Eating by the Norm:
The Influence of Social Norms on Young People's Eating Behavior

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on Young People's Eating Behavior

Eten Volgens de Norm:

De Invloed van Sociale Normen
op het Eetgedrag van Jongeren
(met een samenvatting in het Nederlands)

Proefschrift

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Chapter 1

General Introduction

Humans are social beings. Our identities are for a large part defined by the different social groups we belong to – groups that can be as small as a family and as large as a nation. Those around us influence who we are and our thoughts, our emotions and our behavior are continuously shaped by others through an exchange of ideas, expectancies and practices. Each social group has its own standards or *norms* for behavior, based upon what is considered good or correct behavior within that social group. Such socially shared norms are usually not made explicit, but become apparent through observing the behavior of the group members and through understanding the expectations they have for how others in their social group should behave.

The influence that social norms exert over an individual may be most pronounced in young people, who are still looking to firmly establish their social identity and are especially sensitive to group influences. In the current dissertation, we examine how social norms influence the behavior of young people in the context of eating behavior. Social norms can influence young people's eating behavior positively; if most of an adolescent's peers eat a piece of fruit during school lunch, the adolescent him- or herself will also be more inclined to consume fruit. However, young people's eating behavior in general is not very healthy and neither are the social norms reflecting eating behavior among peers. The focus of this dissertation is therefore to investigate if social norms can be effectively used to promote healthy eating behavior among young people.

Young People's Eating Behavior

Young people's eating behavior has been shown to have deteriorated over the past decades (Bauer, Larson, Nelson, Story, & Neumark-Sztainer, 2009; Kerr *et al.*, 2009; Zizza, Siega-Riz, & Popkin, 2001) and their current dietary intake leaves much room for improvement. Numerous studies have shown that young people's diets are characterized by such unhealthy habits as breakfast skipping (Niemeier, Raynor, Lloyd-Richardson, Rogers, & Wing 2006; Timlin, Pereira, Story, & Neumark-Sztainer, 2008), consumption of fast food (Bauer *et al.*, 2009; Niemeier *et al.*, 2006) and frequent snacking in between meals (Zizza *et al.*, 2001). At the same time, young people do not consume anywhere near the recommended amounts of healthy foods like fruits and vegetables (Larson, Neumark-Sztainer, Hannan, & Story, 2007; Richards, Kattelmann, & Ren, 2006; Sebastian, Cleveland, & Goldman, 2008). Such unhealthy dietary habits can have serious implications for young people's short- and long-term mental and physical health including overweight and obesity, low self-esteem and eating disorders as well as an increased risk for cardio-

vascular diseases, type 2 diabetes and various kinds of cancer (Alinia, Hels, & Tetens, 2009; Holt *et al.*, 2009; Reilly *et al.*, 2003), It is therefore of critical importance to investigate ways to improve young people's eating practices. This becomes even more important when taking into consideration that eating patterns developed during adolescence and emerging adulthood typically continue into adulthood and become life-long habits (Lien, Lytle, & Klepp, 2001; Lytle, Seifert, Greenstein, & McGovern, 2000; Wang & Lobstein, 2006).

Social Norms

One potential way to improve young people's eating behavior is to intervene in the social norms (Cialdini, Kallgren, & Reno, 1991; Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007) that govern eating behavior. Social norms are the (usually implicit) rules that exist within a social group for what are considered acceptable behaviors, values and beliefs of the group members (Aronson, Wilson, & Akert, 2005). Two main types of social norms can be distinguished: descriptive norms are norms that *de*scribe the behavioral practices of other group members (i.e. what group members do), and injunctive norms are norms that *pre*scribe which behavior the group expects from an individual (i.e. what group members believe others in their social group should do).

Previous research has shown that, through changing young people's perceptions of existing social norms, various kinds of health behaviors can be influenced, such as alcohol consumption among college students and smoking among adolescents (for an overview, see Perkins, 2003). The same may be true for eating behavior, and much could be gained by changing the social norms surrounding eating behavior that young people perceive because it has been suggested that the social norms governing young people's eating practices may stimulate unhealthy instead of healthy eating behavior (Croll, Neumark-Sztainer, & Story, 2001; Stead, McDermott, MacKintosh, & Adamson, 2011). Especially in young people, for whom the establishing and maintaining of social identities is an important goal (Erikson, 1968) and who are therefore highly motivated to fit in with the peer group and live up to the group's expectations of them, such unhealthy eating norms may be particularly likely to promote unhealthy eating behavior. Conversely, young people's sensitivity to peer group norms also suggests that if their perceptions of peer eating norms can be changed toward more endorsement for healthy options, their eating behavior is likely to follow suit. The current dissertation will determine if changing young people's perceptions of peer social

norms governing eating behavior, through communicating healthier norms, indeed provides a useful approach to promoting healthier eating among young people.

Research Aims

This dissertation sets out to improve understanding of how and when social norms influence eating behavior in young people, more specifically in the context of promoting healthy eating behavior. Our research aims are threefold. Firstly, we aim to review previous literature to assess if peer group norms are indeed associated with young people's eating behavior, and also if intervening in perceived peer group norms could indeed be a potentially useful tool for the promotion of healthier eating behavior among young people. While quite some research has been conducted on this issue, studies have been extremely heterogeneous, differing widely with regard to norm measurement or manipulation, design and outcome variables, which has made it difficult to draw solid conclusions. A systematic review of the literature is an important first step to gain better insight into the potential usefulness of intervening on peer group norm perceptions as a strategy toward changing young people's eating behavior. Secondly, we aim to investigate which specific types of peer group norms play a role in young people's eating behavior. More specifically, we will explore if peer norms promoting healthy eating or peer norms discouraging unhealthy eating are more strongly associated with young people's eating behavior, and if there are differences between descriptive and injunctive norms in terms of their influence on young people's eating behavior. Thirdly, we aim to increase understanding of how social norms affect eating behavior. We specifically focus on examining how descriptive social norms work, because – providing a small foretaste of findings related to the second research aim – there are indications that changing descriptive norms may offer a more promising approach than changing injunctive norms. We will investigate if the extent to which young people feel connected to their peer group moderates the influence of an intervention communicating healthier peer group norms on their eating behavior. We also examine potential mediating mechanisms of the effect of social norm manipulations on eating behavior.

The five chapters that make up the empirical body of this dissertation correspond to these three aims (Chapter 2 to the first, Chapters 3 and 4 to the second, and Chapters 5 and 6 to the third). In a final chapter we will bring together the main findings from these empirical chapters and provide an overarching discussion and draw general conclusions with regard to our three main aims. Please note that the empirical chapters were written in such a way that they can be read

independently from each other, this introductory chapter and the general discussion. As a result, there may be some overlap between the various chapters. Most notably, in the systematic review, we aimed to provide a complete picture of empirical review conducted to date. Therefore, three studies that are included in the present dissertation (the study presented in Chapter 4, as well as studies 5.1 and 5.2), and that have already been published, are also included in the review, causing a certain degree of overlap between the review, Chapters 4 and 5, and the general discussion.

Overview Of Chapters

Chapter 2 provides the theoretical and empirical background to this dissertation, and includes a comprehensive overview of the theoretical background of the social norm concept. Chapter 2 also includes a systematic review of empirical research that has previously been conducted on peer group norms and young people's eating behavior. This chapter explores both if there is an association between peer group norms and dietary intake in young people, as well as if changing perceptions of peer group norms results in subsequent changes in dietary intake. Moreover, implications for interventions derived from past research are discussed.

Chapter 3 reports a study investigating, in a large international sample of adolescents, how peer group norms are related to eating behavior. An important research question that is addressed is if young people's eating behavior is associated more strongly with peer group norms that encourage healthier eating behavior or with peer group norms that discourage unhealthy eating behavior. Chapter 3 also explores what kind of dietary outcome is more likely to be associated with peer social norms: the intake of healthy foods or the intake of unhealthy foods.

Chapter 4 describes a study that employs an experimental manipulation to explore whether communication of peer group norms can indeed improve young people's dietary intake. This study builds on the results from Chapter 3 by experimentally manipulating the type of social norm that was most strongly associated with young people's dietary intake, namely a norm that promotes healthy eating behavior. The study investigates if a descriptive health-promoting norm and an injunctive health-promoting norm differ in their effect on eating behavior and also includes a control condition against which the two experimental conditions are compared. In this study, we focus on fruit consumption as the outcome variable, based on the finding (in Chapter 3) that peer group norms seem

most strongly related to the intake of healthy foods than to the intake of unhealthy foods.

Chapter 5 builds on the finding from Chapter 4 that a descriptive norm is more effective than an injunctive norm in promoting young people's intake of healthy food. This chapter reports two studies investigating whether the extent to which young people identify with their peer group moderates the effect of that the peer group norm on fruit intake. The studies described in this chapter also explore if social norms can backfire and lead to unintended *boomerang* effects, that is, if a social norm manipulation can actually decrease rather than increase young people's fruit intake.

Chapter 6 aims to improve understanding of how social norms work by exploring potential mechanisms that underlie the effect of descriptive social norm manipulations. In two studies, three potential mediating factors (self-identification, attitude and self-efficacy) are investigated. By addressing a different healthy eating behavior (vegetable intake), the studies reported in Chapter 6 intend to strengthen the generalizability of the findings from studies reported in earlier chapters by demonstrating that descriptive norm interventions affect not only fruit intake, but the intake of healthy foods more generally.

Chapter 7 summarizes and discusses the main findings from the studies reported in the five empirical chapters. We reflect on our three main research aims and draw conclusions about each. We will consider overarching theoretical implications, as well as limitations of the studies that were conducted and avenues for future research. Finally, we will discuss implications for practice that emerge from this dissertation.

Chapter 2

The potential of norms: Peer social norms constitute a promising tool for the promotion of healthy eating behavior in young people

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Abstract

Young people's unhealthy eating behavior is a cause for concern. Because young people are thought to be sensitive to social influence, one potential approach to improving young people's eating behavior is by intervening in the peer norms governing food consumption. In this systematic review, we synthesize the available literature regarding peer group norms and young people's eating behavior. In doing so, we aim to provide a picture of the extent to which peer norms affect young people's eating behavior and to identify potential moderators and boundary conditions of such effects. Twenty-six studies were reviewed. Fourteen were observational studies investigating the association between peer norms and eating behavior, while twelve studies manipulated social norms and investigated the effects of such manipulations on consumption. Results from the review provided clear indications that peer norms, more specifically descriptive peer norms play an important role in shaping young people's eating behavior, and that manipulating peer norms can change eating behavior. The conclusion that descriptive social norms seem to hold potential as a tool for improving young people's eating behavior thus seems warranted, but several important moderating or boundary conditions were also identified that should be taken into account when considering the influence of peer social norms on young people's eating behavior. Implications are discussed in light of developing potential interventions that may use peer norms to improve young people's eating behavior.

Imagine being back in high school. It is lunch time and you and your friends have gathered outside and are getting ready to have lunch. Your mom packed a tasty and healthy lunch for you, consisting of a whole-wheat sandwich with lettuce and tomato, an apple, and some celery sticks. Around you, your friends dig up bags of crisps from their backpacks, and a few of them come walking back from the school cafeteria where they bought a hamburger. Some other friends plan to walk to the shop across the street to buy kebabs, and suggest that you join them. In short, your friends are setting a rather unhealthy behavioral standard. Chances are that you will conform to this unhealthy standard and accompany your peers to the shop, leaving your healthy lunch sitting untouched in your backpack.

In this example, you have complied with your peer group's *social norm* to eat unhealthily during lunch. Social norms are the behavioral standards that exist in a social group for what is considered correct and appropriate behavior (Aronson, Wilson, & Akert, 2005), and they emerge from the shared practices and expectations of the group members. In this paper we provide a systematic review of research regarding peer group norms and young people's eating behavior. While a substantial body of literature exists that points to an important role for peer group norms in shaping young people's eating behavior, these studies are very heterogeneous and have taken widely differing approaches to the conceptualization, operationalization and measurement of social norms. Our aims with this systematic review are twofold. Firstly, we aim to synthesize this heterogeneous body of literature, thereby improving our understanding of the extent to which peer group norms affect young people's eating behavior. Secondly, based on our synthesizing of the available literature, we aim to draw conclusions regarding the potential of social norm-based interventions to promote healthy eating behaviors in young people and to identify potential moderators and boundary conditions for such health promoting effects. In the current review, we focus on young people for two reasons. Firstly, young people's eating behavior is rather unhealthy, which has serious negative health consequences; it is therefore important to better understand reasons for this unhealthy behavior and identify ways of improving their eating practices. Secondly, young people are thought to be especially sensitive to social influence.

A focus on young people

Young people's unhealthy eating practices are a cause for concern. Numerous studies have shown that young people both eat too many unhealthy foods, such as snacks and fast food (Bauer, Larson, Nelson, Story, & Neumark-Sztainer, 2009; Zizza, Siega-Riz, & Popkin, 2001), and eat too few healthy foods, such as fruits and vegetables (Larson, Neumark-Sztainer, Hannan, & Story, 2007; Rolls, Ello-Martin, & Tohill, 2004). Moreover, it has been shown that young people's eating practices have deteriorated over the past decades (Bauer *et al.*, 2009; Larson *et al.*, 2007; Zizza *et al.*, 2001). Unhealthy food consumption among young people has been associated with various long-term negative health consequences, such as overweight and obesity, cardio-vascular diseases and various types of cancer (Alinia, Hels, & Tetens, 2009; Holt *et al.*, 2009). Another reason to worry about unhealthy food consumption in young people is because eating habits that are formed during adolescence and emerging adulthood tend to continue into adulthood and become resistant to change (Lien, Lytle, & Klepp, 2001; Lytle, Seifert, Greenstein, & McGovern, 2000), making it imperative to promote healthy eating behaviors in this phase of life.

One potential approach to improving young people's eating behavior is by intervening in the social norms governing food consumption. Importantly, while normative influence has been shown to affect eating behavior across age groups (Herman & Polivy, 2005; Herman, Roth, & Polivy, 2003), they may have an especially important influence on young people's eating behavior. For young people, the search for a social identity and a sense of belonging to a social group are important goals, more so than for older adults (Erikson, 1968), and it has been shown that eating practices are one way through which young people attempt to establish and express their identity (Stead, McDermott, MacKintosh, & Adamson, 2011; Stok, De Ridder, Adriaanse, & De Wit, 2010). As identity formation is still ongoing, young people will try especially hard to fit in with their peers, live up to peer expectations and gain peer approval (Shapiro, Baumeister, & Kessler, 1991; Wooten, 2006). This sensitivity to peer social influence continues throughout adolescence and into young adulthood (Gall, Evans, & Bellerose, 2000; LaCaille, Nichols Dauner, Krambeer, & Pedersen, 2011), and is lower in older adults (Steinberg & Monahan, 2007; Suls & Mullen, 1982). Indeed, multiple studies have shown that adolescents and emerging adults are more sensitive to peer influence and peer pressure than older adults across various domains such as risk taking

(Gardner & Steinberg, 2005), emotionality (Pasupathi 1991), and health behavior (Rivis & Sheeran, 2003). Young people's unhealthy eating practices, combined with their sensitivity to social influence, make a compelling case to investigate the role of social norms in the eating behavior in this specific population.

Different types of social norms

A 'norm' is defined as a way of behaving that is considered normal, standard or typical (Collins English dictionary). Norms are contingent on the situation: being silent is the norm in a library (Aarts & Dijksterhuis, 2003), but this does not imply that one has to be silent in other environments and situations. Crucially, norms are strongly socially shaped: the behavioral practices and the expectations of social groups constitute social norms, outlining what would be considered acceptable behavior of group members (Aronson *et al.*, 2005; Cialdini, Reno, & Kallgren, 1990; Reno, Cialdini, & Kallgren, 1993). Such social groups can be large and broad, defined by for example nationality or gender, or smaller and narrower, defined by for example family membership or friendship. Social norms can differ widely between different social groups, but they always constitute an important source of influence on the individual group member, affecting people's goals (Shah, 2005), experiences and behaviors (Fiske, 2010). Social norms can stem both from what group members do themselves (the group's practices), as well as from what group members expect others in their social group to do (the group's expectancies). These two types of social norms are typically referred to as descriptive social norms and injunctive social norms, respectively (Cialdini *et al.*, 1990; Reno *et al.*, 1993). Descriptive social norms indicate what most group members do (for example, 'most young people eat less than the recommended amount of fruit'). Injunctive social norms indicate what other group members would consider appropriate behavior (for example, 'most young people think their peers should eat sufficient fruit'). The essential difference is thus that a descriptive norm *de*scribes what *is* done, while an injunctive norm *pre*scribes what *ought to be* done (Cialdini *et al.*, 1990; Deutsch & Gerard, 1955; Reno *et al.*, 1993).

While both types of social norms influence behavior, they may do so in different ways (Cialdini, 2012; Cialdini *et al.*, 1990; Rimal & Real, 2003). Injunctive norms are especially relevant to the interpersonal goal of maintaining positive social relationships (Jacobson, Mortensen, & Cialdini, 2011). For example, if most of my peers want me to eat more healthily, then if I want to gain social approval

and avoid social sanctions, I should in fact eat more healthily. Injunctive norms, then, are thought to motivate behavior because of the promise of social rewards for compliance and social sanctions for noncompliance. Descriptive social norms on the other hand are particularly relevant to the intrapersonal goal of behaving accurately and efficiently (Jacobson *et al.*, 2011). For example, if most of my peers at lunch time choose to eat unhealthily, then eating unhealthily must be the correct way to behave at lunch time.

In addition to the distinction between descriptive and injunctive norms, a distinction is also made between what has been referred to as collective norms versus perceived norms (Knight Lapinski & Rimal, 2005; Rimal & Real, 2003). A collective norm is the actually (objectively) prevailing norm, that is, the actual behavior of other group members or the true expectancies of other group members. The perceived norm on the other hand is the individual's (subjective) perception of the behavior and expectancies of his or her fellow group members. Importantly, people's perceptions of social norms need not necessarily correspond to the objective collective norm, because the collective norm is rarely explicitly or formally stated (Cruz, Henningsen, & Williams, 2000), and because it is impossible "for an individual to know another's actual attitude independent of his or her perception of the other's attitude" (Rimal & Real, 2003). Indeed, perceived norms often are not accurate representations of the collective norm; adolescents have been shown to overestimate peers' consumption of unhealthy drinks (Perkins, Perkins, & Craig, 2010) and to underestimate peers' consumption of fruits and vegetables (Lally, Bartle, & Wardle, 2011). Moreover, it has been shown that people are ultimately influenced by their perceptions of the prevailing social norm, rather than the actual collective norm: a recent study showed that the perceived descriptive norm of peer sugar-sweetened beverage consumption was strongly predictive of adolescents' own consumption, while the actual collective norm was not (Perkins *et al.*, 2010). As it is impossible to consider the influence of a collective norm separate from perceptions of that norm and because what people are ultimately influenced by, and act upon, will always be their own perception or interpretation of a social norm (Rimal & Real, 2003), we focus on *perceived* norms in this review.

