusions of the review articles on contextual interventions. The purpose of this is to add a further dimension to the analysis of the 547 original articles.

5.1.2 Summary of the review articles on contextual interventions for food choices

We identified 16 review articles that focused on the effects of contextual interventions in general. These reviews provide in-depth analysis of how the four main interventions placing,

prompting, price and portioning seem to influence consumers. Appendix B, Table B-1 lists which review articles are included in the analysis.

Placing

Two reviews studied the effects of placing. Bucher et al [86] concluded that distance and food order can influence healthier choices, while Wilson et al [88] found that combination of placing and prompting significantly swayed food choices.

Prompts

Six reviews [89-95] studied how prompts such as labels and signs can influence consumers. Fernandez et al. [90] concluded that symbols and signs can sway food decisions. Hershey et al. [91] observed that symbols and texts are more effective than numeric information. Kiszko et al. [92], Long et al. [93] and Swartz et al. [95] found no evidence suggesting that calorie labels lead to lower energy intake. Sinclair et al. [89] concluded that calorie labeling alone does not influence consumption, and that additional information or reference points are needed to influence choices.

One review by Robinson et al. [96] evaluated the impact of how social norms can prompt and influence eating behavior. The eleven publications included in the review looked at the impact of information on high or low intake norms and food choice consumption. For instance, one study used written information about what other people had been eating or tended to eat and the visual cues denoting the popularity of a food choice. The review found a robust and statistically significant impact of social norms on food choices.

Price

Four reviews studied the effects of price. Epstein et al. [97] found that price can influence the choice of food options, but that effects on consumers' health depended on what was purchased instead. Powell et al. [98] studied the effects of taxes on healthy and less healthy choices, and found that tax increases did not lead to lower sales of sugary drinks. Powell et al also found that higher taxes on fast-food and lower prices of fruit and vegetables were associated with lower population weight. Afshin et al. [99] observed an asymmetric effect of price reductions on healthy options relative to price increases on unhealthy alternatives: a 10% price reduction was associated with a 12% increase in these choices, while a comparable 10% price increase on unhealthy alternatives led to a 6% decrease in these. Furthermore, price reductions were associated with an increased choice of fruit and vegetables, but no increase in healthier drinks. Price increases had a relatively stronger effect on unhealthy drinks compared with fast food.

Portioning

Three reviews studied how portioning can influence consumers to eat less or healthier. Zlatevska et al. [100] found that doubling the portion sizes is associated with a 35% increase in

consumption, but that additional increases did not add to consumption. Two reviews investigated how plate and cutlery sizes can influence consumption; Libotte et al. [101] concluded that size can influence energy intake, while Robinson et al. [102] concluded that experimental studies show only a marginal effect.

General

Two reviews investigated the behavioral interventions in general. Arno & Thomas [85] concluded that contextual interventions on average influenced the number of healthy choices or the proportion of healthy calories by 15%. Liberato et al [103] found that placing and price, together with nutrition education, influenced healthier choices.

5.1.3 Summary of review articles behavioral interventions for food contexts

We identified 14 review articles that focused on the effects of contextual interventions in specific food contexts. These reviews provide in-depth analysis of which interventions seem to work most effectively in supermarkets, restaurants and schools. Table 6 gives an overview of the available evidence of contextual intervention for food choices in specific food settings. Appendix B Table B-2 lists which review articles are included in the analyses.

Table 6. Available evidence of contextual interventions for food choices for specific food settings

Context	Number of available review studies N = 14
Supermarkets	4
Restaurant	2
Schools	5
Restaurant and Schools	1
General	2

Supermarkets

Four reviews evaluated the impact of contextual interventions in a supermarket setting. One review by [87] concluded that placing and price can influence consumers to make healthier choices, while another review [104] found that placing and prompting was influential in making healthier choices in small grocery stores, and the last one [105] concluded that the reviewed studies in total show relatively small effects.

Restaurants

Two reviews focused on how guests can be stimulated to make healthier choices in self-service restaurants. Skov et al. [106] concluded that healthy labels, changes in selection and payment methods can have an effect, but size of plates and cutlery does not influence how much people eat. In addition, Espino et al. [107] found that placing, but not prompts and labels can promote healthier restaurant choices.

Schools

Five reviews investigated how school children can be influenced to make healthier choices. One review [108] found that children's' food choices can be influenced by contextual factors. Similarly, Roy et al [109] concluded that placing, prompts, price and portioning can influence adolescents' food choices. Nørnberg et al. [110] and Mikkelsen et al. [111] concluded that the research evidence is insufficient to establish the clear effects of contextual interventions.

General

Two reviews investigated the behavioral interventions in general. Arno & Thomas [85] concluded that contextual interventions on average influenced the number of healthy choices or the proportion of healthy calories by 15%. Liberato et al. [103] found that placing and price together with nutrition education influenced healthier choices.

Conclusion

A total evaluation of the review articles shows that many studies demonstrate that contextual interventions can influence consumers to make healthier choices. Across different food contexts, the same main interventions (placing, prompting, price and portioning) seem to work in isolation or in combination with each other. It seems like the percentage of successful interventions is quite similar in supermarkets, restaurants and schools. Just about the same proportion of studies report significant changes in choices in all three contexts.

5.2 Physical activity

This section provides an overview of the research on behavioral and contextual interventions for on physical activity. 7 review articles were identified and analyzed.

The reviews evaluated the effect of contextual interventions on active traveling and exercising. Active traveling is walking instead of using motorized transportation or using the stairs instead of an elevator. Exercise is all kinds of activity that planned, structured, repetitive with the intention to improve or maintain physical fitness.

The study settings were tested at workplaces, shopping malls, train stations, banks, medical schools, universities, gyms and public transportation.

The most studied interventions used for encouraging physical activity were prompts and price.

5.2.1 Prompts

One review article by Soler et al. [112] looked at the effects of prompts on increasing stair use. 21 studies were included in the review, and the prompts used included posters, screens, audio signals, signs and footprint symbols placed near the stairwells or at the base of elevators. The prompts encouraged stair use with signs like “Walking upstairs burns almost 5 times more calories than riding an elevator”. The prompts were place in multiple locations such as shopping malls, bus and train stations, banks, medical schools and universities. 20 of the studies reported small, but significant increases in stair use, while one study found no significant changes.

