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Why do Dutch people use dietary supplements? Exploring the role of socio-cognitive and psychosocial determinants

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ABSTRACT

Background: In the Netherlands, the prevalence of dietary supplement use has doubled (from 17 to 40 per cent) since the 1980s. Yet, limited data is available on which socio-cognitive factors are associated with dietary supplement use. Therefore, the purpose of the study is to explain dietary supplement use with determinants deriving from the Integrated Change Model (ICM) and from formative research.
Method/design: Socio-cognitive and psychosocial factors were measured among users and non-users of dietary supplements in a longitudinal survey study, with measurements at baseline (N = 1448) and at one-month follow-up (N = 1161). Negative binomial regression analysis was applied to de data.
Results: Intention emerged as the main predictor of dietary supplement use (OR = 1.99). Further predictors of dietary supplement use with smaller effect-sizes were: health regulatory focus (promotion, OR = 1.46), social modelling (OR = 1.44), attitude (pros, OR = 1.37), attitude (cons, OR = 0.87), health locus of control (OR = 0.77), and risk perception (chance of getting ill, OR = 1.22).
Conclusions: Individuals tend to use dietary supplements if they are promotion oriented, notice dietary supplement users in their social environment, estimate their chances of getting ill higher, and have positive attitudes towards dietary supplements. In contrast, non-users believe that external factors affect their health, and hold negative attitudes towards dietary supplements.
Practical implications: Mapping out individuals' socio-cognitive profile may contribute to the development of online health communication. Based on socio-cognitive and demographical factors, personalised advice can be given about dietary supplement use.

1. Introduction

In the past decades, the use of dietary supplements has become increasingly popular in the United States and other developed countries (Gahche et al., 2011; Skeie et al., 2009; Stein, 2014). According to studies concerning nutrition intake, 50% of the US population (Bailey, Gahche, Miller, Thomas, & Dwyer, 2013), and more than 30% of the UK, Danish, Swedish, Norwegian and Dutch population uses at least one type of dietary supplements regularly (Skeie et al., 2009; van Rossum, Fransen, Verkaik-Kloosterman, Buurma-Rethans, & Ocké, 2011). However, evidence suggests that deficiency on micronutrients rarely occurs among healthy individuals in wealthy industrialised countries (Webb, 2011; van Rossum et al., 2011) and dietary supplements are only recommended when one is suffering from or is at risk of micronutrient deficiencies (The Health Council of the Netherlands, 2015). Hence, there may be no immediate reason to take vitamin C even during wintertime – like 13–21% of the Dutch adults do – because inadequate vitamin C intake from food is uncommon in the Dutch population (van Rossum et al., 2011).

Notwithstanding the fact that dietary supplement use has been increasingly popular in Europe and in the US (Gahche et al., 2011; Skeie et al., 2009), representative data on people's motives for taking dietary supplements is still limited (Bailey et al., 2013). Consequently, input to guide evidence-based health communication about dietary supplements is currently lacking. Therefore, further research is needed to examine which socio-cognitive factors are associated with dietary supplement use.

Previous research has identified several background factors which may be associated with dietary supplement use. Research has shown that dietary supplement use is the highest within groups of the population that are the least likely to need supplementation to their diet, since their nutritional intake from food is

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already sufficient (Bailey, Fulgoni, Keast, & Dwyer, 2011, 2012). For example, women with a healthier lifestyle (e.g. sufficient fruit- and vegetable intake, physically active, low alcohol consumption, not smoking) and high socio-economic status are the most inclined to take dietary supplements (Conner, Kirk, Cade, & Barrett, 2001; Kirk, Cade, Barrett, & Conner, 1999; Vatanparast, Adolphe, & Whiting, 2010). The paradox that people who need supplementation to their diet the least are the most likely to use them has been termed as the "inverse supplement hypothesis" (Kirk, Woodhouse, & Conner, 1998). Ironically, research has also shown that groups at risk of developing certain micronutrient deficiencies – such as young children and women above 50 years old – do not sufficiently supplement their diet with vitamin D. Only 50% of young children and about one third of women above 50 years old actually take vitamin D supplementation (De Nooijer, Jansen, & Van Assema, 2012; van Rossum et al., 2011).

Previous research has investigated the predictive value of different socio-cognitive factors regarding dietary supplement use and intentions to use. Women having higher intentions, attaching higher value to their health, and regarding dietary supplements as an effective tool of disease prevention, are dietary supplement users (Conner et al., 2001). Regarding intentions, Cox, Koster and Russell (2004) found that individuals with a higher perceived response-efficacy of dietary supplements and higher self-efficacy of taking dietary supplements are more intended to use dietary supplements. Chung, Stoel, Xu, and Ren (2012) and Conner et al. (2001) found evidence that attitude, subjective norms, and perceived behavioural control are also significant predictors of (purchase) intentions.