Overview of this review

In this systematic review, we aim to bring together the heterogeneous literature on the influence of social norms on young people's eating behavior. We focus on social norms that stem from peer behavior and peer expectancies, because the peer group is thought to exert a strong normative social influence on young people's behavior (Bradford Brown, Bakken, Ameringer, & Mahon, 2008; Brown, 2004; Noller & Callan, 1991). Our two main aims are, firstly, to provide an overview of research conducted to date on peer social norms and eating behavior that investigates to which extent peer social norms affect young people's eating behavior and, secondly, to identify potential moderators and boundary conditions of such effects.

The remainder of this article is structured as follows. After discussing the methodology of our review, the results will be presented in three separate sections. The first two sections will describe the results found in the available studies. The first section focuses on cross-sectional and prospective studies that measured young people's perceptions of peer social norms and their eating behavior (allowing us to draw conclusions about whether peer social norms affect eating behavior and if yes, when and in whom). The second section focuses on experimental studies that manipulated perceptions of peer social norms and determine what effects this has on young people's eating behavior (allowing us to draw conclusions about whether it is possible to change young people's eating behavior by changing their perceptions of eating-related social norms and if yes, under what conditions). In a third section, we will consider the results that emerge from the review as a whole, above and beyond the level of each individual study, and synthesize the available evidence regarding moderating variables, potential boundary conditions and possible boomerang effects of the effect of peer social norms on young people's eating behavior. Finally, we will discuss what the implications for interventions might be and draw conclusions about our findings.

Method

We included in this systematic review empirical studies of the influence of perceived peer social norms (either descriptive or injunctive norms; either measured or manipulated) on young people's food consumption. Food consumption in this review encompasses young people's (intended) intake of any type of food or any type of non-alcoholic drink. We define young people as

adolescents and emerging adults, aged between 10 and 25 years of age (Arnett, 2010). While this is a rather broad range, we believe it is appropriate to include both adolescents and young adults because both these life phases are considered to be transitional (Coleman, 2011; Gall *et al.*, 2000), and individuals in these phases are thought to experience substantial psychological and physical change.

Inclusion criteria and search strategy

Criteria for the inclusion of studies in this review were the following: the study should be published in a peer-reviewed journal, reported in English and present quantitative data and data analyses; the study sample should consist of adolescents or young adults (mean age between 10 and 25 years old); a social norm stemming exclusively from a peer group should be included as an independent variable (thus excluding studies that, for example, did not differentiate between parents and peers); the social norm should reflect a *group* norm, and not be based on the behavior of one or a few individuals; the social norm should describe either the group's own behavior or the group's expectancies for the participants' behavior; and the social norm should be perceived by the participants themselves (and not reported by others, for instance parents or peers).

Searches for relevant articles that had been published up to September 2013 were carried out in three databases: PsycInfo, Web of Science and Scopus. We formulated a comprehensive string of search terms that included both a social norm-related keyword as well as a keyword related to dietary intake. For dietary intake we included both general terms (e.g., eating) as well as specific terms corresponding to the types of food that are most often investigated in young people (e.g., snack). The complete string of search terms was *("norm" or "social norm" or "eating norm" or "descriptive norm" or "injunctive norm" or "subjective norm" AND "eating" or "food" or "snack" or "fruit" or "vegetable" or "soft drink" or "sugar-sweetened")*. We chose not to include terms indicating peer norms specifically, nor age group identifiers, because this could inadvertently constrict the searches. Instead, we assessed whether the hits we obtained with the string of social norm and eating behavior keywords fit our other criteria regarding studies specifically investigating peer norms in a sample of young people. No restrictions were made regarding year of publication. Through these searches, we identified 49 potentially relevant papers of which the abstracts were screened, after which 32 remained that were eligible for screening of the full text. After a careful reading of

these papers, 11 remained that fit our inclusion criteria (including 12 studies). Using the same search terms, we conducted in a search in Google Scholar, which resulted in the identification of 4 more papers that fit our inclusion criteria. Reference lists of these 15 papers were screened for additional relevant studies, which resulted in the identification of 5 more papers that fit our inclusion criteria. Moreover, the reference lists of several recent reviews investigating social determinants of eating behavior (McClain, Chappuis, Nguyen-Rodriguez, Yaroch, & Spruijt-Metz, 2009; Rasmussen *et al.*, 2006; Van Der Horst *et al.*, 2007) were screened for relevant studies, which resulted in another 5 papers being identified that fit our inclusion criteria. In one case (Lally *et al.*, 2011), the study included both a descriptive and an injunctive norm measure, but the injunctive norm measure did not reflect a perception of what peers would think others should do, so only the descriptive norm measure and its association with eating behavior was considered in our analysis.

Final set of studies

We identified 25 papers describing 26 eligible empirical studies of the influence of peer social norms on young people's dietary intake. Fourteen of these studies measured social norms and corresponded to our first research question (studies #1-14, see Table 1). Twelve studies manipulated social norms and corresponded to our second research question (studies #15-26, see Table 2). Of importance, even when considering peer social norms only and taking into account our rather strict inclusion criteria, these 26 studies still represent a rather heterogeneous body of literature, precluding the possibility of conducting a meta-analysis: different types of norms have been investigated that have been measured or manipulated in a wide variety of ways, and these norms could be either in the direction of promoting healthy eating or of promoting unhealthy eating, Also, different outcome variables have been investigated (intentions or behavior, healthy and unhealthy eating) that have been operationalized in myriad ways.

Table 1: Characteristics of the fourteen studies measuring peer social norms

#	Authors, publication year	Design	Sample	Norm measure(s)	Outcome variable(s)	Quality
1	Lally *et al.*, 2011	CS	264 adolescents	descriptive, 1 item per food type (e.g., "how many servings of fruit do you think boys in year 12 at your school generally eat")	FV; SD; US (self-reported average consumption)	2.5
2	Yun & Silk, 2011	CS	154 college students	separate descriptive and injunctive norms, separate distal and proximal norms, 3 items per norm type (e.g., "most [fellow] university students maintain a healthy diet" (distal descriptive norm); "most of my friends would approve of my having a healthy diet" (proximal injunctive norm))	intention to eat a healthy diet	3
3	Perkins *et al.*, 2010	CS	3831 adolescents	descriptive, 1 item (how many sweet drinks per day are typical for other students in own grade at school; exact wording not provided)	SSB (self-reported average consumption)	3
4	De Bourdeaudhuij & Van Oost, 2000	CS	208 adolescents	descriptive, 2 items per food type (e.g., evaluate fat intake of friends and compare intake of friends with people of same age and sex; exact wording not provided)	% fat; F; V; SD; US (food frequency questionnaire)	3
5	Woodward *et al.*, 1996	CS	2082 adolescents	descriptive, 1 item per food type (e.g., how often participant thought meat was eaten by friends; exact wording not provided)	22 food types in 6 categories (self-reported average consumption)	3.5
6	Nordrehaug Åstrøm & Rise, 2001	CS	735 young adults	descriptive, 2 items (e.g., "think about your friends and peers involved in the leisure time activity, which you value the most. How many of your friends agree that it is important to eat healthy foods regularly in the future")	likelihood of eating healthy food regularly in the future	2.5
7	Grimm *et al.*, 2004	CS	560 adolescents	descriptive, 1 item (if most, some or none of participant's friends drank soft drinks on a regular basis (three or more times per week); exact wording not provided)	SD (self-reported average consumption)	2.5

Note: CS = cross-sectional; P = prospective. F = fruit; V = vegetables; FV = fruit and vegetables; SD = soft drinks; US = unhealthy snacks; SSB = sugar-sweetened beverages; FJV = fruit, juice and vegetables. Possible quality scores range from 0 (lowest) to 4 (highest).

Table 1, continued: Characteristics of the fourteen studies measuring peer social norms

#	Authors, publication year	Design	Sample	Norm measure(s)	Outcome variable(s)	Quality
8	Van Der Horst *et al.*, 2008	CS	1293 adolescents	descriptive, 2 items per food type (e.g., if friends consume few soft drinks; if friends consume a lot of snacks; exact wording not provided)	SD; US (self-reported average consumption)	3
9	Vereecken, Van Damme, *et al.*, 2005	CS	207 adolescents	descriptive, 3 items per food type (e.g., "how many of your friends consume daily fruit; "most of your friends like to eat vegetables")	F; V (self-reported average consumption)	3.5
10	Louis *et al.*, 2007	CS+P	137 college students	descriptive, 3 items (e.g., "what percentage of your fellow university students do you estimate will eat healthily in the next two weeks")	intention to eat healthily (cross-sectional); healthy eating in the past two weeks (self-reported); average healthy food choices (self-reported)	3
11	Wood Baker *et al.*, 2003	CS+P	279 adolescents	combined descriptive and injunctive, 3 items (e.g., "my friends would approve if I ate healthily; "my friends are healthy eaters")	attitude for healthy eating (cross-sectional); intention to eat healthily (cross-sectional); average healthy food choices (self-reported)	3.5
12	Weber Cullen *et al.*, 2001	P	230 adolescents	separate descriptive (12 items; e.g., "most kids eat fruit at lunch"; "my friends like to eat vegetables") and injunctive norms (7 items; e.g., "how much do your friends encourage you to eat vegetables at snack"; "how much do your friends encourage you to drink 100% fruit juice instead of soda")	FJV (food record forms)	3
13	Thompson *et al.*, 2007a	P	275 adolescents	combined descriptive and injunctive, 3 items (e.g., "my friends drink low-fat milk at school lunch when I am with them"; "how much do your friends encourage you to drink low-fat milk at school lunch")	low-fat milk; total milk; SD (food record forms)	3
14	Thompson *et al.*, 2007b	P	275 adolescents	combined descriptive and injunctive, combined across both food types, 7 items (e.g., "most kids eat a serving of cooked vegetables at lunch"; "my friends eat a serving of fruit at school lunch when I am with them")	F; V (food record forms)	3

Note: CS = cross-sectional; P = prospective. F = fruit; V = vegetables; FV = fruit and vegetables; SD = soft drinks; US = unhealthy snacks; SSB = sugar-sweetened beverages; FJV = fruit, juice and vegetables. Possible quality scores range from 0 (lowest) to 4 (highest).

Table 2: Characteristics of the twelve studies manipulating peer social norms

#	Authors, publication year	Sample	Type of social norm	norm manipulation	control or comparison condition	Outcome variable(s)	Quality
15	Stok *et al.*, 2012b	102 college students	D	communicated norm (text message indicating that "73% of Dutch university students eat sufficient fruit")	minority norm ("only 27% of Dutch university students …")	fruit intake intentions (self-reported)	4
16	Stok *et al.*, 2012b	119 college students	D	communicated norm (text message indicating that "73% of Dutch students eat at least 2 portions of fruit per day during the week they kept a fruit diary")	minority norm ("only 27% of Dutch students …") and no-norm control	fruit (daily diary during 7 days)	4.5
17	Robinson & Higgs, 2012	60 college students	D	communicated norm (posters and flyers stating that "students eat more vegetables than you'd think, the average student eats 3 portions of vegetables a day")	health information (posters and flyers stating that "eating vegetables is good for your health, eating 3 portions of vegetables a day protects against heart disease")	vegetable selection and consumption at a lunch buffet	4
18	Salmon *et al.*, 2013	177 college students	D	communicated norm (pie chart indicating that the majority of previous participants (varying between 65% and 85%) had chosen the healthy food product)	no-norm control	number of healthy (vs. unhealthy) choices in a food-choice task	5
19	Robinson, Harris, *et al.*, 2013	129 young adults	D	communicated norm (poster stating that "Most students limit how much junk food they are eating to 1 or less than 1 serving a day")	no-norm control	selection of unhealthy snack foods and fruit and vegetable items from a buffet	6
20	Stok, De Ridder, *et al.*, 2013	96 / 80 adolescents	D + I	communicated norm (text message stating that a majority of high school students either "try to eat sufficient fruit themselves" (descriptive norm) or "think other high school students should eat sufficient fruit" (injunctive norm))	no-norm control	fruit intake intentions ($N = 96$) and fruit consumption (retrospective over past 2 days; $N = 80$)	5.5

Note: D = descriptive norm, D + I = separate descriptive and injunctive norm conditions; 'communicated norm' refers to a social norm message, communicated in an informational text or via a poster or similar, that always describes the behavior or the expectancies of a majority of the peer group. Possible quality scores range from 0 (lowest) to 6 (highest).

Table 2, continued: Characteristics of the twelve studies manipulating peer social norms

#	Authors, publication year	Sample	Type of social norm	norm manipulation	control or comparison condition	DV (measurement)	Quality
21	Mollen *et al.*, 2013	687 college students	D + I	communicated norm (poster indicating that every day more than 150 university students "have a burger for lunch" (unhealthy descriptive norm) or "have a tossed salad for lunch (healthy descriptive norm) or poster stating "have a tossed salad for lunch" (healthy injunctive norm))	no-norm control	food selection at lunch: healthy (salad) and unhealthy (hamburger) choices were coded	4
22	Feeney *et al.*, 2011	21 female students	D	environmental cue (list of number of mini-pizza's eaten by 10 supposed previous participants, which was a low amount (M = 3; healthy norm))	no-norm control	number of mini-pizza's consumed in a taste test	5
23	Pliner & Mann, 2004	72 female students	D	environmental cue (list of number of cookies eaten by 10 supposed previous participants, which was either a low amount (M = 4, healthy norm) or a high amount (M = 14, unhealthy norm))	no-norm control	amount of cookies (either palatable or unpalatable) cookies consumed in a taste test; amount of cookies selected for further testing at home	5.5
24	Prinsen *et al.*, 2013	65 college students	D	environmental cue (presence of a bowl next to the chocolates that was either empty (healthy norm) or contained 20 chocolate wrappers (unhealthy norm))	n.a.	amount of chocolates consumed in a taste test	4.5
25	Roth *et al.*, 2001	134 female college students	D	environmental cue (list of number of cookies eaten by 10 supposed previous participants, which was either a low amount (M = 4, healthy norm) or a high amount (M = 14, unhealthy norm))	no-norm control	amount of cookies consumed in a taste test	5
26	Robinson, Benwell, *et al.*, 2013	64 female college students	D	environmental cue (list of number of cookies eaten by 4 supposed previous participants, which was either a low amount (M = 1.5, healthy norm) or a high amount (M = 9, unhealthy norm))	no-norm control	amount of cookies consumed in a taste test	5.5

Note: D = descriptive norm, D + I = separate descriptive and injunctive norm conditions; 'communicated norm' refers to a social norm message, communicated in an informational text or via a poster or similar, that always describes the behavior or the expectancies of a majority of the peer group. Possible quality scores range from 0 (lowest) to 6 (highest).

Quality assessment

Quality of the eligible studies was assessed separately for the studies measuring versus manipulating social norms. The scoring sheets are presented in Appendix A. For the studies measuring social norms, a checklist was established based on readily available tools (Fowkes & Fulton, 1991; Health Evidence Bulletins, 2004) that were deemed suitable for future use in a systematic review of such tools (Sanderson, Tatt, & Higgins, 2007). The checklist addressed four aspects of research quality that each reflect a possible source of bias or confounding (see Table 3). The four criteria were (1) appropriateness of the sample, (2) possibility of sample bias, (3) appropriateness of the norm measure(s), and (4) appropriateness of the outcome measure(s). Each of the four criteria was scored 0 (strong potential for bias or confounding), 0.5 (some potential for bias or confounding), or 1 (little potential for bias or confounding), with possible total quality scores ranging from 0 (poorest possible quality) to 4 (highest possible quality).

Table 3: Quality assessment for the studies measuring peer social norms

Quality-related aspect	Definition
1. Sample	Three criteria were assessed: (1) was the study sample representative of the population under study; (2) was the sample size adequate; (3) if applicable, were exclusion/inclusion criteria appropriately set. Scored 1 (all criteria met), 0.5 (one criterium not met), or 0 (more than 1 criterium not met).
2. Sample bias	Was there a high non-response? Scored 1 (response >80%), 0.5 (50%<reponse<80%), or 0 (response <50%).
3. Norm measure(s)	Were rigorous processes used to develop the norm variables, or were the variables based on previously developed measures? (e.g., were the questions piloted/validated?) Scored 1 (reliable or previously used norm measure), 0.5 (norm measure less reliable or no information provided), or 0 (unreliable norm measure).
4. Outcome variable(s)	Was the outcome measure appropriate, valid and reliable? Was the outcome measure reflective of the behavior described in the norm manipulation? Scored 1 (food frequency questionnaire or food record form, and outcome reflective of behavior described in norm), 0.5 (self-reported average or frequency of consumption or intention measured with multiple items, or outcome not entirely reflective of behavior described in norm), or 0 (intention measured with 1 item, or outcome not reflective of behavior described in norm).

Note: with four criteria scored between 0 and 1, the maximum quality score is 4 and the minimum score is 0.

For the studies manipulating social norms, a checklist was established based on the Cochrane Collaboration Criteria (Higgins & Green, 2011), adapted to the purposes of the current review. The checklist addressed six aspects of research quality that each reflect a possible source of bias or confounding (see Table 4). The six criteria were (1) appropriateness of the sample, (2) presence of a control group, (3) potential for selection bias, (4) potential for performance bias, (5) appropriateness of the norm manipulation, and (6) appropriateness of the outcome measure(s). Each of the six criteria was scored 0 (strong potential for bias or confounding), 0.5 (some potential for bias or confounding), or 1 (little potential for bias or confounding), with possible quality scores ranging from 0 (poorest possible quality) to 6.

Table 4: Quality assessment for the studies manipulating peer social norm

Quality-related aspect	Definition
1. Sample	Four criteria were assessed: (1) was the study sample representative of the population; (2) was the sample size adequate; (3) if applicable, were exclusion/inclusion criteria appropriately set; (4) only for prospective designs: was there attrition bias, i.e. did drop-out differ between conditions. Scored 1 (all criteria met), 0.5 (one criterion not met), or 0 (more than 1 criterion not met).
2. Control group	Was there a control group? Scored 1 (yes) or 0 (no).
3. Selection bias	Were participants assigned to conditions at random? Were there no differences between participants at baseline, or were baseline differences statistically controlled for? Scored 1 (no selection bias), 0.5 (indications of potential selection bias), or 0 (selection bias certainly present).
4. Performance bias	Were there differences between the conditions other than the intervention being studied? Scored 1 (no performance bias), 0.5 (indications of potential performance bias), or 0 (performance bias certainly present).
5. Norm manipulation	Was the manipulation of the social norm construct appropriate? Scored 1 (appropriate), 0.5 (norm manipulation ambiguous), or 0 (not appropriate).
6. Outcome variable(s)	Was the outcome measure appropriate, valid and reliable? Was the outcome measure reflective of the behavior described in the norm manipulation? Scored 1 (observed consumption, and outcome reflective of behavior described in norm), 0.5 (self-reported consumption, or outcome not entirely reflective of behavior described in norm), or 0 (intention or hypothetical food-related choice, or outcome not at all reflective of behavior described in norm).

Note: with six criteria scored between 0 and 1, the maximum quality score is 6 and the minimum score is 0.