5.2.2 Price

Six review articles evaluated the effects of price and other financial incentives on physical activity in general, exercise behavior, and for active transportation. Stohacker et al. [113] concluded immediate monetary incentives in the short term can stimulate increase in exercise behavior. Additionally, Stohacker et al. [113] showed that providing multiple rewards within a specified time frame might be more efficient for habit formation than rewards given only at each instance of exercise. Mitchell et al. [114] looked at the effects of positive financial incentives on exercise behavior, and concluded that even though financial incentives seem to increase exercise behavior, the research data is insufficient to draw any firm conclusions,

especially since we have little evidence that these incentives work in the long-run. Also Shemilt et al. [115] and Vijar et al. [116] concluded that we have limited evidence, suggesting that financial incentives are cost-efficient.

Martin et al. [117] and Arnott et al. [118] evaluated the effects of price on the mode of transportation. Both reviews concluded that there is limited evidence indicating that financial incentives can promote changes in transportation behavior. Martin et al. [117] showed that the use of positive incentives, such as free bicycles and weekly payments for not using motorized transportation had an impact in most studies. However, public transport subsidies did not seem to work. Martin et al also concluded that negative financial incentives such as increased gasoline prices and charges for road use, can impact how much people choose to drive and promote alternative transportation. However, the overall evidence was not strong enough to suggest that financial incentives are efficient.

5.3 Tobacco smoking

This section provides an overview of the research on behavioral and contextual interventions on tobacco smoking. This is based on an analysis of 11 review articles. The settings for the interventions were workplaces, tobacco vending machines, package design, and interventions on national levels.

The outcome measure in the review articles were changes in consumption, reduction of number of sigarettes smoked, reduction of sigarettes sold, changes in attempts to quit smoking. Some also looked at secondary behaviors such as intentions to quit smoking.

The review articles evaluated the impact of prompts, price, portioning, and availabiliy.

5.3.1 Prompts

Hammond et al. [119] and Thomas et al. [120] found inconclusive results about the efficiency of health warnings on cigarette packages to reduce smoking. One of the studies in Tomas et al. [120] found an impact, but only when the health signs had limited text and the size of the labels were relatively large. Hammond et al. [119] show that the effect of these labels depend on the size and design: labels should be placed centrally on the packages, and use pictures, rather than text, to be efficient. Thomas et al. [120] are unclear about the effectiveness of health labels, and conclude that we lack robust research on this.

Scott-Sheldon et al. [121] evaluated the effect of text messaging interventions as prompts to influence smoking behavior. 22 interventions were identified, and the meta-analysis found robust evidence that text-messaging interventions can reduce smoking behavior. According to this review study, people exposed to text message interventions are 1.37 times more likely to quit smoking than comparison groups. Most of the interventions were targeted and tailored: in other words, they were directed towards target groups (e.g. pregnant women) and tailored with feedback and quitting goals for each individual smoker.

Four review articles by Hughes et al. [122], Moodie et al. [123], McNeill et al. [124] and Freeman et al. [125] evaluated the impact on tobacco use of plain and standardized packaging to reduce the promotional appeal. Plain packages often used simple, uniform colors, no pictures, logo or

brand names. Some of the plain packs had printed health warnings. The only feature that distinguishes packs is the brand name and product variety, and even these were in uniform style, color and position [125]. As of today, Australia is the only country that has implemented standardized packaging and most of the evidence from the studies comes from one large observational study. Norway has decided to implement this in the near future. The three reviews concluded that plain packaging might reduce tobacco use. However, the research material is limited and inconsistent, and the reviews did not find any consistent overall pattern in research findings.

5.3.2 Price

Two reviews evaluated the impact of price interventions on tobacco purchase. Chaloupka et al. [126] reviewed over 100 studies on the impact of tobacco taxes on consumption and clearly demonstrate that tobacco excise taxes are a powerful tool in reducing tobacco use. The large and growing literature clearly demonstrates that the overall demand for tobacco products is significantly impacted by taxes: increased taxes influence existing tobacco users to stop or reduce the use of these products. Furthermore, they prevent potential users from taking up tobacco use, with the greatest impact on younger and low income consumer groups. The authors propose that taxes need to account for <70% of retail prices to be efficient.

Cahill & Perera [127] evaluated the impact of positive financial incentives and competitions. Mostly, these encouraged people to sign into quitting programs, or reward participants for reaching a certain stage in the quitting process. Of the 19 studies reviewed, only 1 study by Volpp et al. [128] found an effect of rewards and competitions; the rest of the studies found no effect. The authors argue that an effect was found by Volpp et al because the cash payment reward was substantial and that the trial group was large.

5.3.3 Portioning

A review by Hollands et al. [129] evaluated the effect of different package portions on food, alcohol and tobacco consumption, and identified three studies related to tobacco. These studies investigated the effect of exposure to long versus shorter cigarettes on tobacco consumption and found that this may reduce tobacco consumption. The studies were however old (from the 1980s) and had a small sample size. One should therefore interpret these results with caution.

5.3.4 Availability

Robertson et al. [130] evaluated the effect cigarette exposure, point-of-purchase promotion and restrictions on tobacco display and promotion had on consumers. The overall conclusion was that there is a relationship between exposure to cigarettes and smoking habits. However, only a few of the studies looked at real purchase behavior and concluded that the impact of point-of-purchase advertisement and display of cigarettes only moderately impacts purchase patterns because only a small proportion of tobacco sales seem to be impulsive. According to

Thomas et al. [120], the impact of perceived availability and exposure to advertisement was more uncertain. Tomas et al. [120] concluded that reduced availability by reducing access to smoking in schools had a clear positive effect. The impact of reduced availability on smoking at workplaces, had a significant impact on the total number of cigarettes smoked daily, and also on how much was smoked at home. Thomas et al. [120] also found in some studies that combining reduced availability with health warnings seemed to be a good strategy.

5.4 Alcohol consumption

This section provides an overview of the research on behavioral and contextual interventions on alcohol consumption. The analysis is based on 6 reviews.

Interventions to reduce alcohol consumption were considered efficient if they had a significant impact on self-reported drinking or sales data. Less drinking or reduced purchase was considered a healthy outcome. Settings for all interventions was on a national or regional level.