The present study uses the Integrated Change Model (ICM) as its theoretical framework. The ICM is a result of theoretical integration (Noar & Zimmerman, 2005), and incorporates concepts from the Health Belief Model (Janz & Becker, 1984), Social Cognitive Theory (Bandura, 1986), and the Theory of Planned Behaviour (Ajzen, 1991). In addition to the models mentioned, the ICM includes pre-motivational factors (knowledge, risk perception, awareness) as well, therefore the phase preceding the development of motivation can be better investigated (Eggers, 2016). The ICM has been previously used to identify determinants of behaviours regarding diet: eating in moderation (Walthouwer, Oenema, Candel, Lechner, & de Vries, 2015), and fruit and vegetable intake (Schulz et al., 2014).

As proposed by the ICM, behaviour is directly predicted by intentions which are influenced by different motivational factors: attitudes (pros and cons), social influence (modelling, social support, social norm) and self-efficacy (de Vries, Mesters, Van de Steeg, & Hoving, 2005; de Vries et al., 2003). Motivational factors are in turn determined by pre-motivational factors: knowledge, risk-perception (susceptibility to illness), awareness, and cues to action (de Vries et al., 2005). Lastly, predisposing factors (e.g. psychological factors) and information factors (e.g. content of the message) may have an influence on health behaviour indirectly through pre-motivational and motivational factors.

Based on formative research, the following pre-disposing factors relevant to dietary supplement use have been identified: health locus of control, health regulatory focus, and health value. Health locus of control (HLC) is the governing perception an individual has concerning his or her health (Wallston & Wallston, 1981). Previous research suggested that users of dietary complementary and alternative medicine (CAM) have a slightly stronger governing perception regarding their health than non-users (Tokuda et al., 2007). In contrast, non-users tend to believe that external factors, such as health professionals or faith may exert the most influence on individuals' health (Schäfer, Riehle, Wichmann, & Ring, 2003; Tokuda et al., 2007).

Other studies investigated the role of health value in dietary supplement use (Chung et al., 2012; Conner et al., 2001). Health value can be defined as the degree to which an individual regards his or her health as important (Lau, Hartman, & Ware, 1986). Conner et al. (2001) found evidence that individuals who place high value on their own health are more inclined to take dietary supplements by way of precaution.

It can be argued that individuals' regulatory focus (promotion vs. prevention) may also influence the way they use certain health related tools, such as dietary supplements (Gomez, Borges, & Pechmann, 2013). Promotion focused individuals tend to apply approach strategies in their life, such as making use of opportunities for advancement, whereas prevention oriented individuals tend to apply avoidance strategies, such as avoiding losses (Higgins, 2002).

The aim of the present study is to gain insight into which socio-cognitive factors explain dietary supplement use. For this purpose, we investigated the explanatory value of the predisposing, pre-motivational and motivational determinants of the Integrated Change Model.

This study adds to the literature in the following ways. First, it moves beyond the more conventional way of explaining behaviour and tries to identify additional determinants besides motivational factors (e.g. attitudes), such as health locus of control, health value, and health regulatory focus. Second, the present study was set up to investigate socio-cognitive factors related to dietary supplement use in more detail. In previous studies, data regarding beliefs about dietary supplements were often collected with limited lists of questions within broader projects, such as national nutritional examinations, or in selective samples of individuals, such as women. Third, to our knowledge, this is the first study that applies a longitudinal design to investigate socio-cognitive determinants of dietary supplement use.

2. Method

2.1. Study design and participants

In this study, a longitudinal design with a baseline measurement of socio-cognitive determinants (T_0) and a 1-month follow-up measurement of behaviour (T_1) was applied. An *a priori* power analysis was conducted using the software package GPower (Faul, Erdfelder, Lang, & Buchner, 2007). The effect size used for this assessment was small ($f^2 = 0.02$, Cohen, 1988), with $p < 0.05$ alpha level, 0.80 power, and 24 tested predictors. According to the power analysis, at least 1085 participants were needed for detecting small effects. Respondents were recruited among members of an internet research bureau (Flycatcher, the Netherlands). Participants were intentionally recruited in such a way that the distribution of dietary supplement users and non-users was equal in the sample. Individuals were eligible to participate in the study when they were older than 18 years old, and had access to the internet. In the case of dietary supplement users, individuals indicating to use dietary supplements exclusively for sports related purposes were not included in the study. Pregnant women were also excluded from the study. This exclusion was established since athletes' and pregnant women's motives (e.g. to aid recovery from training, to prevent neural tube defect in an unborn) to take dietary supplements may differ from those of the general population.

At baseline, 1998 respondents were randomly selected to participate in the study, of which 1448 (72.50% response rate) completed the questionnaire. At follow-up, 1161 respondents (80.18% response rate) filled out the questionnaire.