Results

Association of measured peer norms with young people's eating behavior

In this first section, results from the fourteen studies included in our set are described that measured young people's perceptions of peer norms and examined their relation to eating behavior in either cross-sectional or prospective designs (studies #1-14, see Table 1). With this analysis, we aim to determine whether peer social norms are related to eating behavior and if yes, when and in whom. Our quality assessment (see Table 3 for criteria) indicated that the studies were, overall, of rather good quality, scoring on average 3 out of 4 on our quality assessment measure (see Table 1 for quality ratings; scoring sheets are available in Appendix A1). Aspects reflecting poor quality that were encountered most frequently included a low or modest response rate (5 studies), norm measures for which reliability and validity information was either low or not provided (7 studies), and non-optimal outcome measures (e.g., self-reported frequency of consumption or average consumption, single-item measures of behavioral intention; 10 studies).

Descriptive norms

Eleven (#1-10, #12) cross-sectional or prospective studies assessed the association of descriptive norms with eating behavior, or included a separate descriptive norm measure, of which ten (#1-10) found that young people's perceptions of descriptive peer social norms were associated with (some aspects of) their eating behavior. Descriptive norms were typically measured by asking young people either if most of their friends often ate a certain food (or ate healthily more generally), how many of their friends would often eat a certain food (or ate healthily more generally), or how frequently their friends would eat a certain food (or ate healthily more generally). There were some differences with regard to the exact composition of the normative referent group (e.g., best or close friends, best friends at school or university, friends in general, peers, peers from the same grade, peers from the same university), but these differences in social norm measures did not result in systematically different outcomes. An aspect of the measurement of social norms that did seem to influence results was whether norms related to specific food types: the only study that combined items measuring norms for different kinds of food (#12) was also the only study that found no relation between norms and eating behavior.

Three studies (#2, #6, #10) investigated the association of perceived healthy eating of peers with young people's intentions to generally eat healthily themselves. All three studies found a positive correlation, but for two of these studies there was an important moderating factor. Notably, norms were related to intentions only in young people who strongly identified with the normative referent group (#6), and when the perceived descriptive norm described the behavior of friends (#10); norms perceived to exist among all students at the same university was not related to intentions (#10). One study (#10) also investigated whether perceived healthy eating of peers was related to participants' actual healthy eating during two subsequent weeks, but this was found not to be the case.

Eight other studies (#1, #3-5, #7-9, #12) investigated descriptive norms regarding the perceived frequency of consumption of specific food types. Three food types were investigated in multiple studies: the consumption of fruits and vegetables, unhealthy snacks, and soft drinks or sugar-sweetened beverages. Results for all three food types consistently indicated that there is a relation between perceived peer consumption of these foods and participants' own consumption. Perceived peer consumption of fruits and vegetables was found to be related to participants' own fruit and vegetable consumption in four out of five studies that investigated this association (#1, #4, #5, #9), although one study only found an association for fruits (#4). Perceived peer consumption of unhealthy snacks was found to be related to participants' own snack consumption in three out of four studies that investigated this association (#1, #5, #8). Perceived peer consumption of soft drinks (or other sugar-sweetened beverages) was related to participants' own consumption of soft drinks in four out of five studies that investigated it (#1, #3, #5, #8). The fifth study (#12) showed no relation between a combined norm for fruit, juice and vegetable consumption and students own combined consumption of these food types.

Two studies considered also other indicators of healthy eating, with one study (#4) assessing the percentage of fat content in the total diet, which was not related to perceived peer fat intake, and one study (#5) assessing 22 different food types (including fruits and vegetables, soft drinks and snacks for which results are described above), and found that perceived peer intake of meat products, dairy products (except for ice-cream, which we included in the snacks category) and spreads were not related to adolescents' own intake of these food types.

Injunctive norms

Only two studies included a specific injunctive norm measure (#10, #12). In both these studies, injunctive norm measures consisted of asking participants to what extent their friends or peers would support or endorse participants eating a certain food (or to eat healthily more generally). One of these studies (#10) found that peer encouragement for eating a healthy diet was related to young people's actual intentions to eat a healthy diet. In this study, whether the normative referent group consisted of friends or students at the same university referent group did not change this relation; perceived injunctive norms were related to eating behavior regardless of whether this norm pertained to a referent group of close others (e.g., friends) or of less familiar peers (e.g., students from the same university). Another study (#12) found that peer encouragement to consume fruit, juice and vegetables was not related to a compound measure of adolescents' own consumption of these three food types.

Combination of descriptive and injunctive norms

Three studies (#11, #13, #14) used a compound measure of social norms that included both descriptive and injunctive social norm items. All three studies found evidence of an association between social norms and eating behavior. A perceived peer social norm to eat a healthy diet was related to adolescents' attitude toward eating a healthy diet and, indirectly through attitude, to intentions to eat a healthy diet and actual healthy eating behavior (#11). Also, perceiving a peer social norm to drink more low fat milk was found to be related to higher consumption of low fat milk (#13). This study also assessed soft drink consumption, and found that a stronger social norm to drink milk was associated with lower soft drink consumption, suggesting a spillover effect of the social norm. Furthermore, perceiving a peer social norm to eat more fruits and vegetables was found to be related to higher consumption of fruits and vegetables in adolescents (#14).

Summary of findings regarding peer norms and young people's eating behavior

Of the fourteen studies investigating the association between a perceived peer social norm, thirteen showed (at least some) evidence of an association between peer norms and eating behavior. Associations were found across differing operationalizations of social norms (descriptive, injunctive, or a combination of descriptive and injunctive; pro-healthy or pro-unhealthy behavior), as well as different outcome measures (intention or behavior; healthy or

unhealthy eating; measured with food record forms, food frequency questionnaires, self-reported average daily consumption or self-reported frequency of consumption). Importantly, these differences did not seem to result in substantive differences in associations between peer social norms and eating behavior.

Manipulation of perceived norms and conditions that moderate effects

In the first part of this review section, we found that the available literature provides clear evidence for a relation between descriptive social norms and young people's eating behavior. Thus knowing that perceived peer social norms are related to eating behavior, the next important question is whether the literature also provides evidence for the idea that, through changing perceptions of social norms, young people's eating behavior can also be changed. In this second section, results from the twelve studies included in our set are described that manipulated young people's perceptions of peer norms and investigated the effect of such manipulations on young people's eating behavior (studies #15-26, see Table 2). With this analysis, we aim to determine whether it is possible to change young people's eating behavior by changing their perceptions of eating-related social norms and if yes, under what conditions this is possible. Our quality assessment (see Table 4 for criteria) indicated that the studies were, overall, of rather good quality, scoring on average 4.9 out of 6 on our quality assessment measure (see Table 2 for quality ratings; scoring sheets are available in Appendix A2). Aspects reflecting poor quality that were encountered most frequently included a small number of participants (2 studies), lack of a control condition (2 studies), no randomization or lack of description of whether randomization was successful (4 studies), possible performance bias, with potential differences existing between the conditions other than the intervention being studied (3 cases), non-optimal social norm manipulations (either because it was ambiguous if a norm cue was present or because the norm was ambiguous with regard to the referent group from which the norm stemmed; 2 studies), and non-optimal outcome measures (intention rather than behavior, self-reported consumption, hypothetical rather than actual food choices; 5 studies).

Descriptive norms

Two types of descriptive norm manipulations can be discerned: participants infer the behavior of other group members through an environmental cue (#22-26),

for example by leaving empty wrappers of chocolates or by placing a sheet in sight of the participant on which the supposed consumption of previous participants is noted, or a descriptive norm is communicated to participants, such as "most young people eat at least two portions of fruit and vegetables per day" (#15-21), for example in a short informational text or on a poster. Both types of manipulations seem to affect young people's eating behavior, although there are some differences in terms of the type of eating outcomes that has been assessed in conjunction with the different types of descriptive norms.

The environmental cue manipulation has been investigated in five studies (#22-26). Three of these studies (#23, #25, #26) had three conditions: for one group of participants, the environmental cue indicates that the descriptive norm is to eat very little or not at all of a certain unhealthy food (e.g., mini pizzas, cookies, chocolates), which is typically referred to as the inhibition norm (e.g., Roth, Herman, Polivy, & Pliner, 2001), for a second group the norm is to eat quite a lot of the unhealthy food, which is typically referred to as the augmentation norm (e.g., Roth *et al.*, 2001), and a third group receives no descriptive norm cue, constituting the control condition. A fourth study (#24) included only the two experimental conditions and did not have a control condition. Results of the four studies are consistent and indicate that participants receiving the inhibition norm ate less than participants receiving the augmentation norm. Differences were however found between the studies in terms of the results of the control condition. Two studies (#23, #25) found that participants exposed to the augmentation norm ate more than participants in the control condition, with the latter not differing from participants exposed to the inhibition norm. The third study (#26), however, found that all three conditions were significantly different from each other, with participants exposed to the augmentation norm consuming most, participants in the control condition consuming an intermediate amount, and participants exposed to the inhibition norm consuming least. One study (#22) compared only an inhibition norm condition to a control condition, and found that participants receiving the inhibition norm ate significantly less than participants in the control condition. One study (#23) compared the effect of the manipulation on consumption of both palatable and unpalatable cookies, and only found the described effects for palatable cookies. This study also asked participants to take cookies home for testing during the next four days, and they measured whether the environmental cue manipulation would also affect the amount of cookies

participants would select for future consumption. This turned out not to be the case: norm manipulation did not work outside the specific context.

The communicated norm manipulation has been studied with respect to both healthy eating outcomes (3 studies; #15-17) and unhealthy eating outcomes (1 study; #19), and a further study (#18) used the choice between a healthy and an unhealthy snack as outcome. Studies in which the communicated norm is manipulated typically focus on health-promoting norms, with a typical norm manipulation consisting of the communication of a message such as 'most peers eat healthily' or 'most peers try to avoid eating unhealthily'. Results showed that these messages lead to healthier eating behavior; fruit intake intentions (#15), actual fruit intake (#16) and actual vegetable intake (#17) were found to be higher after receiving a healthy norm message than when no message was provided (#16, #17) or when a norm message stated that only few peers ate healthy (#15, #16). Norm messages stating that only few peers ate healthy, which are referred to as *minority norms*, seemed to produce a boomerang effect; it led college students to consume less fruit than a control group who received no norm message (#16). In two studies (#15, #16), identification with the normative referent group was either measured (#15) or manipulated (#16), and both studies found that descriptive social norms only affect eating behavior of young people if they strongly identify with the normative referent group (#15), or if the descriptive social norm messages was designed to refer to the behavior of a close, familiar referent group (#16); if the message was designed to refer to the behavior of the population as a whole, it did not influence fruit intake. In an additional study (#17), students' vegetable consumption during lunch was found to be affected by a descriptive social norm communication conveying that most students eat plenty of vegetables *only* if participants were habitually low consumers of vegetables. Among students who had a habitually high vegetable consumption the descriptive norm manipulation did not increase vegetable consumption.

In another study (#18), a norm message communicating that most peers chose a healthy snack increased the percentage of participants' choosing a healthy snack, compared to a control condition in which no norm was communicated. It should however be noted that this effect was only observed among people who were brought into a low self-control state. In a further study (#19), a norm message communicating low peer consumption of unhealthy snacks decreased unhealthy snack consumption in participants who were asked to select food items from a

buffet; total consumption in calories also decreased. This study also looked at potential spillover effects by assessing if the unhealthy snack-related norm also influenced intake of healthy alternatives (i.e., fruits and vegetables), but no such spillover effect was found. Also, no moderating effect was found of people's habit to consume junk food.

Descriptive versus injunctive norms

Two studies (#20, #21) compared the influence of descriptive and injunctive norms on eating behavior. One study (#20), which investigated fruit consumption, found that the communication of a descriptive norm ('most adolescents eat two pieces of fruit per day') did not increase fruit intake intentions, but did increase actual fruit intake during two subsequent days. An injunctive norm communication ('most adolescents think their peers should eat two pieces of fruit per day') was found to decrease fruit intake intentions, which is suggestive of a boomerang effect; no effect was found on actual fruit consumption. Another study (#21) looked at three types of norms: a healthy descriptive norm ('most students eat a salad for lunch'), an unhealthy descriptive norm ('most students eat a hamburger for lunch') and a healthy injunctive norm ('have a salad for lunch'). Consumption of both salads and hamburgers was monitored. Hamburger consumption was not affected by any of the norm messages, while salad consumption increased when a healthy descriptive norm was communicated. Neither the unhealthy descriptive norm nor the healthy injunctive norm affected salad consumption. Moreover, it should be noted that the injunctive norm in this study was somewhat ambiguous, as a norm referent group was not explicitly specified.

Summary of findings

All twelve studies investigating the influence of peer social norm manipulations on eating behavior found (at least some) significant effects, indicating that changing young people's perceptions of peer social norms can change their eating behavior. Two broad categories of social norm manipulations could be discerned; social norms were either communicated via a written message or poster; or they were inferred from an environmental cue. These two types of manipulations are quite distinct. Communicating norms through written messages or posters is rather explicit and externally controlled, with the norm being communicated by an external source, while environmental cue manipulations are more implicit and internally controlled, with the norm being inferred by the

participant him- or herself. Despite these differences, both manipulations seem to reliably and similarly influence young people's eating behavior.

Boundary and moderating conditions of peer norm influence

In this third section, we will consider the results that emerge from the review as a whole, above and beyond the level of each individual study, and synthesize the available evidence regarding potential boundary and moderating conditions and of the effect of peer social norms on young people's eating behavior.

Boundary: peer norms influence intake of foods typically consumed around peers

Most studies in our set used as outcome variables the types of food that are often consumed with peers or created a compound measure including at least one food type that is typically consumed around peers, such as snacks and soft drinks, and clearly show that consumption of these types of food is influenced by peer norms. Some studies have also included more home-consumed types of food (e.g., #4, #5). Evidence for a role of peer social norms in the consumption of those foods was less consistent: in one study (#5), meat and dairy consumption was not influenced by peer social norms while consumption of fruits and snacks was, and fruit consumption was related to peer social norms while consumption of fat (as a percentage of total intake) and vegetables was not (#4). In other words, peer norms seemed to have a more consistent influence on intake of those types of food that are associated with peers than on intake of types of food that are less associated with the peer group. In this regard, it is interesting to compare consumption of one food type across different populations, in which one population would typically consume that type of food around peers and the other population would not. For example, the evidence for a relation between peer social norms and vegetable intake (when considered separately from fruit intake) was found to be inconsistent in adolescents, who would probably consume most of their vegetables at home during dinner (#1, #4, #5, #9, #12). However, in studies taking place during lunch time at school or in college cafeteria, that is, when the vegetables would be consumed around peers, vegetable intake was consistently influenced by peer social norm manipulations (#14, #17, #21). Similar observations can be made for milk consumption: a study investigating milk consumption specifically during school lunch found that peer social norms had an influence (#14), but such a finding was not observed when consumption of milk in general was considered (#4, #5). A boundary condition for the influence of peer social norms on eating

behavior thus seems to be that the peer norm should focus on changing consumption of a type of food that is typically consumed in the company of the peer group.

Moderating variables

Identification with or closeness to the norm referent group: Five studies (#2, #6, #10, #15, #16) investigated the potential moderating effect of identification with, or closeness to, the norm referent group, that is, the peer group of which the behavior is described in the social norm. Three studies found that descriptive social norms were only related to young people's intentions to eat healthily when the participants strongly identified with the norm referent group (#6, #10) or when the norm referent group was a (close) group of friends rather than a (more distant) group of students from the same university (#2). Moreover, two studies (#15, #16) found that descriptive norms only affected (intended) fruit intake when participants strongly identified with the norm referent group (#15) or when the descriptive norm was manipulated to ostensibly stem from a closer (fellow students) rather than a more distant (people in general) norm referent group (#16). However, the one study that explicitly investigated the moderating effect of closeness of the normative referent group on the effect of injunctive norms found that injunctive norms were related to intended healthy eating regardless of whether this norm came from a group of close others (i.e., friends) or a less familiar peers (i.e., students from the same university). This same study, as reported above, did however find a difference between these two referent groups with respect to the relation of descriptive norms to healthy eating intentions. Together, these studies provide indications that identification with, or closeness to, the norm referent group thus may moderate the effect of descriptive norms on (intended) eating behavior, but not of injunctive norms.

Habitualness of the eating behavior: One study (#17) showed that descriptive social norms may play a larger role in eating behavior when consumption of the relevant food is not habitual, although it should also be noted that another study (#19) found no such moderating effect of usual intake, which could be considered somewhat similar to habitualness (although habitualness covers more aspects than only usual behavior; Verplanken & Orbell, 2003). The current review thus provides indications that descriptive norms potentially affect intake of food only if the intake of that food is not a habitual behavior, although the evidence so far is inconclusive.

Forcefulness of the norm: Several studies (#2, #11, #13, #14) in this review showed that injunctive peer norms (or a combination of injunctive and descriptive norms) sometimes were positively associated with eating behavior; peer expectations of healthy eating were associated with (intended) healthier eating. In other instances, however, injunctive norm manipulations did not increase consumption of healthy foods nor decrease consumption of unhealthy foods (#20, #21). One study even provided indications that an injunctive norm may lead to a behavioral boomerang effect: an injunctive norm communicating peer expectancies to consume sufficient fruit led to lower fruit intake intentions in adolescents than a descriptive norm or no norm (#20). An important difference between these two sets of findings seems to lie in the forcefulness of the injunctive norm. In the former set of studies, the operant in the injunctive norm message was typically a verb like 'suggest', 'encourage' or 'endorse' (i.e. 'my peers *suggest* that I eat more healthily'), while in the latter set of studies, the operant in the injunctive norm manipulations was a more compelling verb (i.e. 'you *should* eat more healthily'). This difference, which is essentially the difference between a firm prescription, or 'ought message', and a milder suggestion, or 'might message', seems to moderate the extent to which injunctive norms can be used to influence eating behavior in the desired, healthy direction.

Self-control: Results from one of the studies (#18) showed that a health-promoting peer descriptive norm influenced students, who had to make a choice for either a healthy or an unhealthy snack, to choose the healthy snack more often only when their self-control was low. When students had a high self-control capacity, the descriptive norm did not increase the percentage of healthy choices as compared to participants in a control condition who received no norm. This finding points to self-control as a potential moderator of the effect of descriptive norms.

Discussion

While a substantial body of literature exists that investigates the influence of the social environment on young people's eating behavior, it is broad and heterogeneous, comprising research from different fields of study, with widely differing approaches to conceptualizing, operationalizing and measuring social influence. This heterogeneity has greatly impeded our ability to determine if, and if so, under what conditions, peer social norms are related to young people's

eating behavior and, by extension, if peer social norms might constitute a useful tool for public health efforts to promote healthy eating behavior among young people. In this systematic review, we therefore set out to synthesize the literature available on peer social norms and young people's eating behavior and in doing so, provide a clear picture of the potential of social norms as a tool for promoting healthy behavior among young people.

