Dietary supplement use

VALORISATION ADDENDUM

In this valorisation addendum, the societal relevance and impact of this thesis will be discussed, with focus on the following aspects: 1) relevance of the study results; 2) target groups for which the results may be of interest; 3) products that result from the PhD-project; 4) the innovativeness of the findings; 5) the planning of implementation of obtained knowledge.

RELEVANCE

Dietary supplement use rates have never been as high as nowadays. In the Netherlands, 42 per cent of the general population uses dietary supplements (van Rossum et al., 2016) and rates of use are even higher in other Western countries such as the US or Norway (i.e., 50 per cent; Gahche et al., 2011; Skeie et al., 2009). Dietary supplements are thought to be beneficial to health because their efficacy to cure or to prevent deficiency related diseases has been scientifically proven. Yet evidence is growing that besides benefits, dietary supplements may pose risks to one's health since they frequently contain pharmacologically active agents capable of producing biological responses (Boyer, 2005). Such risks include interactions with prescription and over-the-counter drugs (Izzo, Hoon - Kim, Radhakrishnan, & Williamson, 2016; Vrolijk et al., 2015), contamination with undeclared active pharmaceutical ingredients (P. A. Cohen, 2009; Petróczi, Taylor, & Naughton, 2011), two-sided effects etc. (e.g., vitamin D supplements may lower the risk of osteoporosis but may increase the risk of cardiovascular events; Bolland, Grey, Avenell, Gamble, & Reid, 2011). In most cases, supplements related adverse events involve sympathomimetic toxicity which may cause cardiac symptoms (e.g., palpitation, tachycardia, chest pain), shortness of breath, tremulousness etc. (Geller et al., 2015; Haller et al., 2008). Therefore, it is important that consumers are well informed about both the health risks and benefits of dietary supplements in order to make informed decisions.

In the light of these developments, the results of the present dissertation are highly relevant as our findings provide important input for developing health communication messages and how to deliver such messages. The insights into the most salient beliefs and determinants of dietary supplement use provide target points for health communication messages. In addition, our finding that higher levels of interactivity decreased individuals' recall has important implications for online health communication.

TARGET GROUPS

Policy makers, regulators at the national and international level

The studies presented in this dissertation were funded by The Netherlands Food and Consumer Product Safety Authority (NVWA). This organisation is responsible for guarding and maintaining animal health, plant health, food safety, and product safety in the Netherlands. In order to support their practical activities, the NVWA funds scientific research in the areas mentioned. Accordingly, the findings of the present thesis are of interest of the NVWA: they help to understand consumers' perspectives on dietary supplement use and herewith risk-benefit communication about dietary supplements can be adjusted to consumers' information needs. For instance, our results showed that a large group of dietary supplement users are uncertain about their decision and have low levels of knowledge. Therefore, the NVWA should take these findings into account when informing consumers about dietary supplements.

Following a series of food crises, since 2002 the European Food Safety Authority (EFSA) has been an independent source of scientific advice and communication on risks associated with food products both for legislative and executive institutions of the European Union and for consumers (EFSA, 2017). In their effort "to bridge the gap between science and the consumer" our results may help the EFSA to get important insights into consumers' risk perceptions, attitudes, and decision-making patterns about dietary supplement use. Herewith, scientific results on risks associated with dietary supplements can be better translated to the non-scientist public.

Advisory organisations

Based on (the most recent) scientific evidence, the Health Council of the Netherlands (in Dutch: *Gezondheidsraad*) advises the Ministry of Public Health, Welfare & Sport on issues related to public health including dietary supplement use. For instance, the Health Council has already warned policy makers that the current state of claim regulation is confusing: "there is only juristic but no practical or scientific difference between claims about 'maintaining and promoting health' (i.e., health claims) and claims about 'preventing an illness' (i.e., medical claims)" (Health Council of the Netherlands, 2003, p. 3). Results of this dissertation might be of value for the Health Council because they may help to communicate more effectively about dietary guidelines. Among others, these guidelines include information about the rationale of dietary supplement use for risk groups.