The reviews evaluated the interventions prompts, price and availability.

5.4.1 Prompts

Foxcroft et al. [131] meta-analyzed 68 studies on how feedback can prompt and influence alcohol consumption. The studies evaluated the effect of providing universal versus personalized feedback on alcohol consumption, and also compared marketing campaigns with information about recommended drinking patterns compared to interventions that did not have any social norm component included (e.g. educational or psychosocial interventions). The results of the review indicate that social norm interventions did not prevent alcohol abuse among college and university students. Some significant effects were found, but these were too small to be relevant to policy or practice.

5.4.2 Price

Two reviews by Wagenaar et al. [132] and Nelson & McNall [133] evaluated the relationship between alcohol taxes and sales and self-reported drinking. The review only looked at direct effects of price strategies and not at how regional differences in price levels may impact consumption. The meta-analysis demonstrated statistically strong evidence for the effect of price on alcohol consumption. Increasing the price had impact on all kinds of alcoholic beverages.

The review by Nelson & McNall [133] did not find the same impact of price on alcohol consumption. They reviewed the impact of relaxed import quotas and reduced prices on the

volume of alcohol consumed as well as the retail purchasing limits. They based their conclusions on empirical evidence from Denmark, Sweden, Finland, Switzerland and Hong-Kong, and concluded that we lack robust results on the effects of price policy changes. In addition, price restrictions may have a selective effect on drinking patterns rather than broad population-level effects.

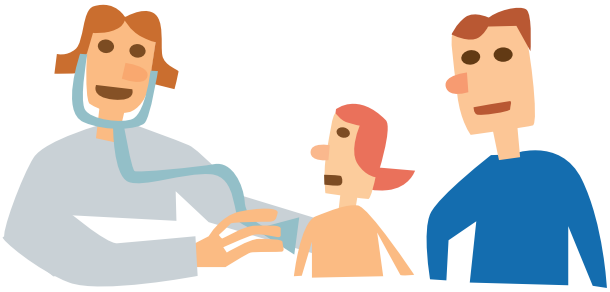
5.4.3 Availability

Bryden et al. [134] evaluated the impact alcohol advertisements and availability have on alcohol consumption. General alcohol availability was measured with outlet density (number of outlets within a given area) or the cumulative distance to an outlet that sold alcohol. They concluded that availability and advertising might impact alcohol consumption, and in particular, that adolescents may be more likely to start drinking. However, the results were inconclusive, and they found no evidence that restricted marketing had a significant impact.

These findings are to some degree consistent with the review by Popova et al. [135] who found stronger evidence that availability has a significant influence on alcohol consumption. However, this review did not directly or objectively measure availability [136].

Holmes et al. [136] concluded that even though a large body of research exists on the impact of alcohol availability on its use, and the recommendation is to control this availability remains valid, there is a lack of understanding on the link between availability, abuse and harmful health effects.

5.5 Other health behaviors



This section provides an overview of the research on behavioral and contextual interventions on other health behaviors. The analysis is based on six original articles and one review article.

The different types of health-related behaviors were adherence to health advice, mental health, warfarin adherence, health risk assessments following medical drug plan, influenza vaccination, manage chronic diseases, end-of-life care, health behavior later in life and screening for colorectal, breast, and cervical cancers.

The setting for the different intervention were home contexts, workplaces and hospitals.

The identified studies investigated the effect of prompts, price and defaults.

Appendix F, Table F-1 lists the review articles that are included in the analysis for other health behavior.

5.5.1 Prompts

Zwane et al. [137] examined whether there was a change in people's behavior after completing a household. Participants were randomly assigned a survey about household finances, followed up to check their use of health care insurances and point-of-use water treatment. The results showed that being surveyed might stimulate people's attention towards certain behaviors such as increased uptake of medical insurance.

The review by Sabation et al. [138] found that feedback interventions are effective in improving screening for colorectal, breast, and cervical cancers, but the effectiveness of interventions was more for some scans than others. One of the included studies [139], tested if feedback could increase medicine residence performance of cancer scanning. The results showed that audits with feedback (monthly seminars about scanning and performance rate feedback) significantly increased the number of cancer scanning's.

5.5.2 Price

Kimmel et al. [140] tested if lottery-based incentives could encourage patients to improve their warfarin adherence. The patient group that was part of a lottery had the lowest percentage of days with incorrect adherence. However, the difference was not statistically significant compared to the group that was not part of a lottery.

A previous study by Volpp et al. [141] also found lottery-based incentives to be efficient in improving warfarin adherence.

Haisley et al. [142] examined the effect of lottery vs. a cash payment to encourage employees to complete a health risk assessment (HRA). The lottery intervention gave employees feedback about what they would have if they completed the HRA. They found that cash and grocery gift cards increased completion rate by 17%, compared to no reward. However, the lottery incentive increased completion by 37%, compared to the other two. The authors concluded that the success of lottery interventions could be applied to other desired health behaviors, especially one-shot behaviors such as getting vaccinations or taking medical tests.

5.5.3 Default options

Halpern et al. [143] evaluated the impact of default options on what end-of-life care options patients choose. Patients were given one of three conditions; The default option for group 1 favored comfort oriented care; group 2 default option favored life-extending care, and for group 3 people chose one of the previous two options and no default was given. Results showed that 77% and 43% of patients in group 1 and 2 stayed with the default. In group 3, 61% chose comfort-oriented care. This suggests that defaults have a strong impact on these particular health-choices.

Milkman et al. [144] encouraged people to make a plan for when they wanted to get an influenza vaccination to increase the likelihood that they would follow through with the desired behavior. The results show that giving people the option to choose a date and time led to higher vaccination rates than just giving them a date or general information about the opening hours of the clinic.

5.6 Summary of empirical results

Table 7 below summarizes the empirical studies on interventions and their effects on health choices for diet and food choices, physical activity, tobacco smoking, and alcohol consumption.

For each of the contextual interventions, namely, placement, prompts, price, portioning and availability, we qualitatively evaluate the impact of the interventions and what level of empirical evidence we have supporting the effectiveness of the interventions.