With 25 studies out of a set of 26 showing evidence for a relation between peer social norms and young people's eating behavior, this review seems to indicate that descriptive norms are strongly related to, and also have a strong impact on, young people's eating behavior. In addition, the studies included in this review that manipulated social norms showed that such manipulations can change eating behavior. This suggests that there is potential for social norm manipulations to change perceptions of existing social norms, and that such changes also result in changes in eating behavior. Moreover, the studies were in general of rather good quality, indicating that the results can be interpreted with some confidence. The conclusion that descriptive social norms seem to hold potential as a tool for improving young people's eating behavior thus seems warranted. There were, however, also clear indications in our set of studies that eating behavior is not always related to, or influenced by, peer social norms: results pointed to several important moderators or boundary conditions that should be taken into account when considering the influence of peer social norms on young people's eating behavior. There were even some indications for boomerang effects, meaning that social norm manipulations sometimes had the opposite effect than was intended. In order to truly advance our understanding of the potential of the peer social norm construct for improving young people's eating behavior, it is therefore of crucial importance to synthesize the available evidence regarding possible boomerang effects of peer social norms, as well as factors that may moderate or restrict the potential effect of peer norms on eating behavior. We discuss these in turn below.

Boomerang effects

Two studies showed evidence of potential boomerang effects, with a social norm manipulation having the opposite effect than was intended. Worse than having no effect, in these cases the normative information actually seemed to backfire and cause people to show less healthy dietary intake (intentions) than if

they received no normative information in the first place. One case was with a so-called minority norm, which indicated that only few group members ate sufficient fruit, and which led individuals to decrease their own fruit consumption, too. With a proper understanding of how descriptive social norms work, this is actually easily explained: a descriptive norm works as a decisional shortcut for behavior. If only few people perform a certain behavior, the automatic assumption may thus be that this behavior is probably not the most accurate or most efficient way to behave, and people thus do not engage in it. This is an important finding to keep in mind: public health campaigners have a tendency to actually communicate to the public that they perform certain healthy behaviors far too infrequently (Stok, De Ridder, De Vet, & De Wit, 2012b), and this finding indicates that that may have rather undesired effects.

The other study showing signs of a boomerang effect was a study comparing the influence of an injunctive and a descriptive norm manipulation on adolescents' fruit consumption. The injunctive norm actually led to a decreased intention to consume sufficient fruit as compared to a no-norm control condition, which may be an indication that adolescents are not always open to what they may conceive of as pressures to behave a certain way, and may actually respond by doing the exact opposite. This is known as reactance (Brehm, 1966). The study found no carry-over effects to actual behavior, which indicates that the reactance response may be rather short-lived. Nevertheless, it seems prudent to keep in mind that injunctive norms may not always lead to the desired effect in adolescents. One moderating factor, which we will discuss below, may be the extent to which the injunctive norm forces, versus suggests, young people to perform a certain behavior.

Factors that moderate or restrict the potential of peer norms

Consistent with a focus theory of normative conduct account (Cialdini *et al.*, 1990), results from our review indicate that the efficacy of peer social norms may be restricted to those types of food that are consumed around peers or which are associated with peers (e.g., snacks, fruits and soft drinks). The focus theory of normative conduct posits that, because various (and potentially conflicting) norms typically exist at the same time, one specific norm will influence behavior only in situations that activate that specific norm. The idea would then be that food types that are associated with peers are more likely to activate peer norms, while food

types that are typically consumed in other social context (most notably at home, in the company of parents and family) may sooner activate family or parental social norms. This restriction is likely to exist mostly in adolescents: students often do not live with their parents anymore, and peer norms may therefore be activated by food types consumed at home, too.

Identification with, or closeness to, the norm referent group was shown to be an important moderator of the effect of descriptive norms on eating behavior. For injunctive norms, such a difference was not observed, although it should be noted that only study included in this review investigated how injunctive norms from a close versus a distant referent group were related to intended healthy eating. Future research is thus necessary to further investigate how identification moderates the effect of injunctive norms on eating behavior. The same is true for the moderating effects of habitualness of the behavior. The current review provided some first indications that a descriptive norm promoting the consumption of a healthy food may influence consumption only for young people who do not have a habit of eating that specific food. Additional research is necessary to replicate this finding and to determine if and how habitualness moderates the effect of injunctive norms on eating behavior.

This review also provided first indications that a descriptive norm may affect eating behavior only when people have low self-control. This is in line with how descriptive norms are thought to exert their influence, namely via an automatic and effortless pathway (Jacobson *et al.*, 2011). Descriptive norms have, in fact, been suggested to benefit from not being consciously considered: they influenced behavior to a larger extent when people were cognitively busy with other tasks (Jacobson *et al*., 2011; Kredentser, Fabrigar, Smith, & Fulton, 2012). No studies in our set investigated the relation between self-control and injunctive norms. However, other studies have provided clear indications that injunctive norms influence behavior more when cognitive resources are free to consciously consider the norm. The idea is that, because injunctive norms may not correspond to people's personal goals, it takes effort to comply with them anyway: the norm has to be consciously considered and potential discrepancies with personal goals have to be effortfully resolved (Jacobson *et al.*, 2011; Kredentser *et al.*, 2012). Future research should replicate the findings with regard to self-control and its moderating effect on the influence of descriptive social norms on eating behavior,

and investigate how self-control moderates the influence of injunctive norms on young people's eating behavior.

Another important moderator that was identified in this review seems to be the forcefulness of, especially injunctive, social norms. Injunctive norms that contained an 'ought' message were shown not to affect eating behavior (and in one case, to negatively affect intended fruit intake), while injunctive norms that contained a more subtle 'might' message were positively related to healthier (intended) eating behavior. This may be due to the fact that messages that are explicitly restrictive or enforcing could be construed by young people as attempts to restrict their freedom, which may induce reactance (Brehm, 1966) and resistance to the norm message. Forthcoming work (De Vet, Stok, & De Ridder, 2013; Stok, De Vet, De Ridder, & De Wit, 2013) provides corroborating evidence for the moderating effect of forcefulness by showing that rephrasing a prescription ('you are not allowed to eat') into a suggestion ('it is better not to eat') results in less (compensatory) unhealthy eating once the restriction is lifted. Importantly, forcefulness of the norm is expected to only affect the influence of injunctive norm messages, as descriptive norm messages merely describe other people's behavior and therefore should not induce a feeling of being steered in a certain direction.

Implications for interventions

An important question may be if and why a 'social norms approach' to curbing young people's unhealthy dietary intake might be more effective than other types of interventions. We believe that the potential of social norms interventions stems from the importance of the peer group. Young people are trying to find their social identity and are therefore highly likely to be influenced by social normative information that stems from the peer group: by behaving like other group members and living up to the peer group's expectations, they hope to create a positive social image and a solid social identity. It is important to note that this seems to hold true across adolescents and young adults alike; there were no indications in our review that effects differed between these two age groups.

Interestingly, the potential of social norms to change young people's eating behavior is also its danger: much depends on what social norm young people perceive. If they perceive a healthy norm, their behavior will change for the good. If they perceive an unhealthy norm, however, their behavior will change for the bad: the studies in our set showed that healthy and unhealthy peer social norms

alike influence young people's dietary intake. In this light, it is important to realize that in general, young people perceive rather unhealthy existing eating-related peer norms (e.g., Lally *et al.*, 2011; Perkins *et al.*, 2010), indicating that there is much to be gained by interventions that manage to change perceptions of peer social norms for the healthier.

While not yet applied to eating behavior, the so-called social norm approach (Burchell, Rettie, & Patel, 2013; McAlaney & McMahon, 2007) has been used quite extensively to address other health behaviors in young people, most notably alcohol consumption among college students (Perkins & Berkowitz, 1986; Stewart *et al.*, 2002). The social norms approach entails addressing the social norms governing a certain problematic health behavior, for example by communicating to college students that their peers in fact drink less, and are less accepting of drinking, than they would have thought. While this social norms approach has met with considerable success (see Burchell *et al.*, 2013, for an overview), it is not without controversy: several studies have shown that addressing social norms does nothing to improve health behavior and even that social norm messages may actually lead to adverse effects by actually increasing unhealthy behaviors (see Cameron & Campo, 2006, for an overview). We believe that this controversy may partially stem from a lack of knowledge or understanding of the potential boomerang effects, and the moderating and restricting variables that play a role in the relation between social norms and health behavior. While social norms hold great potential as a tool for the improvement of young people's eating behavior – and by extension, other health behaviors – great care must be taken to deliver social norms the right way and under the right circumstances. Norm interventions that try to enforce a certain norm too strongly or that are too obviously aimed at improving their health behavior may be construed by young people as attempts to restrict their freedom, which may, as described above, induce reactance (Brehm, 1966) and eventually even lead to boomerang effects.

One way to use social norms in a more subtle manner, avoiding such reactance effects, may be to employ social norms in the form of *nudges* (Thaler & Sunstein, 2008). Nudges are subtle hints in the environment that make the healthy choice the typical or automatic choice. Environmental cue manipulations seem to be the most suitable type of norm manipulation to be employed as social nudges, as they are already quite subtle manipulations (more so than communicated norms or injunctive norms). Such social nudges may be most applicable to well-

defined and constrained situations (e.g., at a party): the nudge would show what behavior is typical in that very situation, but its effects may not carry over to other situations. This idea is corroborated by findings the only study included in this review that investigated the effects of an environmental cue not only on consumption within the specific laboratory situation, but also considered the amount of cookies selected for later consumption (i.e., outside of the specific setting): no effect was found on this latter outcome.

Limitations

One important limitation that should be noted is that we only included published studies in this review. It may be the case that more studies have been conducted that did not find a relation between social norms and eating behavior, which have not been published (perhaps due to the publication bias; Rothstein, Sutton, & Borenstein, 2005). Nevertheless, we feel that a set of 26 studies in which 25 indicate a relation between social norms and young people's eating behavior make a rather convincing case that social norms must play at least some role in young people's eating behavior.

Another limitation of our review was that there were not always sufficient studies that investigated a certain issue (e.g., the role of injunctive norms; the role of several moderators) to draw conclusions with certainty. We have attempted to clearly indicate how many studies each conclusion was based on, and point out again here that more research is certainly necessary to draw up a clear and complete picture of how peer social norms are related to, and influence, young people's eating behavior.

Conclusions

In this systematic review, we aimed to synthesize the available literature on peer group norms and their effects on young people's eating behavior, and based on that synthesis, to draw conclusions about the potential of the social norm concept for addressing and improving young people's eating behavior and to identify potential moderators and boundary conditions for such social norm interventions. Based on the review, it seems that we can conclude that the social norm construct provides definite potential as a tool for the improvement of young people's eating behavior. However, we have also identified an important boundary condition (only the intake of certain types of food can be affected by

social norms) and several moderators (self-control, habitualness of the behavior, identification with the norm referent group, and forcefulness of the norm) of the efficacy of social norm interventions. Moreover, we have shown that, under specific circumstances, norms may backfire and lead to boomerang effects. More research is needed to provide a clearer picture about some of these boundary conditions and moderators and to arrive at a more complete understanding of the role that peer social norms can play in young people's eating behavior. Future research should also focus on the role of injunctive norms and on how peer social norms actually work: what are the mechanisms through which they influence young people's eating behavior. Notwithstanding this need for additional research, however, the current review has shown that peer social norms hold great potential as a tool in the arsenal of those who aim to improve young people's eating behavior.

Appendix A1: quality scoring sheet for the observational studies

#	1. sample	2. sample bias	3. norm measure(s)	4. outcome variable(s)	total
1	1	0.5 (medium response)	0.5 (no description of reliability/validity)	0.5 (self-reported average amount)	2.5
2	0.5 (convenience sample)	1	1	0.5 (intention measured with 4 items)	3
3	1	1	0.5 (no description of reliability/validity)	0.5 (self-reported average amount)	3
4	1	0 (low response)	1	1	3
5	1		1	0.5 (variables not clearly described)	3.5
6	1	0.5 (medium response)	1	0 (one-item intention; item not reflective of behavior measured with norm variable)	2.5
7	1	0.5 (response bias possible)	0.5 (no description of reliability/validity)	0.5 (self-reported frequency)	2.5
8	1	1	0.5 (no description of reliability/validity)	0.5 (self-reported average amount)	3
9	1	1	1	0.5 (self-reported frequency)	3.5
10	0.5 (convenience sample)	1	1	0.5 (intention and self-reported healthy eating with multiple items; self-reported frequency)	3
11	1	1	1	0.5 (intention and self-reported healthy eating with multiple items)	3.5
12	1	0.5 (response bias possible)	0.5 (modest validity and reliability)	1	3
13	1	0.5 (medium response)	0.5 (modest validity and reliability)	1	3
14	1	0.5 (medium response)	0.5 (modest validity and reliability)	1	3

Appendix A2: quality scoring sheet for the experimental studies

#	1. sample	2. control group	3.selection bias	4. performance bias	5 norm manipulation	6 outcome variable(s)	total
15	1	0	1	1	1	0 (intention)	4
16	0 (restricted sample, no attrition information)	1	1	1	1	0.5 (self-reported consumption)	4.5
17	1	1	0 (no information provided)	0 (no information provided)	1	1	4
18	1	1	1	1	1	0 (hypothetical food choices)	5
19	1	1	1	1	1	1	6
20	1	1	1	1	1	0.5 (intention and self-reported consumption)	5.5
21	1	1	0 (no randomization)	0.5 (field setting)	0.5 (injunctive norm not specifically peer-group related)	1	4
22	0 (small sample)	1	1	1	1	1	5
23	1	1	0.5 (success of randomization unclear)	1	1	1	5.5
24	1	0	1	1	0.5 (low norm is ambiguous)	1	4.5
25	1	1	0.5 (conditions run per time slot, success of randomization unclear)	0.5 (confounding with time or day possible)	1	1	5
26	0.5 (somewhat small sample)	1	1	1	1	1	5.5

Chapter 3

The proof is in the eating: Peer social norms are associated with adolescents' intended and actual eating behavior

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F. Marijn Stok, Emely De Vet, John B. F. De Wit, Aleksandra Luszczynska, Magdalena Safron, & Denise T. D. De Ridder. The proof is in the eating: Peer social norms are associated with adolescents' intended and actual eating behavior.

Abstract

The objective was to investigate associations of eating-related peer social norms with adolescents' healthy eating intentions and intake of healthy and unhealthy foods. Data were collected in a large international survey in which over 2500 European (pre-) adolescents aged between 10 and 17 years participated. Two types of peer subjective norms were assessed: peer encouragement of healthy eating and peer discouragement of unhealthy eating. Outcome variables were intention to eat healthily, intake of healthy foods (fruits and vegetables) and intake of unhealthy foods (snacks and soft drinks). Peer subjective norms were associated with all three outcome variables. While both encouragement of healthy eating and discouragement of unhealthy eating were related to intentions, only peers' encouragement of healthy eating predicted adolescents' intake. Peer subjective norms appeared to play a role in adolescent eating behavior and as such are an important target for health promotion. Addressing norms that encourage healthy eating may be more promising in changing health behavior than norms that discourage unhealthy eating.

Youngsters' increasingly unhealthy eating behavior (Bauer, Larson, Nelson, Story, & Neumark-Sztainer, 2009) and the growing prevalence of overweight and obese adolescents (Wang & Lobstein, 2006) are strong indicators that maintaining a healthy dietary pattern is difficult for young people. In the current environment, unhealthy and calorie-dense foods are available in abundance and are typically easily accessible, meaning that adolescents are constantly confronted with temptations (De Vet *et al.*, 2013; Feng, Glass, Curreiro, Stewart, & Schwartz, 2010). There is, however, more to the eating environment than only the physical presence of food. The social norms that exist around food and food consumption constitute another important aspect of the eating environment (De Ridder, De Vet, Stok, Adriaanse, & De Wit, 2013). In this study, we investigate whether peer social norms predict adolescents' intentions to eat healthily, as well as their actual healthy and unhealthy eating behavior.

Eating behavior in adolescence

In the past few decades, intake of snacks and fast food has increased among adolescents (Bauer *et al.*, 2009; Kerr *et al.*, 2009; Zizza, Siega-Riz, & Popkin, 2001) whereas fruit and vegetable consumption has decreased (Larson, Neumark-Sztainer, Hannan, & Story, 2007). Concurrently, and likely related to these changes in dietary pattern (Jebb, Rennie, & Cole, 2004; Niemeier, Raynor, Lloyd-Richardson, Rogers, & Wing, 2006), the number of adolescents who are overweight or obese has increased and is projected to continue to increase in the near future (Wang & Lobstein, 2006). Being overweight as an adolescent has serious negative implications for mental and physical health (Dietz, 1998; Reilly *et al.*, 2003), both short-term (e.g., low self-esteem and eating disorders) and long-term (e.g., cardio-vascular diseases and type 2 diabetes). It is therefore highly important to address eating behavior among this age group. This becomes even more pressing knowing that eating patterns that are developed in this phase of life often become habits that track into adulthood and then become difficult to change (Lien, Lytle, & Klepp, 2001; Lytle, Seifert, Greenstein, & McGovern, 2000; Wang & Lobstein, 2006).

Adolescence is a transitional phase in life, which also impacts eating behavior. As more time is spent outside the home and in the company of peers, autonomy grows. Previous research has shown that adolescents may use eating behavior as a way to express newly acquired autonomy to peers (Stok, De Ridder,

Adriaanse, & De Wit, 2010). In addition, the peer group becomes more important (Bradford Brown, Bakken, Ameringer, & Mahon, 2008; Brown, 2004). Adolescence is marked by a heightened need for peer approval and belonging to peer groups (Brown, Clasen, & Eicher, 1986; Coleman, 2011) and adolescents will typically try hard to comply with group norms. Importantly, previous research has shown that there are clear group norms surrounding eating behavior among adolescents (Croll, Neumark-Sztainer, & Story, 2001; Neumark-Sztainer, Story, Perry, & Casey, 1999; Stead, McDermott, MacKintosh, & Adamson, 2011; Stevenson, Doherty, Barnett, Muldoon, & Trew, 2007). Taken together, this suggests that the peer group likely forms a powerful source of influence on adolescent eating behavior (Lally, Bartle, & Wardle, 2011; Perkins, Perkins, & Craig, 2010; Story, Neumark-Sztainer, & French).

Social norms

Social norms are defined as the rules that a group has regarding acceptable behaviors, values and beliefs of its members (Aronson, Wilson, & Akert, 2005). Two sources of social influence are distinguished (Cialdini, Kallgren, & Reno, 1991; Deutsch & Gerard, 1955; Knight Lapinski & Rimal, 2005): the actual behavior that other group members display (called *descriptive norms*), and the expectations of other group members regarding how one should behave (called *injunctive* or *subjective norms*). In the current paper, we focus on this second source of social influence. Subjective norms are thought to constitute an importance source of influence on behavior because people are motivated to maintain positive relations with their social group and thus to behave consistently with perceived group expectations (Cialdini & Goldstein, 2004; Cialdini, Kallgren, & Reno, 1991; Knight Lapinski & Rimal, 2005; Tajfel & Turner, 1986). With the heightened importance of the peer group and of social conformity in adolescence, this motivation would be an especially important influence on the behavior of young people.