Our findings might be relevant to the National Institute for Public Health and the Environment (RIVM) as well. The RIVM is responsible for the Dutch National Food Consumption Survey (DNFCS) in which data are collected and analysed on food consumption, including dietary supplement use. The RIVM is committed to promoting public health. On the long term, dietary supplement use may affect the health of the Dutch population, since it is increasing especially in the aging population. Therefore, insights are needed about individuals' motivation for dietary supplement use.

Non-governmental, non-profit organisations

The Netherlands Nutrition Centre (in Dutch: *Stichting Voedingscentrum Nederland*) is an independent organisation that aims to provide consumers (and professionals) with reliable information about healthy, safe, and more sustainable food (The Netherlands Nutrition Centre, 2017). The Dutch Consumers' Union (in Dutch: *Consumentenbond*) is a non-profit, independent alliance that strives for an "honest, fair, and safe market of consumer goods", including food products such as dietary supplements (The Dutch Consumers' Union, 2012). Both organisations can use our results as input for improving the information presented on their website.

Healthcare providers, dieticians

Dietary supplement use is more common in the older age groups and is positively associated with having chronic illnesses. Consequently, dietary supplement users may have regular appointments with health professionals who could inform them about health benefits and risks of dietary supplements. Unfortunately, research has shown that patient-physician communication about dietary supplements is rare: only one-third of patients report their use to their conventional health care provider (Frenkel et al., 2013; Mehta, Gardiner, Phillips, & McCarthy, 2008; Schofield, Juraskova, & Butow, 2003). The findings of chapter 2 showed the need for health education because several misconceptions should be targeted. In addition, chapter 4 revealed that users are uncertain about their decision and have low levels of knowledge. Healthcare providers could fulfil an important role in educating patients about dietary supplements.

Users, non-users of dietary supplements, and risk groups of micronutrient deficiencies

Users of dietary supplements could benefit from the findings of this thesis. Despite the fact that dietary supplement use is associated with individuals' need to improve their health, consumers should not overlook the possible health risks of dietary supplements. This especially holds true if individuals take prescription drugs or undergo conventional health treatments. In addition, dietary supplement users should become more aware about the need to make informed decisions about dietary supplement use. According to our results in chapter 4, some groups of consumers decide to take dietary supplements but they remain uncertain about their decision. In addition, a small group of dietary supplement users seemed to avoid information about them.

Risk groups of micronutrient deficiencies might also benefit from our findings. In their case, there is sufficient scientific evidence for supplementing the normal diet. However, research showed that in risk groups dietary supplement use is not adequate. Therefore, our findings regarding the most salient beliefs and determinants of dietary supplement use may give insight into what determinants should be targeted in order to increase dietary supplement use.

In the Netherlands, 42 per cent of the general population uses dietary supplements on a regular basis (van Rossum et al., 2016). Even if the majority of the Dutch population does not use dietary supplements, the findings of this thesis might be of interest to them. Dietary supplements are readily available in grocery shops, 'health stores' etc. According to findings in chapter 2, this creates the misconception that dietary supplements involve only negligible risks. Otherwise — as individuals argued — they would not be sold without the prescription of a health professional. This illustrates that the general population should become more aware about the fact that not all types of dietary supplements undergo rigorous safety and efficacy tests. However, clear communication about both the benefits and risks (and uncertainties) of dietary supplements is often lacking, which hinders informed decision-making.

Producers of dietary supplements or related stakeholders

In the European Union, in the current legislation on dietary supplements (i.e., Food Supplements Directive) and on claims (i.e., Nutrition and Health Claims Regulation) producers are expected to take responsibility for the (correct) labelling on the package (e.g., listing all ingredients, not making exaggerated or misleading claims). Consequently, it is also the producers' responsibility to enable consumers to make informed decisions. Therefore, producers of dietary

supplements may have interest in our results with regard to how consumers make decisions in favour or against dietary supplement use and what are their information needs.

The Vitamin Information Bureau (in Dutch: *Vitamine Informatie Bureau*) has been sponsored by Bayer Consumer Health, but they do not advise in favour or against specific brands and they are not involved in commercial activities. As stated at their website (www.vitamine-info.nl), they aim to provide consumers (and professionals) with evidence-based information, such as the dietary guidelines of the Health Council. Our findings may help them to improve their (online) health communication about dietary supplements.