Table 7. Summary of empirical results

Interventions	Diet and food choices	Physical activity	Tobacco smoking	Alcohol consumption
Placement	Significant impact Sufficient empirical evidence	N/A	N/A	N/A
Prompts	Inconsistent impact Sufficient empirical evidence	Weak impact Weak empirical evidence	Inconsistent impact Weak empirical evidence	Weak impact Weak empirical evidence
Price	Inconsistent impact Sufficient empirical evidence	Weak impact Weak empirical evidence	Significant impact Sufficient empirical evidence	Inconsistent impact Weak empirical evidence
Portioning	Inconsistent impact Sufficient empirical evidence	N/A	Weak impact Weak empirical evidence	N/A
Availability	N/A	N/A	Inconsistent impact Weak empirical evidence	Inconsistent impact Weak empirical evidence
Contexts	Inconsistent impact Quite similar impact across food contexts Sufficient empirical evidence	N/A	N/A	N/A

Comment: The table shows how to what extent we have sufficient empirical studies and to what extent the empirical studies show significant effects on the healthier choices. N/A means not applicable, indicating that no empirical studies were identified.

We have rated the effects of the interventions as significant, inconsistent or weak. Significant effects mean that the interventions seem to more consistent across trials, while inconsistent effects mean that they seem to work in some cases, but not others. Weak impact indicates the interventions do not seem to influence health choices and behaviors.

We have rated the level of empirical evidence as sufficient or weak. Sufficient evidence means that we have identified a significant number of empirical studies that have investigated the intervention, while weak evidence means that there are few studies that have tested and measured the interventions.

For diet and food choices, we took into consideration the empirical evidence for all of the interventions as sufficient. We also identified a high number of review studies based on a high number of original empirical studies on how contextual interventions can sway choices. Placement seems to have a consistent effect on healthy food choices, while the impact of the other interventions is considered inconsistent: they work in some cases, but not in others.

For physical activity, the empirical evidence is considered as weak, and the observed effects of contextual interventions are also weak.

For tobacco smoking, price seems to have a significant effect, based on sufficient empirical evidence. The effects of prompts and availability are inconsistent, based on weak empirical evidence. The effects of portioning seem weak, based on weak empirical evidence.

For alcohol consumption, the effects of price and availability are inconsistent, based on weak empirical evidence, and the effects of prompts also weak, based on weak empirical evidence.

6 Discussion of results and recommendations

Main points

This chapter suggests how behavioral and contextual interventions can be applied to policy design and for designing implementation strategies. The chapter suggest a model for how to apply contextual interventions for policy design, focused on the quality of the empirical evidence, the complexity of health decisions, focus contexts for influencing peoples' choices, implementation agents, and shorter and longer term policy implications.

Food choices

- Include behavioral policies principles of behavioral economics in health policies
- Adapt the most effective interventions to a Nordic context, test and evaluate the effects and base further implementation and expansion on these results
- Design Nordic and country level behavioral health policies focused on promoting and monitoring contextual interventions among food producers and food providers
- Design meeting arenas for dialogue between public policy makers and the food industry – and aligning ambitions and solution strategies

Physical activity

- No clear policy recommendation due to limited number of empirical studies and weak impact on behavior
- Obtain further empirical evidence and do in-depth analysis of original studies to evaluate how strongly contextual interventions can change the decision contexts
- Analyze and test further empirical interventions

Tobacco consumption

- Implement behavioral policies based on interventions that are supported by empirical evidence
- Obtain further empirical evidence and do in-depth analysis of original studies to evaluate how strongly contextual interventions can change choices
- Further empirical evaluations of existing policies in each of the Nordic countries to assess their effectiveness on influencing consumers at the point of choice

Alcohol consumption

- Implement behavioral policies based on interventions that are supported by empirical evidence
- Obtain further empirical evidence and do in-depth analysis of original studies to evaluate how strongly contextual interventions can change choices
- As alcoholic beverages in some Nordic countries are sold in the same contexts as food, we specifically recommend policy agencies and researchers to empirically study how contextual interventions that influence food choices might sway choices of alcoholic beverages as well

6.1 From empirical studies to policy design and implementation strategies

This report opened with a review of how many policy reports have suggested that behavioral interventions can influence people's health choices and promote population level health outcomes.

We have analyzed the scientific evidence on how contextual and behavioral interventions can sway health related choices related to food, physical activity, alcohol and tobacco consumption, and other health related behaviors. The review shows that the evidence level for contextual interventions varies significantly for these behavioral categories.

In this chapter we suggest and discuss policy implications and potential implementation strategies. Table 8 provides an overview of the logic of the chapter.

Table 8. Overview of empirical evidence and implementation strategies

	Food and diet choices	Physical activity	Tobacco consumption	Alcohol consumption	Other health behaviors
Strength of empirical evidence	Inconsistent impact Sufficient evidence	Weak impact Weak evidence	Inconsistent impact Weak evidence	Inconsistent impact Weak evidence	Weak impact Weak evidence
Complexity of decisions	High	Variable	Medium	Medium	Variable
Focus contexts for influence	Clear	Vague	Clear	Clear	Vague
Implementation agents	Clear	Vague	Clear	Clear	Vague
Policy implications	Clear	Vague	Clear	Clear	Vague
First implementation steps	Adapt Evaluate Implement	Analyze Test Evaluate	Adapt Evaluate Implement	Adapt Evaluate Implement	Analyze Test Evaluate
Next implementation steps	Behavioral policy design Dialogue and commitment	Unclear	Behavioral policy design Dialogue and commitment	Behavioral policy design Dialogue and commitment	Unclear

Strength of empirical evidence refers to the number of review and empirical studies, and to what extent the studies indicate that contextual interventions significantly influence people's choices.

Complexity of decisions is an aggregated indicator of the range of factors that can be assumed to influence the health decision; how many categories of decisions that are included in the behavior; the number of times the decision is made; and the strength of habits and biological drives involved in the decision. This is a qualitative estimate provided by the authors of the report, and an indicator that should be developed further to expand our understanding of opportunities and limitations associated with contextual interventions.

Focus context of decisions refers to what extent it is clear in what contexts and situations the decisions are made.

Implementation agents refer to whether it is clear who is responsible for or who has the power to change the context within which the decision is made.

Policy implications refer to the extent to which it can be recommended to design and implement behavioral policies based on the review and analysis in this report.