However, to date evidence for the role of subjective norms in adolescent eating behavior is mixed at best. Subjective norms are typically found to be a weak predictor of eating-related behavioral intentions and to be unrelated to actual eating behavior (see, e.g., Backman, Haddad, Lee, Johnston, & Hodgkin, 2002; Berg, Jonsson, & Conner, 2000; De Bruin, Kremers, Schaalma, Van Mechelen, & Brug, 2005; Lytle *et al.*, 2003; Martens, Van Assema, & Brug, 2005; Nordgrehaug Åstrøm & Rise, 2001; Wood Baker, Little, & Brownell, 2003). We propose two

reasons for this lack of predictive association. The first stems from the manner in which subjective norms are typically assessed, which is through asking how the adolescent believes that 'important others' would want him or her to behave. This operationalization aggregates the perceived norms of parents, peers, siblings, teachers, health professionals and perhaps other referents, which may confound the measure (Wood Baker *et al.*, 2003) and generate less clear results than if specific referent groups would be identified and investigated separately. As described above, the peer group is likely to constitute an important source of normative influence in adolescence, which is corroborated by earlier findings. In the only study we are aware of that studied the influence of subjective norms *of distinct referents* on adolescent eating behavior, peer norms were more strongly related to attitudes toward healthy eating than parental norms (Wood Baker *et al.*, 2003).

Another weakness of many earlier studies assessing subjective norms and healthy eating is that only subjective norms for increasing healthy eating were assessed (e.g., 'important others want me to eat healthily') while norms regarding decreasing unhealthy eating (e.g., 'important others want me to eat less unhealthily') have mostly been disregarded (e.g., Backman, Haddad, Lee, Johnston, & Hodgkin, 2002; Berg, Jonsson, & Conner, 2000; Lytle *et al.*, 2003; Nordgrehaug Åstrøm & Rise, 2001). Few studies assessed subjective norms for restricting unhealthy eating (e.g., De Bruin, Kremers, Schaalma, Van Mechelen, & Brug, 2005; Martens, Van Assema, & Brug, 2005), which generally find that such subjective norms predict intention to restrict intake, but not actual restriction (but note that the subjective norm construct in these studies again referred to 'important others', thus potentially obscuring the importance of peer subjective norms). Importantly, to our knowledge no study to date has investigated both types of subjective norms – approval of healthy eating and disapproval of unhealthy eating – simultaneously. We propose that it is important to consider the relationship of both these types of norms with eating behavior, as normative support for healthy eating is not necessarily equal to normative discouragement of unhealthy eating. More specifically, adolescents may perceive that their peers encourage the intake of healthy foods while not disapproving of unhealthy eating. Vice versa, adolescents may experience that their peers discourage unhealthy eating, but do not encourage the consumption of healthy foods. Moreover, both types of norms need not influence eating behavior in the same way and to the

same extent. The present research therefore considers both peer encouragement of healthy eating and peer discouragement of unhealthy eating.

Current study

In the current study, which was part of the TEMPEST study, a large-scale European research project, we investigated the association between subjective peer norms and adolescent eating behavior, and aimed to extend the current evidence-base in two ways. Firstly, previous studies investigating subjective norms and eating behavior have typically focused on intentions to eat healthily as the main outcome. When actual eating behavior was investigated, focus was typically on either healthy or unhealthy eating. In the current study we investigated three outcomes: healthy eating intentions, healthy food intake and unhealthy food intake. Based on earlier findings (Armitage & Conner, 2001), we hypothesized that there would be stronger associations between norms and behavioral intentions than between norms and actual intake. Moreover, because previous research has found that it is, in general, more difficult to decrease unhealthy behaviors than to increase healthy behaviors (Adriaanse, Vinkers, De Ridder, Hox, & De Wit, 2011; Holland, Aarts, & Langendam, 2006), we also predicted that subjective peer norms would be more strongly associated with healthy eating than with unhealthy eating.

Secondly, we jointly assessed the effects of two types of subjective peer norms: normative encouragement of healthy eating as well as normative discouragement of unhealthy eating. This approach allowed us to determine whether there were differences in the extent to which peers approve of healthy eating versus the extent to which they disapprove of unhealthy eating. As argued before, normative support for healthy eating is not necessarily equal to normative discouragement of unhealthy eating. We will therefore investigate if the two norms are differentially associated with intended and actual adolescent eating behavior.

Method

Participants and procedure

Participants were 2764 European (pre-)adolescents aged 10 – 17 (*M* age = 13.2, *SD* = 1.9) who were recruited from 24 different schools in four countries:

Poland, Portugal, UK and The Netherlands. Care was taken to select schools located in neighborhoods of both low (31.4%) and high (68.6%) socio-economic status and in both rural (50.9%) and urban (49.1%) areas. Of the participants, 50.9% were boys and 49.1% were girls. Most participants (94.2%) indicated being native to the country they lived in, while a minority (5.8%) indicated being an immigrant. Most participants (71.5%) had a normal BMI, while 11.9% was underweight, 13.4% was overweight and 3.2% was obese.

This study was conducted according to the guidelines laid down in the Declaration of Helsinki. All procedures involving human participants complied with the ethical guidelines of each specific country and (exemption from the requirement to seek) ethical approval was granted by an ethical review board in each country. Active or passive written consent was sought from parents before their child participated and children could opt out of participation. Participants filled out the questionnaire during normal class hours and in their regular class setting. Their regular teacher and a research assistant were present in the classroom at all times during data collection.

Measures

The questionnaire was originally prepared in English and then translated into each country's native language. To check accuracy and to revise translations where required, questionnaires were then back-translated into English. The following measures were used:

Socio-demographic characteristics: Participants were asked to indicate their age, gender, height and weight. BMI was calculated from height and weight, and scores were dichotomized (0 = not overweight, 1 = overweight) based on cut-offs determined by the International Obesity Task Force (Cole, Bellizzi, Flegal, & Dietz, 2000). Immigrant status was assessed by asking participants what language they typically spoke at home with their parents (Berry, 2001). Family socio-economic status was assessed using the Family Affluence Scale (FAS; Currie *et al.*, 2008), which uses child-appropriate items (e.g., 'do you have your own bedroom for you alone'; 'how many computers does your family own). Using the procedure outlined by the authors of the scale, three categories (low, medium and high affluence) were created.

Peer social norms: Four items were used to assess peer social norms, based on the 'subjective norm' component of the Theory of Planned Behavior (Azjen, 1991).

The items were measured on a 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). Two items, 'my friends encourage me to eat fruits and vegetables' and 'my friends approve of my eating fruits and vegetables', were averaged to create the *peer encouragement of healthy eating* construct (r = .410, p < .001). The other two items, 'my friends discourage me from eating snacks and drinking soft drinks' and 'my friends disapprove of my eating snacks and drinking soft drinks', were averaged to create the *peer discouragement of unhealthy eating* construct (r = .518, p < .001).

Healthy eating intentions: Participants' intention to eat healthily was assessed by four items measured on a 5-point scale ranging from 1 (completely disagree) to 5 (completely agree). Example items are 'I intend to eat healthier' and 'I would like to eat healthier'. One average score was created (Cronbach's alpha = .76).

Healthy food intake: Two items measured intake of healthy foods. Participants indicated average daily consumption of portions of fruit and serving spoons of vegetables (ranging from 0 = less than one to 5 = more than four). A sum score was computed to represent an index of healthy food intake (cf. De Bruin *et al.* , 2005; Martens *et al.*, 2005).

Unhealthy food intake: Two items measured intake of unhealthy foods. Participants indicated average daily consumption of unhealthy snacks and soft drinks (ranging from 0 = less than one to 5 = more than four). A sum scores was computed to represent an index of healthy food intake (cf. De Bruin *et al.* , 2005; Martens *et al.*, 2005).

Data analyses

Hierarchical linear regression analyses were run for each of the three main outcome variables: healthy eating intentions, healthy eating behavior and unhealthy eating behavior. In each linear regression analysis, socio-demographic characteristics were entered in step 1. In step 2, peer encouragement of healthy eating and peer discouragement of unhealthy eating were entered to determine if adding these constructs significantly increased explained variance. Both social norm constructs were added for all three outcome variables to determine the relative importance of peer encouragement of healthy eating versus peer discouragement of unhealthy eating.

To correct for a potential clustering effect at country level, both regression analyses were re-run using complex sample analysis with the nine countries as

strata. The square root of the design effects deviated maximally .002 from 1.00, indicating that the design effect was extremely small (i.e. standard errors changed by no more than 0.2% when the country level was taken into account). Country effects were thus negligible and because results did not differ between the complex samples analyses and regular analyses, results from the regular linear regression analyses are reported here.

Results

Descriptive statistics

Participants consumed an average of 3.6 portions of fruits and vegetables per day (SD = 1.7) and an average of 4.4 (SD = 2.3) unhealthy snacks and soft drinks per day. They reported a slight intention to eat healthily (M = 3.44, SD = 0.69). The correlation between the two types of peer norms was large (r = .593, p < .001). Participants perceived neutral peer norms with regard to encouragement of healthy eating (M = 2.89, SD = 1.02), and slightly negative peer norms regarding the discouragement of unhealthy eating (i.e., peers were perceived *not* to discourage unhealthy eating; M = 2.56, SD = 1.02). A paired t-test indicated that healthy-encouraging scores were significantly higher than unhealthy-discouraging scores, t (2656) = 18.27, p < .001.

Explaining healthy eating intentions

Step 1 of the linear regression analysis indicated that several socio-demographic variables were (weakly) associated with healthy eating intentions (see Table 1): younger adolescents, girls and overweight adolescents reported having stronger healthy eating intentions than older adolescents, boys and normal-weight adolescents. Family affluence and immigrant status were not associated with healthy eating intentions. Step 2 (see Table 1) showed that peer encouragement of healthy eating (β = .154, p < .001) and peer discouragement of unhealthy eating (β = .147, p < .001) were both positively related to healthy eating intentions.

Explaining healthy eating

Step 1 of the linear regression analysis indicated that most socio-demographic variables were unrelated to healthy eating behavior (see Table 1).

Only age was found to be significantly associated, with younger adolescents reporting eating more fruits and vegetables than older adolescents. Gender, weight status, family affluence and immigrant status were not associated with healthy eating behavior. Step 2 (see Table 1) showed that only perceived peer encouragement of healthy eating was associated with higher consumption of fruits and vegetables (β = .097, p < .001); peer discouragement of unhealthy eating was unrelated to fruit and vegetable consumption (β = .042, p = .114).

Table 1: Regression analyses of healthy eating intention, healthy eating and unhealthy eating on socio-demographic variables (Step 1) and peer social norms (Step 2)

	Healthy eating intention[b]		**Healthy intake**[c]		**Unhealthy intake**[d]	
Predictor variables	*B* (*SE*)	β	*B* (*SE*)	β	*B* (*SE*)	β
Step 1[a]						
age	-.056 (.008)	-.152***	-.153 (.024)	-.137***	.059 (.026)	.054*
gender (0 = boy, 1 = girl)	.171 (.031)	.110***	-.169 (.099)	-.039	-.498 (.105)	-.110***
overweight status (0 = not overweight, 1 = overweight)	.112 (.042)	.061**	-.056 (.133)	-.007	-.400 (.140)	-.064**
family affluence dummy 1 (0 = low or medium, 1 = high affluence)	-.094 (.049)	-.065	.128 (.154)	.028	-.118 (.164)	-.027
family affluence dummy 2 (0 = low or high, 1 = medium affluence)	-.030 (.051)	-.018	-.006 (.161)	-.002	-.210 (.171)	-.042
immigrant status (0 = native, 1 = immigrant)	.006 (.069)	.004	.162 (.219)	.013	.645 (.231)	.058**
Step 2						
peer encouragement of healthy eating	.114 (.019)	.154***	.213 (.059)	.097***	-.147 (.062)	-.063*
peer discouragement of unhealthy eating	.109 (.019)	.147***	.092 (.058)	.042	-.052 (.062)	-.022

Note: *** indicates p < .001; ** indicates p < .01, * indicates p < .05.

[a] *B*'s and beta's from the final (Step 2) model are reported.

[b] $R^2_{\text{Step 1}}$ = .059, F (6,2096) = 21.96, p < .001. $R^2_{\text{Step 2}}$ = .128, F (8,2094) = 38.53, p < .001. R^2_{change} = .069, F (8,2094) = 83.08, p < .001.

[c] $R^2_{\text{Step 1}}$ = .024, F (6,2070) = 8.93, p < .001. $R^2_{\text{Step 2}}$ = .040, F (8,2068) = 10.90, p < .001. R^2_{change} = .015, F (8,2068) = 16.39, p < .001.

[d] $R^2_{\text{Step 1}}$ = .024, F (6,2083) = 8.51, p < .001. $R^2_{\text{Step 2}}$ = .030, F (8,2081) = 8.00, p < .001. R^2_{change} = .006, F (8,2081) = 6.33, p = .002.

Explaining unhealthy eating

Step 1 of the linear regression analysis indicated that most socio-demographic variables were (weakly) related to unhealthy eating behavior (see Table 1): older adolescents, boys, normal-weight adolescents and immigrant adolescents reported consuming more unhealthy snacks and soft drinks than younger adolescents, girls, overweight adolescents and native adolescents. Family affluence was not associated with unhealthy eating behavior. Step 2 (see Table 1) showed that only peer encouragement of healthy eating was associated with lower consumption of snacks and soft drinks (β = -.063, p = .019); peer discouragement of unhealthy eating was unrelated to consumption of snacks and soft drinks (β = -.022, p = .401).

Discussion

The present study investigated whether subjective peer norms were associated with adolescents' healthy eating intentions and self-reported healthy and unhealthy food intake. While quite some research has previously investigated subjective normative influences on adolescent food intake (Backman *et al.*, 2002; Berg *et al.*, 2000; De Bruin *et al.*, 2005; Lytle *et al.*, 2003; Martens *et al.*, 2005; Nordgrehaug Åstrøm & Rise, 2001; Wood Baker *et al.*, 2003), the unique influence of *peer* subjective norms has rarely been investigated. Our results indicate that peer norms are related to healthy eating intentions as well as to actual healthy and unhealthy food intake. In accordance with our hypotheses, peer norms explained most variance in healthy eating intentions, less in actual healthy intake and least in unhealthy intake. Moreover, while both peer encouragement of healthy eating and peer discouragement of unhealthy eating were related to behavioral intentions, only peer encouragement of healthy eating was associated with intake (of both healthy and unhealthy food). Peer discouragement of unhealthy eating was unrelated to intake. Two issues warrant further discussion: first, the generally low percentages of explained variance and the differences therein between the three outcome variables and, second, the differences in the association between, on the one hand, peer encouragement of healthy eating and the outcome variables and, on the other hand, peer discouragement of unhealthy eating and the outcome variables.

Explaining variance in eating intentions and behavior

A wide range of factors potentially shape adolescent eating behavior (McClain, Chappuis, Nguyen-Rodriguez, Yaroch, & Spruijt-Metz, 2009; Rasmussen *et al.*, 2006). Zooming in on a single variable and enrolling a large and heterogeneous sample, as we did in the current study, is therefore unlikely to render high percentages of explained variance. In line with the purpose of the study, our results do demonstrate that subjective norms are associated with intended *and* actual eating behavior, above and beyond socio-demographic variables. Moreover, the strength of these correlations indicates that associations are meaningful and represent important targets for health promotion. Notably, a one-point increase on the response scale in peer encouragement of healthy eating was shown to increase daily fruit and vegetable consumption with one-fifth (almost 1.5 portions per week), and to decrease daily snack and soft drink consumption with one-seventh (one portion per week). Peer subjective norms are only a small part of the picture of adolescent eating behavior, but it does seem to be a part that is related to substantial differences in intake of both healthy and unhealthy foods.

Peer encouragement of healthy eating and peer discouragement of unhealthy eating

Both peer encouragement of healthy eating and peer discouragement of unhealthy eating were associated with adolescents' healthy eating intentions. In other words, adolescents intend to eat more healthily when their peers encourage them to eat healthily, but also when their peers discourage them from eating unhealthily. In terms of intake of healthy food, however, only peer encouragement of healthy eating was significantly related; only when peers encouraged healthy eating did adolescents report higher intake of fruits and vegetables, not when peers discouraged unhealthy eating. More surprisingly, similar associations were found for unhealthy eating (i.e., intake of snacks and soft drinks). Lower intake of unhealthy foods was *not* associated with peer discouragement of eating such unhealthy foods, but only with peer encouragement of eating healthy foods.

These findings may indicate that promoting healthy adolescent eating behavior may be most successful using a positive approach that supports healthy choices. Peer encouragement to eat healthy foods was associated not only with adolescents doing exactly that, but also with adolescents consuming fewer

unhealthy foods. Other findings from the TEMPEST project corroborate this suggestion, showing that adolescent support for public health interventions that promoted the consumption of healthy foods is higher than their support for interventions that aim to decrease the consumption of unhealthy foods (Stok, De Wit, & Nureeva, 2013). Future research should determine if this is the case only for social norms that come from the peer group, or if norms from other referent groups (e.g., parents, health professionals) are also more influential when framed in a healthy-eating encouraging manner rather than an unhealthy-eating discouraging manner.

Limitations and suggestions for future research

Several limitations of the current study should be noted in addition to the limited explained variance addressed above. Notably, the data for this study were collected through self-report and previous research has shown that self-report measures of eating are not always reliable (Livingstone, Robson, & Wallace, 2004). Furthermore, due to the cross-sectional design of the study, no inferences can be drawn about causality, leaving open the possibility that adolescents' eating behavior shapes how they perceive peer norms. Future research should, therefore, replicate our results using longitudinal or experimental designs and employing more robust outcome measures, such as food diaries (Day, McKneown, Wong, Welch, & Bingham, 2001).

The phrasing of the subjective norm items could also be a limitation of this study. In the current study, norm items were phrased to correspond with the promotion of healthy eating behavior: peer *en*couragement of healthy eating, and peer *dis*couragement of unhealthy eating. In future studies, it would be interesting to determine if similar results are obtained when the norm items are phrased in the opposite direction (peer *dis*couragement of healthy eating and peer *en*couragement of unhealthy eating).

Implications and conclusions

This study contributed to our understanding of normative influences on eating by regarding the specific association of peer subjective norms with adolescent eating behavior, without confounding the measure with additional sources of normative influence. Results show that peers are an important referent group for adolescents: peer subjective norms are associated with healthy eating

intentions as well as with the intake of both healthy and unhealthy foods. This corroborates earlier findings that peers' subjective norms influence adolescent eating behavior more than parents' subjective norms (Wood Baker *et al.*, 2003).

Most important may be the novel finding that peer encouragement to eat healthily is associated with adolescents both adding healthy things to their diet as well as removing unhealthy things from it, while peer discouragement of unhealthy eating was unrelated to intake. While future research will need to determine if this is also the case for normative influence from, for example, parents and health professionals, it seems prudent for any source of normative influence to keep in mind that healthy eating behavior may be better promoted through improving support for healthy eating rather than through the discouragement of unhealthy eating.

Chapter 4

Don't tell me what I should do, but what others do: The influence of descriptive and injunctive peer norms on fruit consumption in adolescents

This chapter is based on:
F. Marijn Stok, Denise T. D. De Ridder, Emely De Vet, & John B. F. De Wit. (2013). Don't tell me what I should do, but what others do: The influence of descriptive and injunctive peer norms on fruit consumption in adolescents. *British Journal of Health Psychology*, E-publication ahead of print.