ACTIVITIES AND PRODUCTS

Since input was lacking for developing effective health communication about the benefits and risks of dietary supplements, the main product of this dissertation is the insights gained into people's beliefs about dietary supplements, how they make decisions about their use (or non-use), and whether interactive health information is beneficial for health education purposes. In addition, two surveys were developed during this project. Based on formative research, items were generated for a survey measuring psychosocial and cognitive determinants of dietary supplement use. Another survey was developed — also based on formative research — to assess relevant components of informed decision-making about dietary supplement use. After validation, this tool can be used in the area of self-care decisions such as the use of complementary and alternative medicine (e.g., special diets) or the use of over-the-counter drugs (e.g., painkillers). Although the website developed for the purposes of the experimental study might be considered a prototype, it is a result of several pilot-tests and it was based on the guidelines of the Ottawa Decision Support Tutorial (O'Connor et al., 2015). Therefore, it might be used for further experimental research: by adjusting the CSS coding, other elements of the website could be manipulated.

The results of this thesis were presented at international conferences, such as the conference of the European Health Psychology Society (EHPS). In addition, results were published in peer-reviewed, international journals.

INNOVATION

Research on why people use dietary supplements is still scarce. Therefore, there was a need for systematic and comprehensive research on this topic. The studies presented in chapter 2 and 3 are innovative because to our knowledge, no

previous research used a two-step approach (i.e., qualitative and quantitative research) to gather in-depth knowledge on beliefs and determinants of use and non-use of dietary supplements. In addition, both studies used the same theoretical background which resulted in a more systematic investigation of the behaviour.

Another innovative aspect of the thesis is, that we conceptualised and assessed informed decision-making in a context in which it has never been investigated before. In chapter 5, we demonstrated that informed decision-making is a relevant concept for dietary supplement use. In addition, the results of chapter 4 and 5 indicated that informed decision-making should not be restricted to two measures (i.e., knowledge and value-behaviour consistency), but it should entail more relevant components such as autonomy.

Our study presented in chapter 6 and 7 contributed to existing experimental research on interactive online health information in several ways. First, to our knowledge only a few previous studies incorporated different types of variables (i.e., independent variable, moderators, mediators, and dependent measure) in their conceptual model to investigate interactivity effects. In this manner, we explored different mechanisms through which interactivity might influence recall. Herewith, we made an attempt to find an explanation for inconsistent results in previous research. Second, even less studies measured what users actually do with interactive features of websites despite the fact that interactivity entails — among others — that users are free to choose what interactive functions they want to use. Third, data on online behaviour were successfully linked to other types of individual-level measures, such as recall of information. Herewith, we demonstrated how tracking tools, such as Google Analytics can be employed in scientific research.

PLANNING OF IMPLEMENTATION OF KNOWLEDGE

This project was aimed at generating input for evidence-based health communication about the risks and benefits of dietary supplements. Although important steps were made towards a better understanding of this health behaviour and health communication about dietary supplement use, currently, there are no concrete plans to continue the project. Therefore, we give suggestions for future research.

First, in our studies we focused on the general population however, epidemiologic data showed that dietary supplement use varies according to age, gender, and health condition (van Rossum et al., 2016). Therefore, future studies should explore the information need and decision-making processes of sub-

groups in which dietary supplement use is high. In addition, risk groups of developing micronutrient deficiencies could be another important target group for future research. In contrast to the general population, in which dietary supplement use involves uncertainties and lack of scientific consensus, there is sufficient scientific evidence that risk groups may truly benefit from dietary supplement use. Second, in order to communicate effectively about health benefits and risks of dietary supplements, the risk-benefit ratio of each type of dietary supplement should be known. In addition, other types of risks, such as supplement-drug interactions also should be known. Unfortunately, to date scientific research on the potential adverse effects of dietary supplements is scarce. Therefore, more laboratory research is needed in order to identify risk groups of supplement-drug interactions and to adequately inform these target groups.