First implementation steps suggest whether there is sufficient empirical evidence to recommend applications of contextual interventions into policy measures, or whether a further review of existing empirical evidence is still needed.

Next implementation steps are our recommendations of for how this report can be followed up by health policy makers and food providers.

6.2 Food and dietary behaviors

6.2.1 Strength of empirical evidence

This report has analyzed the 31 most recent review articles based on more than 400 empirical studies on how contextual interventions can sway food choices in a healthier direction. These studies show that the four most effective interventions are placing, prompts, price and portioning, and these interventions can influence food choices significantly in supermarkets, restaurants and schools. Since these reviews encompassed a range of different eating settings and participant groups, we are confident that these findings are likely to be widely applicable.

Although the quality and extent of the analyzed empirical studies have substantial limitations, we consider the evidence collected as sufficient to conclude that behavioral interventions can influence healthier food choices. The high number of successful empirical studies suggests that contextual interventions may be effective in stimulating healthier food choices. The limited number of studies in the Nordic countries suggests that the interventions should be adapted, tested and evaluated for a Nordic setting.

6.2.2 Complexity of decisions

Food decisions can be considered as a result of patterns of complex behavior, as they need to satisfy a number of biological, sensory, personal, social, and cultural needs. People make many food choices every single day, in a range of different contexts and settings. Some food decisions are associated with immediate pleasure, while others involve delayed consumption.

6.2.3 Focus contexts for influence

In the Nordic countries, adults make the majority of food decisions in supermarkets, restaurants, and at home. This report shows that contextual interventions in grocery stores, at workplace buffets and at restaurants can sway food decisions in a healthier direction.

Supermarkets seem to be a particularly important context in the Nordic countries as consumers spend a significant amount of their food budget here, so these purchases determine what is consumed at home. In addition, work place restaurants significantly influence what adults consume.

6.2.4 Implementation agents

Food providers and food producers control the design and decision architecture of their outlets and products. Thus, supermarket chains, restaurant businesses and the food industry are the implementation agents that can enable healthier food contexts. These agents are business organizations, motivated by commercial goals as well as other interests such as image, identity and social responsibility. These roles, goals and interests need to be taken into account when engaging food providers and food producers in contextual interventions aimed at stimulating healthier consumer choices.

6.2.5 Policy implications

Substantial evidence suggests that food choices and consumption is strongly associated with NCDs, other health problems and growing health care costs. Sufficient empirical evidence suggests that the design of the food decision context influences consumers' healthy food choices. Contextual interventions based on the principles of behavioral economics should therefore clearly be included in future health policies. It is recommended to combine contextual strategies with established regulatory strategies such as regulations, information and incentives. Behavioral policies require a different set of roles and competencies among public policy agencies. Policy implications should be based on dialogues between the food industry and regulators rather than unilateral enforcement of regulatory changes. Health policy makers need to engage and involve food providers to create a shared understanding of their role in influencing consumers' health, to monitor and reward positive performance and achievements. In Norway a cooperation agreement between the health authorities, the Confederation of Norwegian Enterprise (NHO), and the food industry was signed in 2016, aimed at making it easier for consumers to make healthier choices. This agreement is a good example of how dialogue makes it easier to achieve national health goals and is an example to follow for other Nordic countries.

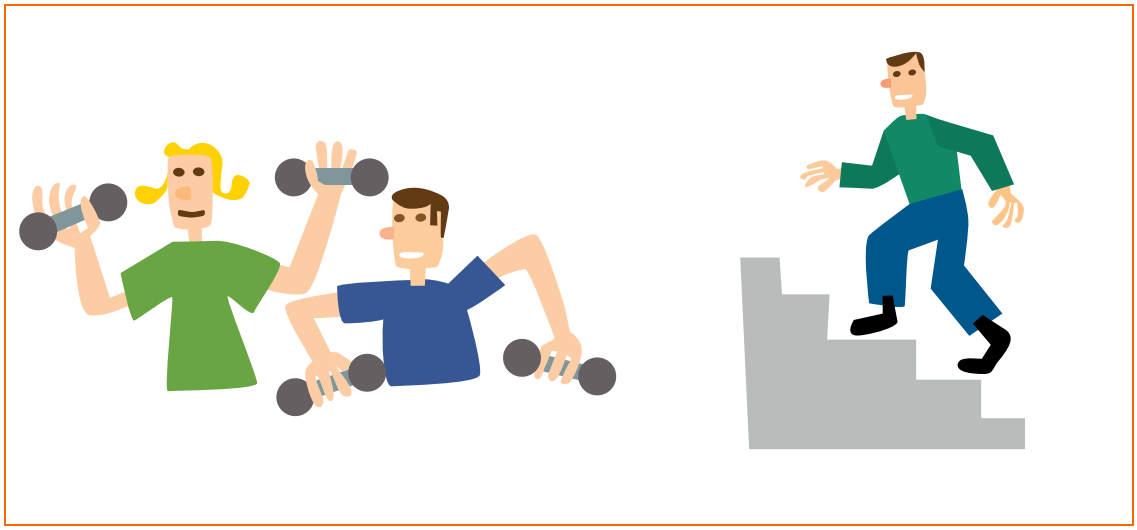
6.2.6 First implementation steps

Sufficient empirical evidence exists to suggest that the contextual interventions, namely, placing, prompts, price and portioning can significantly sway consumers' healthy food choices. In addition, other interventions have partly been empirically explored, some with promising results. We recommend that the next steps are to adapt the most effective interventions to a Nordic context; test and evaluate the effects; and let the results of these tests and evaluation become the foundation for further implementation and expansion. It is recommended that food providers cooperate with independent researchers or agencies to monitor the effectiveness of contextual interventions and provide objective information about their effects.

6.2.7 Next implementation steps

We recommend that the next implementation steps include design of Nordic level and country level behavioral health policies focused on promoting and monitoring contextual interventions among food producers and food providers. We also suggest designing meeting points and arenas for dialogue between public policy makers and the food industry – and aligning ambitions and solution strategies.

6.3 Physical activity



6.3.1 Strength of empirical evidence

This report identified and analyzed seven review studies on how contextual interventions can influence people's level of physical activity. The two main categories of physical activity were people's choice of transportation option (e.g. if they drive the car, take public transportation or bike to work) and exercise habits (e.g. if they start exercising and if they maintain this habit).