Abstract

While healthy eating patterns are of high importance in adolescence, most adolescents portray quite unhealthy eating behavior. One reason for this may be that social norms among peers tend to be unsupportive of healthy eating. The current study investigates whether communicating health-promoting descriptive and injunctive norms influences adolescents' intended and actual fruit consumption. The study employed an experimental prospective design. A norm message manipulation (descriptive vs. injunctive vs. no-norm control) was administered to high school students after which fruit intake intention ($N = 96$) was assessed. At follow-up, actual fruit intake over two days ($N = 80$) was recorded. Adolescents receiving the descriptive norm did not report higher fruit intake intentions than the control group, but did consume (borderline, $p = .057$) significantly more fruit in the following two days (2.3 portions per day) than the control condition (1.7 portion per day). Adolescents receiving the injunctive norm reported lower fruit intake intentions than the other two groups, but actual fruit consumption (1.5 portions per day) was similar to that of the control group. It turned out that health-promoting injunctive norms not only had no positive effects on fruit intake but actually caused a decrease in fruit intake intentions, indicating that injunctive norms may be vulnerable to reactance. A health-promoting descriptive norm was found to positively affect fruit intake in adolescents. No effect on fruit intake intention was found. Results show that simple single-sentence norm messages hold the potential to substantially influence health behavior.

Adolescents' eating practices often do not meet nutrition guidelines (Bauer, Larson, Nelson, Story, & Neumark-Sztainer, 2009; Larson, Neumark-Sztainer, Hannan, & Story, 2007). Moreover, recent research indicates that adolescents' eating behavior has deteriorated in recent years, indicating that the problem is steadily growing (Bauer *et al.*, 2009; Larson *et al.* 2007). Insufficient fruit intake is one important consumption-related problem signaled in adolescents (Larson *et al.*, 2007; Sebastian, Cleveland, & Goldman, 2008; Vereecken, De Henauw, & Maes, 2005), with adolescent consumption typically falling well short of the recommended two portions of fruit per day (United States Department of Agriculture, 2010). This is worrisome given that adequate fruit consumption is considered highly beneficial to various important health issues such as weight management and the prevention of cardiovascular diseases (Alinia, Hels, & Tetens, 2009; Holt *et al.*, 2009).

In apparent contradiction to their unhealthy eating practices, research indicates that adolescents know rather well that healthy eating is important (Brown, McIlveen, & Strugnell, 2000; Stevenson, Doherty, Barnett, Muldoon, & Trew, 2007). Furthermore, adolescents seem to have sufficient knowledge of what constitutes healthy eating. Most adolescents know, for example, that a healthy diet includes consumption of sufficient portions of fruit (Croll, Neumark-Sztainer, & Story, 2001). In an attempt to solve this apparent contradiction between knowledge and behavior, it has been suggested that there must be factors other than a general lack of knowledge at play, which hinder adolescents' healthy eating behavior (Croll *et al.*, 2001; Stok, De Vet, De Ridder, & De Wit, 2012a). One suggestion is that these hindering factors may include social norms that are unsupportive of healthy eating (Croll *et al.*, 2001).

Social norms

Social norms are defined as the rules that a group has for the acceptable behaviors, values and beliefs of its members (Aronson, Wilson, & Akert, 2005). Given that people operate in a social environment rather than as isolated individuals, the social norms that exist within this social environment exert important influence over the behavior of group members (Cialdini, Kallgren, & Reno, 1991; Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). Research has distinguished two main kinds of social norms, descriptive norms and injunctive norms (Aronson *et al.*, 2005; Cialdini *et al.*, 1991). Descriptive norms *de*scribe the behavior of others and as such indicate what is the normal or typical thing to do in a

certain situation, whereas injunctive norms *pres*cribe behavior and as such indicate what others consider appropriate behavior and how others want an individual to behave in a certain situation.

While research has convincingly demonstrated that both descriptive and injunctive norms can influence behavior (Deutsch & Gerard, 1955; Reno, Cialdini, & Kallgren, 1993), it is not the case that the two types of norms always influence behavior in the same direction and to the same extent (Cialdini *et al.*, 1991; Schultz *et al.* 2007). Regarding health behavior, a meta-analysis indicated that while both types of norms are associated with health behavioral intentions, associations were stronger for descriptive norms than for injunctive norms (Rivis & Sheeran, 2003). A more recent study about eating behavior in adolescents also demonstrated that peer descriptive norms were more strongly related to eating behavior than peer injunctive norms (Lally, Bartle, & Wardle, 2011). Research conducted to date, however, has been cross-sectional in nature, and differences between the effects of descriptive and injunctive norms on eating behavior have yet to be established experimentally.

Peer eating norms

Various recent studies have shown that in adolescence, peer norms may stimulate unhealthy rather than healthy eating. While good for their physical health, healthy eating may hold negative consequences for adolescents in terms of their social health. In various studies, it was found that healthy eating was perceived by adolescents to be uncool (Neumark-Sztainer, Story, Perry, & Casey, 1999), characterized as undesirable and susceptible to peer ridicule (Croll, Neumark-Sztainer, & Story, 2001), and qualified as untrendy, nerdy and geeky (Stead, McDermott, MacKintosh, & Adamson, 2011). Together, these studies seem to suggest that healthy eating may hold social risks for adolescents in terms of being laughed at or excluded from the group. As adolescence is a period in life in which the creation and maintenance of a positive social image assumes high importance (Erikson, 1968), most adolescents will try hard to be accepted by others, fit in with peer group expectations and avoid deviating from group norms (Shapiro, Baumeister, & Kessler, 1991; Wooten, 2006). Social norms are therefore likely to constitute an important source of influence on adolescents' behavior. Support for this idea stems from the finding that the link between norms and health behavioral intentions in a meta-analysis was stronger in young samples than in adults (Rivis & Sheeran, 2003).

Given their inclination to conform to group norms, it is especially unfortunate that adolescents seem to hold incorrect views of their peers' eating norms, perceiving peers' eating behavior to be even unhealthier than it already is (Lally *et al.*, 2011; Perkins, Perkins, & Craig, 2010). A recent study demonstrated that adolescents underestimated peers' fruit and vegetable intake (the *descriptive* fruit consumption norm) by more than three portions per week, constituting sixteen percent of weekly intake (Lally *et al.*, 2011). Perhaps even more telling is that the authors showed that adolescents perceived peers' attitudes towards fruit and vegetable intake (what they call the *injunctive* fruit consumption norm) to be less positive than the actual attitudes held by the peer group: adolescents reported that they thought their average peer would find eating sufficient fruit and vegetables significantly less 'good' and less 'sensible' than was indicated by the actually reported attitudes from the peer group (Lally *et al.*, 2011). In trying to match their peers' behavior and attitudes in order to avoid being ostracized, adolescents ironically enough may thus adjust their eating habits to incorrectly perceived unhealthy standards, giving rise to a spiraling problem recognized in the literature as pluralistic ignorance (Katz & Allport, 1931; Prentice & Miller, 1993).

Current study

In the current study, we investigate the effects of providing health-promoting peer fruit consumption norms on adolescents' intended and actual fruit consumption. If incorrectly perceived unhealthy peer fruit consumption can lead to perpetuated unhealthy eating behavior, then it is worth investigating if providing healthier fruit consumption norms from within their own peer group can also positively influence adolescents' eating behavior.

While the effect of social norms in adolescence and especially in adolescent health behavior has been researched previously (Lally *et al.*, 2011; Rivis & Sheeran, 2003), the body of research on this topic is not extensive and most of the work that has been conducted has been cross-sectional. The current study aims to fill this gap in the literature and to our knowledge, it constitutes the first study with an experimental and prospective design. We employ an experimental manipulation for investigating the direct influence of both descriptive and injunctive norms on adolescent eating behavior as compared to each other and compared to a control condition. Because individuals' own motivation to engage in health-protective behavior has been shown to be an important influence on the actual engagement in

that behavior (Ryan & Deci, 2000), we also take into account the extent to which participants were themselves motivated to consume sufficient portions of fruit. Moreover, as we expect there may be individual differences in the tendency to compare oneself with others, we include a measure of social comparison tendency.

We hypothesize that receiving normative information will increase participants' intended and actual fruit intake compared to a no-norm control condition. Moreover, because various previous studies indicate that descriptive norms have larger effects than injunctive norms on health behavior (Rivis & Sheeran, 2003) and in adolescents (Lally *et al.*, 2011), we hypothesize that participants in the descriptive norm condition will report higher intended and actual fruit consumption than participants in the injunctive norm condition. A main effect of motivation was hypothesized, such that participants reporting higher motivation scores will also report higher intended and actual fruit consumption.

Method

Participants

Participants were recruited in six classes of a Dutch high school. From an initial sample of 98 students, two participants were excluded because they had already reached the age of 18; both had twice failed a school year. The final sample thus consisted of 96 adolescents. Participants were between 14 and 17 years of age (M = 15.5, SD = 0.75) and had an average BMI of 20.58 (SD = 2.90); 61.5% were girls. Not all participants were present when the follow-up measures were administered, leaving a smaller sample for the analyses including follow-up measures (N = 80). A dropout-analysis indicated that participants who were present at follow-up did not differ from participants who were not present at follow-up in terms of age, BMI, motivation and tendency toward social comparison (all F's (1,91) < 1) nor in terms of gender (χ^2 (1, N = 96) = 2.54, p = .111) or assigned experimental condition (χ^2 (2, N = 96) < 1).

Procedure

High school students were asked to participate in a study on fruit consumption during class hours. Parental approval was sought with using the opt-out procedure, which none of the parents used. The experimenter explained that participants' answers would remain anonymous and that participation was voluntary.

Participants read and signed an informed consent form. The data collection procedure complied with Dutch ethical guidelines. As per the guidelines of the Dutch Central Committee on Research Involving Human Subjects, it was not necessary to obtain approval from an ethics committee for this specific study.

The experimenter explained to the participants that they would receive a booklet containing questions and a short informational text. Participants were instructed to read the informational text carefully before proceeding (this informational text contained the experimental manipulation). Three types of booklets (containing either the descriptive norm text or the injunctive norm text or the control condition text) were randomly shuffled prior to distribution and were then distributed to the participants based on seating order. The booklets were completed in class, with participants being seated separately to ensure that they would fill out the booklet without input from their peers. After all participants were finished, they handed in their booklets at the same time to assure anonymity. Participants were asked not to discuss the research with each other. Three days after they had filled out the original questionnaire, participants were asked to complete a short follow-up questionnaire and debriefed.

Experimental manipulation

The experimental manipulation was induced through a short informational text about fruit consumption included within the questionnaire. All participants read the following text: "Healthy eating can contribute to being healthy. By eating healthily, you can maintain your weight and will not become overweight. In addition, a healthy eating style reduces the risk of developing several serious diseases like diabetes and coronary diseases. An important part of healthy eating is to consume sufficient fruit. In previous studies we conducted at high schools, we asked high school students like yourself how they think about healthy eating." For control group participants, this was the end of the text. In the descriptive and injunctive norm conditions, one additional sentence was added about the results from these supposed previous studies. Participants in the descriptive norm condition received information that a majority of high school students try to eat sufficient fruit *themselves*, while participants in the injunctive norm condition received information that a majority of high school students think *other high school students* should eat sufficient fruit.

Measures

The booklet included four demographic items (age, gender, height in meters and weight in kilograms). Subsequently, participants' autonomous motivation to consume fruit and their tendency toward social comparison were assessed. The next page of the booklet consisted of the experimental manipulation described above. The final part of the booklet assessed participants' intention to consume sufficient fruit in the coming time.

Motivation: Autonomous motivation for fruit consumption was assessed with the autonomous subscale of the Treatment Self-Regulation Questionnaire (TSRQ; Williams, Grow, Freedman, Ryan, & Deci, 1996), consisting of six items (e.g., 'The reason I would eat fruits is because I feel that I want to take responsibility for my own health'; 'The reason I would eat fruits is because it is an important choice I really want to make') assessed on a 7-point scale ranging from 1 (*not at all true*) to 7 (*very true*); Cronbach's alpha = .82. A mean motivation score was computed.

Social comparison: Tendency toward social comparison was assessed with four items from the Iowa-Netherlands Comparison Orientation Measure (INCOM; Gibbons & Buunk, 1999). Example items are "I often compare how I am doing socially (e.g., social skills, popularity) with other people" and "I am not the type of person who compares often with others" (reverse coded) assessed on a 5-point scale ranging from 1 (*completely disagree*) to 5 (*completely agree*); Cronbach's alpha = .75. A mean social comparison tendency score was computed.

Intention: Participants rated their intention to eat sufficient fruit in the coming period of time. This was measured with four items ("I intend/plan/want/expect to eat sufficient fruit in the coming time") on a 5-point Likert scale ranging from 1 (*completely disagree*) to 5 (*completely agree*); Cronbach's alpha = .90. A mean intention score was computed.

Fruit consumption: In the follow-up assessment three days later, fruit consumption information was obtained by having participants indicate how much fruit they had consumed during the two previous days (i.e. on the two days following the day that they had filled in the original questionnaire) for each of the two days separately: "How much fruit did you consume on [weekday, date]?" Responses for both days correlated to a high extent ($r = .76$, $p < .001$) and one average fruit consumption score was computed.

Results

Analyses presented here were conducted on the full sample of 96 students, *except for* the analyses including the follow-up measure of fruit consumption. These analyses were conducted on the data of the 80 students who were present during the follow-up.

Participants on average were somewhat autonomously motivated to consume fruits (M = 4.72, SD = 1.19) and reported a somewhat low tendency toward social comparison (M = 2.30, SD = 0.91). Overall, they reported a moderate intention to consume sufficient fruit (M = 3.76, SD = .93) and had eaten an average of 1.8 (SD = 1.4) daily pieces of fruit during the two days that constituted the follow-up measure. Correlations, means and standard deviations of all variables under study are reported in Table 1. Means, standard deviations and number of participants per condition are reported in Table 2.

Table 1: Correlations, means and standard deviations of the variables under study

Variable		1	2	3	4	5	6	7
1. Age								
2. Gender (1=boy, 2=girl)		-.195 [a]						
3. BMI		.073	.114[a]					
4. Autonomous motivation		.107	.134 [a]	-.047				
5. Social comparison tendency		-.015	-.187 [a]	-.142	.124			
6. Intention		-.040	.292** [a]	.049	.529**	.102		
7. Two-day fruit consumption		.273*	.168 [a]	.099	.427**	-.028	.420**	
	M	15.5	n.a.	20.53	4.72	2.30	3.75	1.8
	SD	0.8	n.a.	2.89	1.20	0.91	0.92	1.4

Note: * indicates $p < .05$; ** indicates $p < .01$; [a] indicates Spearman coefficient.
Values in row 7 are based on the smaller follow-up sample of 80 participants.

Randomization check

A MANOVA including age, gender, BMI, motivation and tendency toward social comparison as dependent variables and condition as independent variable indicated that randomization across the conditions was successful: neither the multivariate effect ($F(10,172) < 1$) nor any of the univariate effects (all F's$(2,90) < 1$) reached significance.

Table 2: Number of participants and means and standard deviations of the variables under study per condition

Variable	descriptive norm condition (N = 31)	injunctive norm condition (N = 34)	control condition (no norm) (N = 31)
1. Age	15.55[a] (0.85)	15.53[a] (0.71)	15.39[a] (0.72)
2. Gender (% males)	36%[a]	41%[a]	39%[a]
3. BMI	21.02[a] (3.98)	20.20[a] (1.85)	20.54[a] (2.57)
4. Autonomous motivation	4.80[a] (1.25)	4.56[a] (1.04)	4.62[a] (1.30)
5. Social comparison tendency	2.40[a] (0.88)	2.21[a] (0.90)	2.30[a] (0.96)
6. Intention	3.87[a] (0.77)	3.43[b] (0.76)	3.88[a] (0.76)
7. Two-day fruit consumption	2.3[a] (1.6)	1.5[b] (0.9)	1.7 [b†] (1.0)

Note: Values with different subscripts within the same row indicate significant differences. † Indicates a marginally significant difference (p = .057). Values in row 7 are based on the smaller follow-up sample (N = 80).

Intention to consume sufficient fruit

A first ANOVA investigated whether the experimental manipulation influenced participants' intention to consume sufficient fruit in the coming time. Since gender and autonomous motivation were correlated with intention, these variables were controlled for in the analysis. Results indicated that gender significantly influenced intention, $F(1,90) = 4.72$, $p = .033$, $p\eta^2 = .050$ with girls (M = 3.90, SD = 0.76) reporting higher levels of intention than boys (M = 3.55, SD = 0.76). Autonomous motivation also was significantly positively associated with intention, $F(1,90) = 31.31$, $p < .001$, $p\eta^2 = .258$. Even when controlling for these two variables, the norm that participants received exerted significant influence over their fruit intake intentions, $F(2,90) = 3.88$, $p = .024$, $p\eta^2 = .079$. Post-hoc comparisons (see also Figure 1) indicated that this difference was due to participants in the injunctive norm condition (M = 3.43, SD = 0.76) reporting significantly lower levels of intention than participants in both the descriptive norm condition (M = 3.87, SD = 0.77, $p = .021$, d = 0.58) and the control condition (M = 3.88, SD = 0.76, $p = .017$, d = 0.59). Participants in the descriptive norm condition and participants in the control condition did not differ significantly from each other on intention ($p = .938$).

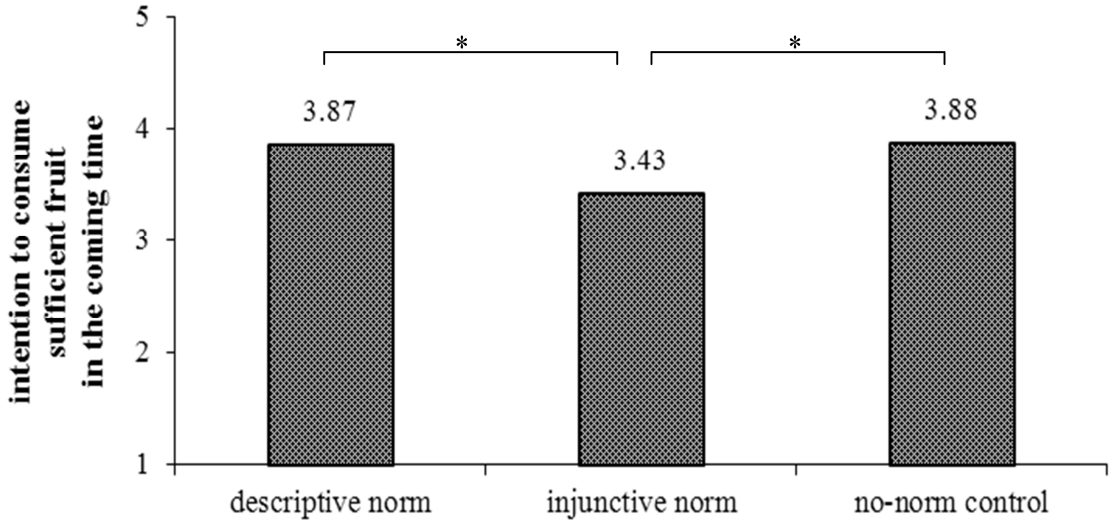

Figure 1. Participants' intention to consume sufficient fruit in the descriptive norm, injunctive norm and control condition.