The review articles found inconsistent effects of financial incentives. According to the reviews prompts and signs can significantly influence people to choose stairs instead of an elevator.

6.3.2 Complexity of decisions

Changing transportation mode, choosing to take up or maintain exercise habits, may involve a range of decisions of varying complexity. Physical activity behavior is influenced by a number of different considerations, such as work and family commitments as well as time management. Furthermore, how the actual decision context is presided may vary depending on individuals or different groups and their characteristics. However, the determinants of physical activity are not well understood, which makes it hard to generalize what it is that determines people's choice of transportation mode and exercise behavior. To design targeted behavioral and

contextual interventions we need an in-depth understanding of the context and process of decision-making.

6.3.3 Focus contexts for influence

It seems unclear at what points in time people decide what transportation mode to use or if they should exercise or not. Such decisions might be made ahead of time in terms of general goal setting and pre-commitments, while the actual choice to exercise is made under different circumstances and can be influenced by external and internal stimuli at that point in time.

6.3.4 Implementation agents

There can be several implementation agents for influencing people's exercise behaviors, including employers, public health agents, public city bike rental agents, architects, city planners, designers of roads and bicycle paths, owners of exercise facilities, and others.

We need more understanding of when and how people actually make decisions to engage in physical exercise. Design of behavioral and contextual interventions depends on in-depth understanding of the context and process of decision-making.

6.3.5 Policy implications

Nordic health policies focus on promoting physical activity. As the decision contexts for influencing exercise choices vary, and there exists only a limited number of empirical studies, it is not possible to provide any policy recommendations.

6.3.6 First implementation steps

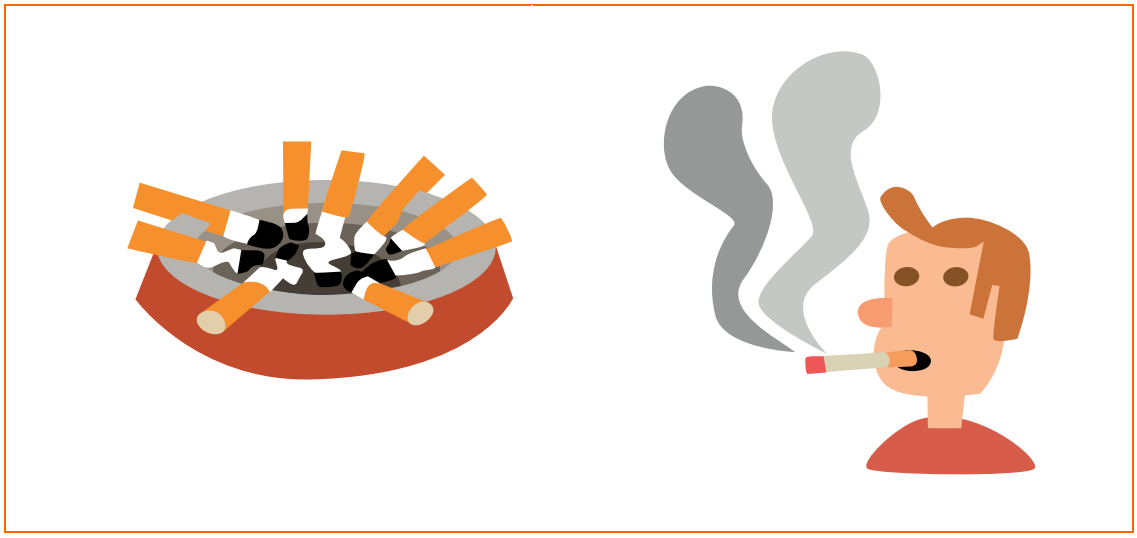
We recommend obtaining further empirical evidence for how strongly contextual interventions can change the decision contexts that influence physical activity behavior.

This report is based on analysis of review studies. A first immediate next step may be to complete an in-depth analysis of existing original empirical studies to find interventions that are effective and to find solutions that are relevant to the Nordic context. Based on this, it might be possible to provide more specific policy recommendations.

6.3.7 Next implementation steps

The next steps can include finding, analyzing and testing further empirical interventions aimed at influencing transportation choices, engaging in more physical activity and exercise behavior.

6.4 Tobacco consumption



6.4.1 Strength of empirical evidence

This report identified and analyzed 12 review studies on how contextual interventions can influence tobacco consumption. These show that the empirical evidence supporting people's tobacco consumption can be influenced by contextual interventions is inconsistent.

Some contextual interventions seem to significantly influence consumption, while the impact of others seems unclear. Price level and price increases can significantly limit uptake and use. Some of the studies on restricting consumer's access to tobacco products show significant effects on limiting consumption, but not all of them. The same is the case for prompts, warnings and signs: these interventions may work, but not all studies show supportive evidence, so more studies are needed to determine the effectiveness of interventions.

6.4.2 Complexity of decisions

Tobacco consumption can be considered medium complex decisions to influence, as it involves the choice of one specific product in clearly defined contexts. Just like consumption of food and alcohol, smoking can satisfy a number of biological, sensory, personal, social, and cultural needs.

This report focuses on consumption in general, and not tobacco addiction. We have reviewed studies on how the context and situation can sway consumption independent of characteristics of individual consumers and consumer groups, and independent of habits and preferences.

6.4.3 Focus contexts for influence

In the Nordic countries, the contexts where consumers are exposed to tobacco products are food stores, other retail outlets and sales points. These are the contexts that can influence what and how much people choose to purchase and consume.

6.4.4 Implementation agents

In the Nordic countries the owners and managers of commercial business outlets control the design and decision architecture of these contexts. Tobacco producers control the design of boxes and containers, and thus influence consumption at the point of purchase and during consumption.

Existing policy interventions influence and control how these commercial agents can market, expose, present and sell tobacco products. Norway will implement plain packaging, and it is recommended that an objective evaluation of the impact on uptake and sales is conducted.

6.4.5 Policy implications

Nordic tobacco policies include financial incentives through taxes on tobacco products; regulations and restrictions that limit availability and marketing promotion; and public information about negative health consequences of consumption. These policies have contextual consequences that limit the consumers' options to purchase and consume tobacco products.

The empirical evidence shows that price clearly influences consumption. Some, but not all studies show that restricting access to tobacco products and smoking areas can limit consumption. This does not imply that existing policies are ineffective: it just shows they have been insufficiently validated through empirical evidence.

Policy makers can implement behavioral policy processes by obtaining further information on how consumers actually make choices on consumption, and by empirical evaluation of policy measures on a smaller scale to determine their effectiveness – and by implementing only those policies and contextual interventions that are supported by empirical evidence.

6.4.6 First implementation steps

We recommend obtaining further empirical evidence for how effectively regulations can change the decision contexts that influence purchasing and consuming of tobacco products.

This report is based on analysis of review studies. A first immediate next step can be to complete an in-depth analysis of existing original empirical studies to identify results and solutions relevant to the Nordic context. Based on this, it might be possible to provide more specific policy recommendations.

6.4.7 Next implementation steps

The next steps can include further empirical evaluations of existing policies in each of the Nordic countries to assess their effectiveness on influencing consumers at the point of choice.

As tobacco products are sold in the same contexts as food, we specifically recommend policy agencies and researchers to empirically study how contextual interventions that influence food choices can be applied to tobacco products. This can include placing (i.e. distance, order and number of options available), price (i.e. price levels and price changes), prompts (i.e. tags, labels, warnings and other messages at the point of purchase and products) and portioning (design of containers that help consumers demine and limit how much they consume).
Since contextual interventions are well tested for influencing food choices, we can recommend a rapid policy development and implementation approach for such interventions relevant to tobacco products. Such an approach involves designing and adapting the contextual interventions, measuring baseline sales, implementing interventions in a test period in a limited number of test sites, and measuring effects. Based on results, the interventions can be adjusted and further tested, or implemented directly if they are clearly very effective in swaying and limiting consumption.

6.5 Alcohol consumption

6.5.1 Strength of empirical evidence

This report identified and analyzed six review studies on how contextual interventions can influence alcohol consumption. The empirical evidence given in the six review articles does not provide sufficient and consistent evidence to make any firm conclusions on contextual interventions and their impact on people's alcohol consumption.

It is unclear whether drinking behavior can be significantly influenced by changes in price, availability, marketing, feedback and social norms.

6.5.2 Complexity of decisions

Just like for food consumption, alcohol consumption is a complex decision to influence. When we choose to drink and how much we drink is influenced by a number of biological, sensory, personal, social, and cultural needs.

Just like food, alcohol drinking can be considered a complex decision to influence, as it satisfies a number of biological, sensory, personal, social, and cultural needs.
This report focuses on consumption in general and not on extensive and addictive alcohol consumption. We have reviewed studies on how the context and situation can sway consumption independent of characteristics of individual consumers and consumer groups, and their habits and preferences.

Compared with food, most people make relatively fewer and more rare decisions on whether or not to consume alcohol and how much to consume on each occasion. Some alcohol decisions are associated with immediate pleasure in bars and restaurants, while others involve delayed consumption through purchasing in supermarkets and outlets.

6.5.3 Focus contexts for influence

In the Nordic countries, the contexts where consumers are exposed to alcoholic beverages are food stores, special official outlets (Systembolaget and Vinmonopolet), restaurants and bars. These are the contexts that can influence people's choices of what and how much to consume.

6.5.4 Implementation agents

In the Nordic countries where alcoholic beverages are available in supermarkets and other outlets, the owners and managers of these commercial business organizations control the design and decision architecture of these contexts. In Norway and Sweden, the management of the official outlets control the decision architecture of these outlets. Alcohol producers control the design and size of bottles and containers, and thus influence consumption at the point of purchase and during consumption. The goals, roles and interests of these agents should to be taken into account when planning contextual interventions aimed at stimulating healthier consumer choices.

6.5.5 Policy implications

Nordic alcohol policies include financial incentives through taxes on alcoholic beverages; regulations and restrictions that limit availability and marketing promotion; and public information about negative health consequences of excessive consumption. These policies

therefore limit the context in which the consumers are exposed to and can purchase alcoholic beverages.

Even though it is commonly believed that alcohol regulations and restrictions are effective, this report shows that there is limited and inconsistent empirical support for this assumption. This does not imply that existing policies are ineffective; it just shows they have been insufficiently validated through empirical evidence.

The GreeNudge approach to changing food choices is to sway these in a healthier direction: consume more of the healthier options, less of the unhealthy ones. Through many small changes every day, the total consumption will end up significantly healthier.

We recommend a similar approach to swaying alcohol consumption, namely, to stimulate consumers to select more non- or low-alcoholic options, and relatively fewer choices of high alcohol density. Consumers can also be stimulated to drink somewhat less through portioning, price, and prompts, and other contextual means.

We assume that such an approach may also be acceptable for alcohol producers and providers, as they can maintain sales and profits along with helping their consumers make good choices for their health and quality of life.

Nordic policy makers can contribute by implementing regulations that influence consumers at the time of choice, and by stimulating changes in the decision contexts where alcohol is sold and made available.

Moreover, policy makers can implement behavioral policy processes by obtaining further information about how consumers actually make consumption choices and by empirical evaluation of policy measures at a smaller scale, to determine their effectiveness by implementing only those policies and contextual interventions that are supported by empirical evidence.

6.5.6 First implementation steps

We recommend obtaining further empirical evidence for how strongly regulations can change the decision contexts that influence consumption.

This report is based on analysis of review studies. A first immediate next step can be to complete an in-depth analysis of existing original empirical studies to identify results and solutions relevant to the Nordic context. Based on this, it might be possible to provide more specific policy recommendations.

6.5.7 Next implementation steps

The next steps can include further empirical evaluations of existing policies in each of the Nordic countries to assess their effectiveness on influencing consumers at the point of choice.

As alcoholic beverages in some Nordic countries are sold in the same contexts as food, we specifically recommend policy agencies and researchers to empirically study how contextual interventions that influence food choices might sway choices of alcoholic beverages as well. This can include placing (i.e. distance, order and number of options available), price (i.e. price levels and price changes on alcohol as well as items that can replace alcohol), prompts (i.e. tags, labels, warnings and other messages at the point of purchase and on bottles and containers) and portioning (i.e. design of bottles and information of containers that help consumer demine and limit how much they consume).