Fruit consumption at follow-up

A second ANOVA then investigated whether the experimental manipulation also influenced actual fruit consumption as measured at follow-up. Since age and autonomous motivation were correlated with intention, these variables were controlled for in the analysis. Results indicated that age positively influenced fruit consumption, $F(1,75) = 6.84$, $p = .011$, $p\eta^2 = .084$. Autonomous motivation also was significantly positively associated with intention, $F(1,75) = 17.40$, $p < .001$, $p\eta^2 = .188$. Even when controlling for these two variables, the norm that participants received exerted significant influence over fruit consumption, $F(2,75) = 3.21$, $p = .046$, $p\eta^2 = .079$. Post-hoc comparisons (see also Figure 2) indicated that this difference stemmed from a larger fruit consumption in participants who received the descriptive norm ($M = 2.3$ daily pieces of fruit, $SD = 1.6$) than in participants who received either the injunctive norm ($M = 1.5$, $SD = 0.9$, $p = .020$, $d = 0.65$) or in control condition participants ($M = 1.7$, $SD = 1.0$, $p = .057$, $d = 0.47$), albeit that the latter difference was only marginally significant. There was no difference in fruit intake between participants in the injunctive norm condition and participants in the control condition ($p = .681$).

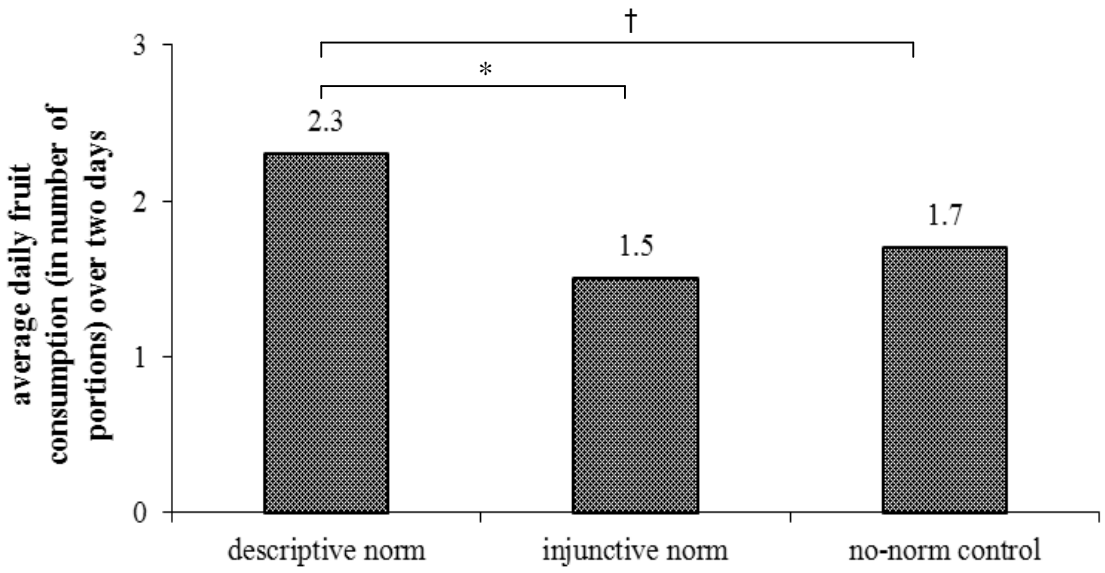

Figure 2. Participants' daily fruit consumption (in number of portions) in the descriptive norm, injunctive norm and control condition.

Discussion

Results from this study indicate that descriptive and injunctive norms exert influence over either adolescents' intention to consume sufficient fruit or their actual fruit consumption. More specifically, and confirming our hypothesis, it was found that a message containing an injunctive norm to consume sufficient portions of fruit did not positively influence fruit consumption. What is more, we in fact found a short-term negative effect of the injunctive norm message as shown by a decrease in adolescents' intention to consume sufficient fruits. A descriptive norm message, on the contrary, positively influenced adolescents' actual fruit consumption, as we hypothesized. We did not find an effect of the descriptive norm message on fruit intake intentions. As expected, motivation positively influenced both fruit intake intentions and actual consumption. In our opinion, these findings point to two main issues warranting further discussion. The first issue is the negative influence of the injunctive norm message on fruit intake intentions. The second issue is the lack of influence of the descriptive norm message on intentions, while there was an effect on actual behavior. We will address each of these below, beginning with the former.

Reactance

An injunctive norm may lead people to feel like they are being pushed in a certain direction by the source delivering the norm, especially when that norm is not in line with their personal goals (Jacobson *et al.*, 2011; Melnyk *et al.*, 2011). This may be perceived as an attempt to limit one's freedom of thinking and acting (Silvia, 2006) and therefore evoke resistance to the proposed behavior. Resistance, in turn, may lead people to focus mostly on counterarguments, to suppress thoughts in favor of the proposed behavior and to think negatively about the credibility of the norm message source (Silvia, 2006; Tormala & Petty, 2004). When this happens, there is the potential for the injunctive norm to backfire (Melnyk, Van Herpen, Fischer, & Van Trijp, 2011) and lead to psychological reactance (Brehm, 1966).

In the current study, this was likely also the case. As previous studies indicate that healthy eating typically is not very high on adolescents' list of personal goals (Croll *et al.*, 2001; Stead *et al.*, 2011), an injunctive norm to eat more fruit may thus be received as inconsistent with personal standards and therefore induce resistance and reactance, reflected in lower self-reported fruit intake intentions as compared to the other conditions. In the current study, this effect seems to have faded away rather quickly as it did not carry over to actual consumption which was similar to that of participants in the control condition. It is important to note, however, that the norm message in the current study consisted of just one single sentence contained within a short informational text. If injunctive norm messages are communicated more frequently or more extensively, their (potentially negative, reactance-inducing) effects on behavior may also become larger and more persistent. This is something that should be addressed in future research.

Descriptive norms as heuristics

In the current study, descriptive norms were found to influence actual behavior but not behavioral intentions. We believe that this may be due to the nature of descriptive norms and the way that descriptive norms exert their influence. Descriptive norms motivate by indicating what would be effective and adaptive behavior in a certain situation. As such, a descriptive norm can function as a *heuristic* (Shah & Oppenheimer, 2008) or decisional shortcut for behavior, which should offer an information-processing advantage (Cialdini, 2008). It is not necessary for an individual to exert much effort to reach a behavioral decision: the descriptive norm provides a quick and efficient behavioral guideline. Various studies have

demonstrated that conscious and effortful processing and elaboration of descriptive norm information indeed is not necessary for the norm to influence behavior (for example through demonstrating that descriptive norm information still influences behavior under conditions of low self-regulatory resources; Jacobson, Mortensen, & Cialdini, 2011; Salmon, Fennis, De Ridder, Adriaanse, & De Vet, 2013).

Our results are consistent with the idea of descriptive norms working as a heuristic, helping people reach behavioral decisions without conscious effort or awareness: we found no influence of the descriptive norm on intention, a cognitive measure which asked participants to report on a process that thus very well may have taken place outside awareness, and we did find an effect of the descriptive norm heuristic on actual fruit consumption. The increase in fruit consumption at follow-up indicates how powerful descriptive norms can be: a one-time, single-sentence norm message was strong enough to positively influence fruit consumptions for up to 48 hours, and potentially longer.

Limitations and suggestions for future research

Fruit consumption at follow-up was self-reported and had to be recalled over 48 hours. Previous research (McPherson, Hoelscher, Alexander, Scanlon, & Serdula, 2000) has indicated that self-reported food intake is not always accurate, especially when some time has already passed, which means that the conclusions we can draw from this finding may be somewhat limited. However, this research is already a step up from previous other studies where no attempt was made to measure actual consumption following an experimental norm manipulation at all. In future research, alternative methods for assessing food intake (a food diary for example) could be employed.

In the current study, the descriptive and injunctive norm messages were formulated such that they came from within the participants' own group (it was their peers' behavior or opinion that was described in the norm). It remains to be determined what the effects would be, if the norm messages come from other sources. With regard to the descriptive norm message, previous research has demonstrated that descriptive norms are most influential when the referent group is one with which participants can identify (Stok, De Vet, De Ridder, & De Wit, 2012b; Turner, 1991), and such a norm would therefore likely have less influence on behavior if it describes the behavior of a more distant group. With regard to the injunctive norm message, however, it may be the case that adolescents would

respond differently to an injunctive norm when this norm comes from a source of authority (e.g., parents or health experts). This issue should be further explored in future research.

There was a two-day interval between the first and the second measurement. While participants were asked not to discuss the research with each other, we can of course not be sure that everybody complied with this request and there is thus a potential of contamination between conditions. Given that the difference between conditions consisted of only one varying sentence within a six-page booklet, however, we believe that the likelihood of such contamination is rather low. During the debriefing, we received no indication that participants had realized that there were different versions of the booklet or that the information they had received varied across students.

Implications and conclusion

The current study investigated the influence of descriptive norms and injunctive norms on adolescents' fruit intake intentions and actual fruit consumption. Descriptive norms were found to positively influence consumption, but not intention, pointing to the possibility that descriptive norms function as a heuristic: descriptive norms need not be processed and cognitively elaborated upon in order for them to influence behavior. Injunctive norms, on the other hand, seem to be less influential for behavior. In the current study, a negative effect on fruit intake intentions was even found, which may point to the possibility of injunctive norms causing feelings of resistance and reactance.

The current study was among the first to directly and experimentally compare the influence of descriptive and injunctive norms on both intended and actual health behavior in adolescents. Our results point to the potentially large effects of a very small and quick manipulation: a simple one-line descriptive norm message was found to be capable of positively influencing fruit intake behavior for up to two days, indicating the potential of health-promoting descriptive norms to improve adolescents' eating behavior. As has been suggested previously (Lally *et al.*, 2011; Perkins *et al.*, 2010), improving adolescents' perceptions of their peers' eating habits by communicating health-promoting descriptive norms from within their peer group thus holds great promise for health interventions in this age group. Moreover, the current results also indicate that injunctive norms may be less useful in this regard and should even be communicated with great care, given that, in this study, a

similarly simple one-line injunctive norm message may activate resistance processes and could as such create behavioral boomerang effects.

Chapter 5

Minority talks:
The influence of descriptive social norms on fruit intake

This chapter is based on:
F. Marijn Stok, Denise T. D. De Ridder, Emely De Vet, & John B. F. De Wit. (2013). Minority talks: The influence of descriptive social norms on fruit intake. *Psychology & Health, 27*, 956-970.

Abstract

Previous research established that norms describing the behavior of a *majority* (e.g., 'many people consume too much alcohol') can have ironic and unwanted effects on health behavior. To date no research has addressed the effects of *minority* descriptive norms (e.g., 'only few people use sunscreen'), while such minority norms are frequently communicated to the public. The current studies investigate the effects of minority and majority norms on intended and actual fruit intake. University students received either minority or majority normative information describing fruit intake behavior of a referent group. Identification strength with this referent group was measured (Study 1) or manipulated (Study 2). Results showed that, compared to majority norms, minority norms negatively affected fruit intake when participants strongly identify with the referent group. Moreover, absolute negative (minority norm) and positive (majority norm) effects of one third portion of fruit were found compared to a no-norm condition. Since minority norms are often communicated with the intention of alarming people regarding their low engagement in health protective behavior, the potential ironic effects of these minority norms should be taken into account when presenting such information to the public.

Descriptive norm information is information regarding the acceptable or typical way to behave within a certain group and is derived from the behavior of other group members (Aronson, Wilson, & Akert, 2005). A substantial body of research has shown that descriptive norms constitute an important source of influence on behavior (Asch, 1951; Sherif, 1936) including health behavior (e.g., Larimer, Turner, Mallet, & Markman Geisner, 2004; Louis, Davies, Smith, & Terry, 2007; Nordrehaug Åstrøm & Rise, 2001; Wiium, Torsheim, & Wold, 2006). However, this influence is not always in the desired direction. For example, informing college students about heavy alcohol use on campus has been shown to actually increase their alcohol consumption (Perkins, Haines, & Rice, 2005). This is ironic and unwanted given that the provision of such information is likely rather intended to stimulate them *not* to engage in this unhealthy behavior.

To date, most studies on descriptive norms and health behavior have focused on, as we refer to them, *majority* norms. Such norms, like the one in the example above, describe the behavior of a majority and hold the potential for ironic effects when the referenced behavior is unhealthy. Less is known, however, about the influence on health behavior of norms describing the behavior of a minority – even though, in the practical context of health behaviors, people are frequently confronted with such minority norms. Observations of other people's behavior will indicate, for example, that only few people perform such desired health behaviors as using sunscreen and consuming sufficient fruit (CDC, 2010; Hall, Everett Jones, & Saraiya, 2009), forming a first source of encounters with minority norms. The fact that so few people adhere to recommended health behavioral guidelines is highly newsworthy and, as such, is often reported about in the media (e.g., "88% of children do not eat the recommended amounts of fruit and 92% don't eat enough vegetables", reported in the Los Angeles Times, November 17th, 2010; "too few Americans are getting the recommended [breast, cervical and colon cancer] screens or getting them regularly enough", reported in US News & World Report, January 15th, 2009). Such media reports form a second source of encounters with minority norms. In response to such low engagement figures, public health campaigns are instigated to alert the population to the low frequency with which it performs various important health behaviors – thus constituting a third source of minority norm encounters. For example, the Dutch Nutrition Center ran a campaign focused on promoting fruit and vegetable consumption with the slogan '80% knows [how much fruit and vegetables should be consumed daily], but only

20% behaves accordingly' (Dutch Nutrition Center, 2010), and the American Environmental Working Group in one of their campaigns states that "few people use enough sunscreen to benefit from the SPF protection promised on the label" (Environmental Working Group, 2010). Both these campaigns thus explicitly mention a minority norm in their slogan.

Given the frequency with which such minority norms are communicated to large audiences, it is important to know whether minority descriptive norm information about healthy behaviors poses the same dangers of unwanted, ironic effects (i.e. decreasing engagement in a healthy behavior even further) as does majority descriptive norm information about unhealthy behaviors. The current set of studies explores the influence of providing minority norm information versus majority norm information regarding others' fruit consumption on participants' fruit intake. Fruit consumption was chosen as the target behavior because only few people consume sufficient fruit, a minority norm that is often featured in campaigns and media outlets (see above). Moreover, insufficient fruit consumption is an important health-risk factor: it is implied in increased risk for high blood pressure, cardiovascular and other chronic degenerative diseases and several types of cancer (Dutch Nutrition Center, 2010).

Minority norms

Majority norms are a powerful motivator because they refer to what most people do, thereby clarifying the typical behavior in a certain situation. This provides people with information about 'social reality' (Festinger, 1954). Such norms also provide consensus information: the more people who behave in one way in a given situation, the more correct that behavior is perceived to be (Thibaut & Kelley, 1959). In the case of minority norms, the social reality and consensus information arguments do not apply: there seems to be little sense in modeling an, as it were, a-typical or rare behavior.

Nevertheless, the focus theory of normative conduct (Cialdini, Reno, & Kallgren, 1990) suggests that minority norms, too, may influence behavior. This theory holds that norms will exert an influence over behavior particularly when the given norm is salient at the time of acting. Even when descriptive norm information refers to a minority, this information can still be salient when one acts and, through this salience, influence behavior. We therefore suggest that a minority norm, too, can influence behavior. This is corroborated by findings

outside the arena of health behavior, showing that a minority group can indeed also exert influence over behavior (Aronson & O'Leary, 1982; Cialdini *et al.*, 1990; Moscovici & Lage, 1969). Whether the magnitude of the effect of minority norms on health behavior is similar to the influence of majority norms, or rather smaller, will be investigated in the current studies. One important aspect to consider is the role that identification processes may play in the effect that social norms have over behavior.

Identification with the referent group

The influence of norms on behavior depends substantially on the extent to which one identifies with the norm's referent group (Turner, 1991). Identity theory (Burke, 1980; Stryker, 1987) stipulates that one's self-concept consists of a number of identities reflecting different roles across environments and groups. Every social situation has its own set of appropriate behaviors and performing these behaviors validates one's identity and sense of belonging within that specific social group. Building upon these basic identity theory premises and upon social identity theory (e.g., Turner, 1999), the referent informational influence model (Terry & Hogg, 1996) holds that when identification with a certain group is strong, this group's behaviors will influence behavior more than when identification is weak, which has also been demonstrated empirically (Johnston & White, 2003; Louis *et al.*, 2007). Whether identification with the referent group is of equal importance when people are confronted with information about a minority remains subject to investigation. As minority norms do not directly indicate the typical behavior within a broader referent group, but rather indicate a-typical or less common behavior, identification with the referent group may have a less strong moderating effect than in the case of majority norms.

Present studies

The current studies explore the influence of minority versus majority descriptive norm information on fruit intake intentions (Study 1) and actual fruit intake (Study 2). Expectations are that, compared to receiving majority norm information, participants receiving minority norm information will exhibit lower intentions to consume sufficient fruit and lower actual fruit intake, but only when identification with the referent group is strong.

In addition to the novel focus on minority norm messages, these studies contribute to the existing literature by investigating the effect of explicitly providing participants with normative information instead of working with perceptions, as occurred in most health-related studies to date. As health campaigns often provide people with normative information in an explicit manner, it is highly relevant to investigate what its effects on behavior are. Moreover, the current studies focus on the effects of descriptive norms on both health behavioral intentions (Study 1) and actual health behavior (Study 2), allowing for a comparison of the effects of descriptive norms across intention and behavior.

Study 1

In Study 1, university students received information indicating that either many (majority norm) or few (minority norm) university students eat sufficient fruit. We hypothesized that, compared to a majority norm, participants receiving minority norm information would report significantly lower fruit intake intentions. Moreover, this effect was expected only for participants identifying strongly with the referent group.

Method

Participants

Participants were 102 university students (17 men and 85 women) with a mean age of 22.5 years (*SD* = 5.4). They had on average eaten sufficient fruit on 3 days during the last week (*SD* = 2.1). All analyses were also conducted for men and women separately, but no differences were found. Therefore, results are reported for all participants combined.

Procedure and materials

Participants were recruited in the university's psychology building to fill out a questionnaire. They were not reimbursed for their participation. The questionnaire started with two demographic items (gender and age), an item about the number of days on which participants had eaten sufficient fruit during the past week, and two items regarding identification rated on a 7-point scale (1 = not at all, 7 = very much): 'I identify with / feel a connection to Dutch university students'. One average identification measure was created (Cronbach's α = .79). Most participants scored around the mean, attenuating the potential influence that

truly weak and high identification scores may have on the effect of normative information on fruit intake intentions and indicating a nonlinear effect. Scores on this variable were therefore categorized (see, e.g., Becher, 2005, for an overview of categorization in the case of nonlinear effects) as either low (below or equal to -1*SD*, *N* = 22), moderate (between -1*SD* and +1*SD*, *N* = 68) or high (equal to or above +1*SD*, *N* = 12).

Subsequently, participants read a short text: "*It is common knowledge that eating sufficient fruit (at least two portions per day) is important. However, we also know that many people do not meet this criterion: most people eat insufficient fruit*." The norm manipulation was then introduced: "*Previous research has shown that Dutch university students …do show quite good fruit intake behavior: 73% of Dutch university students eat sufficient fruit*" (majority norm) or "*…also do not show very good fruit intake behavior: only 27% of Dutch university students eat sufficient fruit*" (minority norm).