As the food-related contextual interventions are well tested, we can recommend a rapid policy development and implementation approach for such interventions relevant for alcoholic beverages. Such an approach is to design and adapt the contextual interventions; measure baseline sales; implement interventions in a test period in a limited number of test sites; and measure effects. Based on results, the interventions can be adjusted and further tested, or implemented directly if they are clearly very effective in swaying and limiting consumption.

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8 Appendix

Appendix A

The Norwegian approach to implementing healthier food contexts

The scientific evidence reviewed in this report can help design several different implementation strategies for healthier food choices. We suggest implementation strategies for 1) policy collaboration between health authorities and the food industry, 2) food industry, 3) health policy authorities, and 4) for the educational sector.

Policy collaboration between health authorities and the food industry

In 2016 the Norwegian Directorate of Health and the Norwegian food industry formalized the "Intention Agreement for Promoting Healthier Diets". The purpose of the agreement is to promote healthier consumer food choices through cooperation between the health authorities and the food industry. The agreement states that interventions for healthier diets should be evidence based and that interventions should stimulate rather than regulate consumers' choices. The dietary focus areas of the agreement are to increase the consumption of fruit and vegetables, fish and seafood, and whole grains. In addition, the amount of sugar, salt and saturated fat should be decreased. The food industry commits to promoting improved food choices through developing and promoting healthier options. The health authorities will also contribute through activities that provide information, influence the consumer, provide better consumer understanding, and through research.

This report may be of help when implementing the intention agreement. Potential areas of relevance can be:

- Enable shared understanding of how the design of food outlets can stimulate consumers to make healthier choices, and acknowledge how contextual interventions can influence consumers

- Agree on which specific characteristics of food outlets stimulate consumers to make healthier choices. Define baselines for the extent to which food outlets today promote healthier choices

- Define ambitions and objectives for how food outlets and food products can be changed to promote health and prevent unhealthy choices. Enable the setting of specific objectives for how healthy and unhealthy food categories can be changed to sway consumers towards healthier diets

- Monitor how food outlets over time influence consumers in a healthier direction

- Communicate positive practices and achievements by the food industry, and motivate future investments in health promoting initiatives among food producers and food providers

Implementation opportunities for the food industry

Food producers and food providers can use the report to design strategies and approaches that promote the sales of healthier options, and to communicate progress and achievements.

This is how the report can be used:

- Define measurement criteria and measurement tools to form baselines for how food products and outlets today stimulate consumers' choices. Specifically, food providers can define observable measurement criteria related to how placing, prompts, price and portioning influence consumers.

- Define objectives and plans for improving the health footprint of food outlets. Test and measure how changes in placing, prompts, price and portioning influence sales and consumption

- Evaluate and document how implemented interventions and changes in outlets have influenced consumers' choices. Compare sales of healthier items before and after the changes were implemented, and judge how the consumers were influenced. Examples can be:
    - How the sales of fruit, vegetables and fish have increased after these categories have been moved to more prominent positions in food outlets
    - How discounts and price reductions on fruit and vegetables have influenced sales volumes
    - How introduction of more whole grain bread options and price reductions have influenced consumers to purchase more of these.
- It is recommended that independent researchers and advisers be involved to ensure verification of changes and promote credible communication of the results.

- Define competence and training programs for promoting healthier choices using behavioral insights.

- Design tools and methods that managers and staff can use to optimize the outlets they manage to promote profitable healthy interventions

Implementation opportunities for the health- and educational authorities

The report addresses how the design of contexts can influence people to make healthier choices, and suggests that behavioral interventions in combination with other policy tools such as information, regulation and incentives can promote healthier life styles. Moreover, it provides an evidence base for further testing and implementation of health promoting contextual interventions.

Suggestions for relevant applications for behavioral insights:

- Health policy authorities can design more targeted interventions based on insights about how people perceive and judge the situation in which the health promoting choice is made. This can involve adjusting existing policy tools based on behavioral insights, or testing novel and innovative interventions.
    - Suggestions:
        - Adjusting taxes and evaluating how these influence product price levels, and how consumers perceive the attractiveness of food options, and how sales volumes are influenced
        - Evaluate existing food label systems (e.g. the green key hole, a Norwegian label) focused on how consumers actually perceive it, and invent and test adjustments that might make it even more effective
        - Invent and test interventions for portioning of food options, which is considered one of the most cost-effective interventions for influencing population level dietary behaviors

These suggestions are in line with recent recommendations for behavioral health policy [8, 12, 145].

- Educational authorities can use the report to design interventions to support health-promoting contexts in schools and educational institutions. Behavioral interventions can be relevant to the food provided at school and in kindergartens, but also be used to influence parents and care takers to make healthier food for their children. In Norway most children bring home-prepared food to school, and the schools are considered important for learning life-long healthy food habits [54]. The report can also be used to design training and competence development interventions aimed at personnel providing food for children and adolescents, so they can apply contextual interventions to stimulate healthy food choices.

- Health- and educational authorities can use the report as input for future research projects that can be prioritized. The report suggests we need more research based knowledge about how effectively contextual interventions work. The Norwegian authorities can support this research by providing funding. Norway will implement plain

packaging, and it is recommended to objectively evaluate the impact on uptake and sales.

Research opportunities on the behavioral insights of food choices

Scientists and researchers can use the report to design and implement studies of consumer behavior based on a behavioral and contextual perspective. We suggest that such projects are organized as collaborative research interventions between the food industry and researchers and focused on testing the effects of contextual interventions on larger groups of consumers over time.

This report points to several future research areas, such as:

- Future studies of how supermarket design can promote healthier food choices, using contextual interventions, such as, attractive placing of the healthier options; prompts and labels on healthier alternatives; price reductions and price increases on healthy versus unhealthy items; and packages that help people eat the right portions.

- Future studies of how restaurants, work place buffets, cafeterias and other outlets can influence guests to eat healthier, using placing, prompts, price and portioning. The design of these interventions may vary between different categories of restaurants, and it is suggested that more detailed studies are carried out into how interventions can be adapted to different food microenvironments.

- Future studies of interventions aimed at helping children and adolescents eat healthier in educational settings

- Future studies of how product design can stimulate consumers to select the healthiest alternative. Norway will implement plain packaging, and it is recommended to objectively evaluate the impact on uptake and sales.

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Appendix B – F.
At request