Fruit intake intentions were then measured with four items answered on a 5-point scale (1 = completely disagree, 5 = completely agree): 'I want to / intend to / expect to / will eat sufficient fruit in the coming period of time'. One average intention measure was computed (Cronbach's α = .94).

Results

Participants reported a moderately strong intention to eat more fruit in the coming period (*M* = 3.72, *SD* = 0.87) and identified with Dutch students to a moderate extent (*M* = 3.68, *SD* = 0.80). The three identification groups consisted of those scoring 3.88 or lower (low identification group; scores ≤ -1*SD*), those scoring between 3.89 and 4.47 (moderate identification group; (-1 *SD* < scores < +1 *SD*), and those scoring 4.48 and higher (high identification group; scores ≥ +1 *SD*).

A MANOVA indicated that randomization over the minority vs. majority norm information conditions was successful. Age, gender, fruit consumption and identification did not differ between conditions, *F*'s(1, 100) < 2.15, *p*'s > .140.

An ANOVA showed a significant effect of minority vs. majority norm on intention, *F*(1, 96) = 6.94, *p* = .010. Participants who received majority norm information reported higher fruit intake intentions (*M* = 3.89, *SD* = 0.97) than participants receiving minority norm information (*M* = 3.53, *SD* = 0.72). This effect was qualified by a marginally significant interaction effect between norm condition and identification, *F*(2, 96) = 2.39, *p* = .095 (see Figure 1). Norm

information significantly influenced intentions when participants strongly identified with the referent group, $t(10) = 2.57$, $p = .028$, but not when identification was moderate, $t(59) = .83$, $p = .409$, or weak, $t(20) = .61$, $p = .546$. Post-hoc pairwise comparisons (LSD) indicated that only the minority norm / high identification participants differed from all other participants, reporting significantly lower fruit intake intentions (mean differences > .749, p's < .030). All other participants' intentions did not differ significantly, mean differences < .626, p's > .165 (see Table 1).

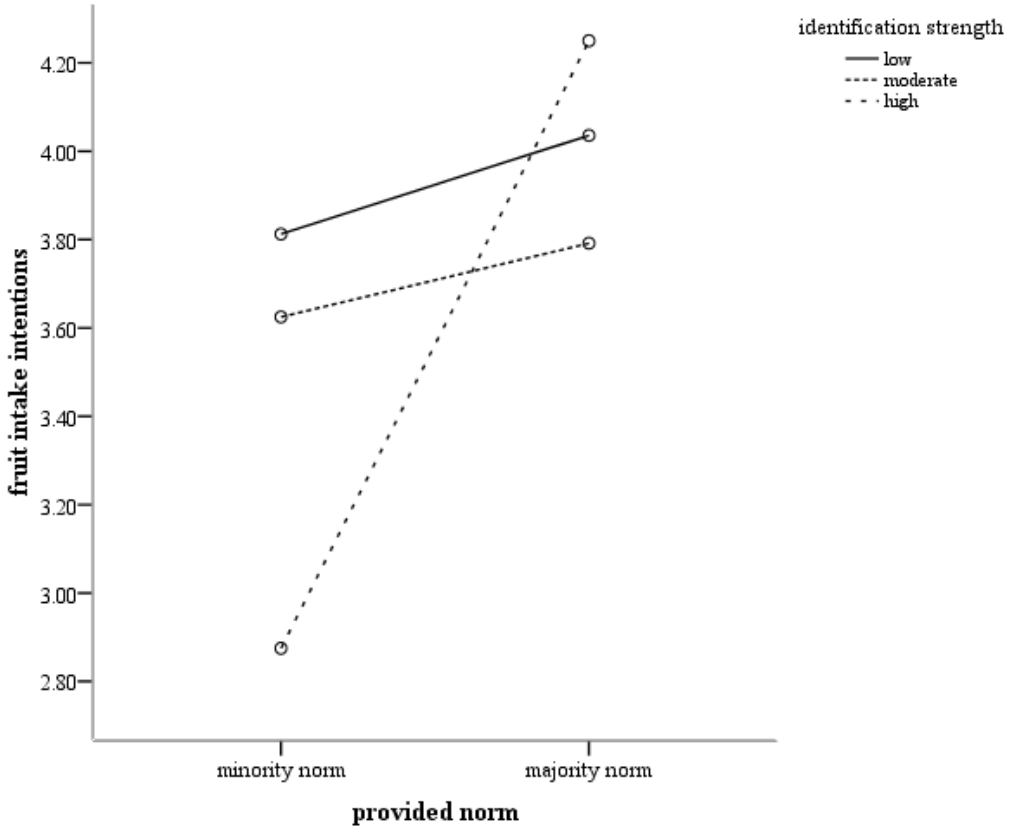

Figure 1. The interaction effect of majority versus minority descriptive norm information and level of identification with the reference group on fruit intake intention.

Discussion

Providing majority versus minority normative information influenced intended fruit consumption such that a minority norm led to lower intentions to eat sufficient fruit in the coming period of time as compared to a majority norm. This effect was only present in participants who strongly identified with the referent group. Receiving minority norm information of a referent group with which one strongly identifies was thus especially detrimental to fruit intake intentions.

Study 1 did not include a control condition, meaning that no conclusions can be drawn regarding the magnitude of the relative effects of minority and majority norm information. Moreover, identification with the referent group was self-reported by participants, with most participants scoring around the mean. In addition, it was not measured whether participants believed the information they read. Therefore the possibility cannot be precluded that the majority-norm information was more or less credible than the minority-norm information. Lastly, in Study 1, only intended fruit intake was investigated. Study 2 was designed to replicate and extend the findings from Study 1.

Table 1: Mean fruit intake intentions (and standard deviations) by norm condition and identification strength

		identification strength		
		low identification	moderate identification	high identification
provided norm	minority norm	3.81[a] (0.61)	3.63[a] (0.62)	2.88[b] (0.88)
	majority norm	4.04[a] (0.91)	3.79[a] (1.00)	4.25[a] (0.87)

Note: means with different superscripts differ significantly from each other at $p < .050$.

Study 2

Study 2 encompassed reported actual fruit intake over the course of one week as the dependent measure. Moreover, rather than using a self-report measure of participants' identification with the referent norm group, the extent to which participants can identify with the referent group was manipulated experimentally so as to ensure sufficient variability. Additionally, a control condition was included.

To conceal the true purpose of the study from participants, a cover story was developed[1]. Participants were informed that the study was designed to test the effects of keeping a diary on fruit consumption. All participants believed they were in an experimental condition compared to supposed control subjects who would not keep a diary. Due to this cover story, we expected an overall increase in fruit consumption across the conditions. Importantly, we expected that majority norm / high identification participants' fruit consumption would increase more than that of control participants, and that minority norm / high identification participants' fruit intake would decrease compared to control participants. We expected no differences between control and low identification participants.

Method

Participants

Assuming that a certain threshold level of ability or willingness to eat sufficient fruit must be present in order for participants to adapt fruit intake, only participants who reported eating sufficient fruit on at least one day during the previous week were included in the study. After removing participants who missed more than three diary installments (N = 26), 119 participants remained (22% men and 78% women). Participants had a mean age of 21.7 years (SD = 2.9). All analyses were also conducted for men and women separately, but no differences were found. Therefore, results are reported for all participants combined.

Procedure

University students wanting to eat more fruit were recruited for a diary study. They completed a baseline questionnaire, a seven-day fruit diary and an exit questionnaire. When participants signed up, they had to provide their e-mail address. All parts of the study were administered online through a unique link sent every day to each participant's email address. On day 1, which was always

[1]In earlier work, we found that simply providing the normative information did not lead to differences between conditions. It seems that manipulating norms and identification to influence repetitive, multiple-day behavior may be more complex than influencing intentions or one-trial behavior (such as the decision to reuse a towel or not; Goldstein, Cialdini, & Griskevicius, 2008). Participants seem to need some more background information to be able to internalize the normative information, which is why a cover story was devised about becoming more aware of one's behavior and the relevance of self-monitoring through keeping a diary. Moreover, the referent group's behavior has to be realistically attainable. In this study, we therefore restricted the reported group behavior to one week.

the first Monday after participants signed up for the study, the baseline questionnaire was administered. On days 2 through 8, the fruit diary was administered. On day 9, participants received an exit questionnaire. In return for completion of all nine parts of the study participants received course credit or 8 euros.

The experimental manipulation occurred in the baseline questionnaire and was repeated in each installment of the fruit diary. Minority and majority normative information were manipulated similar to Study 1. High vs. low identification was manipulated by using either Dutch university students or the Dutch population as the referent group. A pilot study was conducted amongst 149 university students (21% males, *M* age = 21.7 years) to pre-test these two referent groups. A repeated measures ANOVA showed that participants identified more with Dutch students (*M* = 3.7 on a 5-point scale) than with the Dutch population (*M* = 3.2 on a 5-point scale), $F(1,148) = 34.16$, $p < .001$. The pilot study thus indicated that this manipulation indeed created a low and a high identification group.

The baseline questionnaire started with the following text: "*From previous research, we know that good eating habits are promoted by making people aware of what they actually eat. Keeping a diary is a useful strategy to achieve this. This has also been shown in previous fruit diary studies*." This cover story was deemed necessary because we found in earlier work that simply providing normative information does not lead to differences between conditions. It seems that manipulating norms and identification to influence repetitive, multiple-day behavior may be more complex than influencing intentions or one-trial behavior (such as the decision to reuse a towel or not; Goldstein, Cialdini, & Griskevicius, 2008). Participants seem to need some more background information to be able to internalize the normative information, which is why a cover story was devised about becoming more aware of one's behavior and the relevance of self-monitoring through keeping a diary.

After this text, the manipulation followed in the form of an informative statement which read "*73% (vs. 27%) of Dutch students (vs. the Dutch population) eat at least two portions of fruit per day during the week they kept a fruit diary*", resulting in a 2 (majority vs. minority descriptive norm) x 2 (high vs. low identification referent group) between-subjects design. From previous research, we know that the referent group's behavior has to be realistically attainable which is why we restricted the reported referent group's behavior to one week.

A fifth group of participants only read the first text piece and did not receive a statement, constituting the control condition. Participants were randomly assigned to a condition.

Materials

Baseline fruit intake and fruit intake intentions: One item assessed fruit intake at baseline: 'How many portions of fruit do you typically eat per day?' Fruit intake intentions were measured with four items answered on a 5-point scale (1 = completely disagree, 5 = completely agree): 'In the coming research week, I want to / intend to / expect to / will eat sufficient portions of fruit'. One average intention measure was computed (Cronbach's α = .91).

Fruit diary: Participants received a link to the fruit diary every day at 7.30 pm, which remained active until 11 am the following morning. The diary always started with a screen on which the descriptive norm information was repeated. Participants continued to a screen where they indicated whether they had consumed fruit that day (if not, the diary was automatically closed). They were then routed to a screen providing a list of 21 types of fruit and checked all types they consumed, providing the number of portions consumed. The next screen asked participants if they had eaten any other types of fruit (if they indicated no, the diary was terminated). They were then routed to a final screen where they provided the other types of fruit they consumed, including the number of portions.

Average fruit consumption: Average fruit consumption was calculated by dividing the total number of consumed portions by the number of diaries completed. Change in fruit intake from baseline to the research week was calculated by subtracting the baseline consumption from this average consumption score.

Identification with referent group: To check whether the high and low identification referent group manipulation was successful, participants rated the extent to which they identified with the referent group mentioned in their normative statement ('I identify with Dutch university students / the Dutch population'; answered on a 5-point scale, 1 = not at all, 5 = very strongly). This information was obtained in the exit questionnaire and only in the experimental conditions.

Perception and credibility of normative information: Perception of the norm was probed in the exit questionnaire by asking participants 'In this study we told you

what percentage of people previously participating in this research ate sufficient fruit. Did you find this percentage high or low?' (answered on a 5-point scale; 1 = very low, 5 = very high). Credibility of the normative statement was probed by the question 'Did you find this norm credible?' (answered on a 5-point scale; 1 = not at all, 5 = very much). This information was obtained only in the experimental conditions.

Results

Participants reported strong intentions to eat sufficient fruit in the coming week (M = 4.27, SD = .82). Moreover, they indicated having eaten an average of 1.36 (SD = .57) portions of fruit per day in the week prior to participation.

Randomization and manipulation checks

A MANOVA including age, gender, fruit intake intention and average number of fruit portions consumed per day at baseline as the dependent variables and condition as the independent variable showed that condition did not have a significant effect on any of the variables (neither the multivariate effect nor any of the univariate effects reached significance, F's(4, 118) < 2.00, p's > .120), indicating that randomization across the conditions was successful[2].

A t-test indicated that participants in the high identification conditions identified with their referent group more (M = 3.98, SD = 0.93) than participants in the low identification conditions (M = 3.26, SD = 0.85), $t(97) = 3.89$, $p < .001$, indicating successful manipulation of high vs. low identification. A second t-test indicated that the norm manipulation was also successful: participants in the minority norm conditions perceived the norm as lower (M = 2.65, SD = 0.76) than participants in the majority norm conditions (M = 3.85, SD = 0.74), $t(97) = 7.98$, $p < .001$. Participants rated the minority (M = 3.53, SD = 1.06) and majority (M = 3.35, SD = .92) norm as equally credible, $t(83) = -.847$, $p = .399$.

[2]A second MANOVA was conducted with the same dependent variables, but additionally including credibility of the provided norm. Condition was again the independent variable, but the control condition was excluded from this randomization check as no normative information was provided in that condition. Results again indicated successful randomization, with none of the effects reaching significance, all F's(3, 81) < 2.10, all p's > .110.

Main analyses

An ANOVA with norm (majority vs. minority) and group (high identification vs. low identification) as independent variables and fruit intake change as dependent variable indicated that there was a significant effect of normative information on fruit intake change, $F(1, 114) = 5.57$, $p = .020$ (see Figure 2). This main effect was qualified by a significant interaction effect with identification, $F(1, 118) = 4.21$, $p = .042$. There was no main effect of identification, $F(1, 118) < 1$.

Post-hoc pairwise comparisons (see Table 2) indicated that, firstly, minority norm / high identification participants consumed significantly less fruit than participants in the other experimental conditions (mean differences > .38, p's < .040). Minority norm / high identification participants and majority norm / high identification participants did not differ significantly from participants in the control condition (mean differences <.30, p's. > .130). Participants in the other conditions did not differ significantly from each other. Although not statistically significant, however, fruit intake increased with 0.3 of a portion fruit per day in majority norm / high identification participants – and decreased with the same 0.3 of a portion per day in minority norm / high identification participants – as compared to the control condition, which are substantial and relevant changes in terms of portions of fruit. The relevance of these results was corroborated by the obtained effect sizes: Cohen's d was .45 (majority norm) and .47 (minority norm), respectively, indicating medium-size effects.

Discussion

Study 2 demonstrated that compared to majority norm / high identification participants as well as compared to both low identification conditions, participants in the minority norm, high identification condition ate significantly less fruit in the research week. While not statistically significant, results also indicated substantial changes in fruit intake compared to the control condition: fruit intake increased one third portions of fruit per day in majority norm / high identification participants, and decreased with one third portions of fruit per day in minority norm / high identification participants, as compared to control condition participants. When identification with the norm group is low, there are no differences in fruit intake compared to control participants.

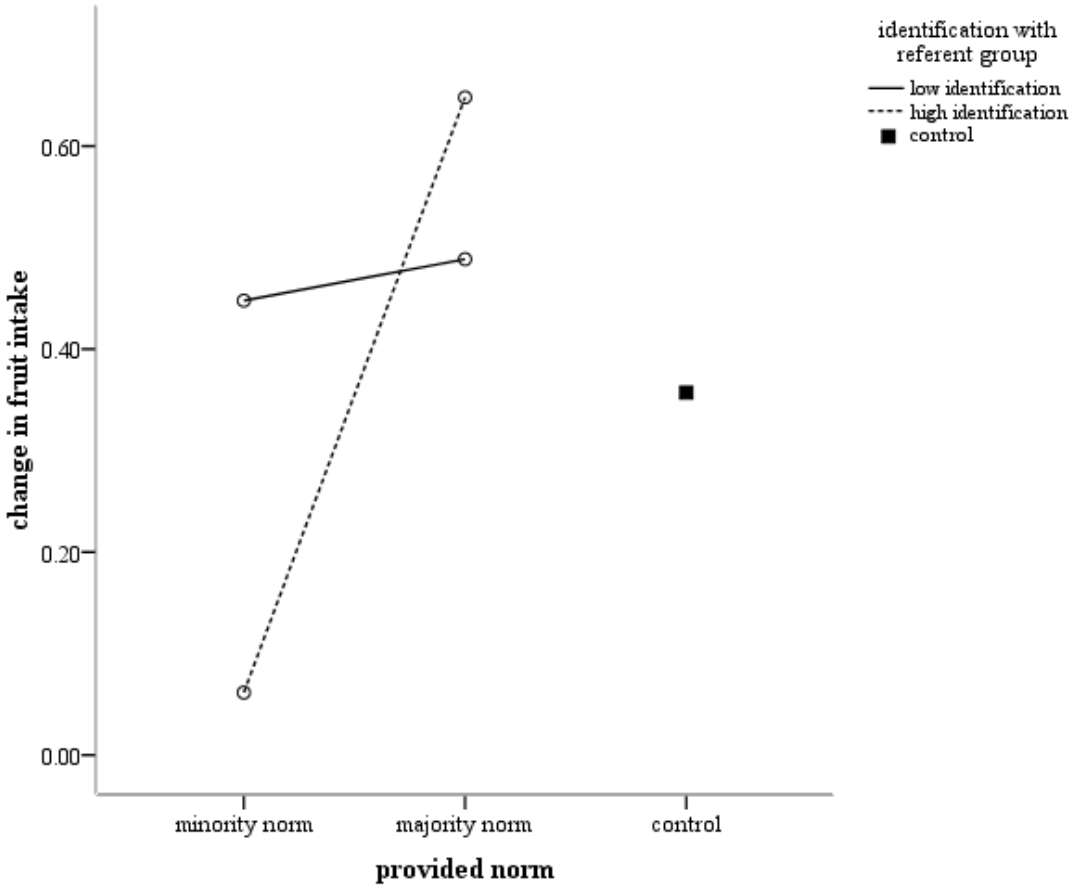

Figure 2. The interaction effect of majority versus minority descriptive norm information and high versus low identification group on change in fruit intake.

Table 2: Average fruit portions consumed per day at baseline, average fruit portions consumed during the diary week and fruit intake change from baseline to diary week per condition (with standard deviations)

		identification								
		low identification			high identification			control		
		base	diary	change	base	diary	change	base	diary	change
provided norm	minority norm	1.26	1.71	.45[a] (.67)	1.57	1.63	.06[b] (.67)			
	majority norm	1.33	1.82	.49[a] (.64)	1.25	1.90	.65[a] (.67)			
	control							1.45	1.81	.36[a] (.61)

Note: means with different superscripts differ significantly from each other at $p < .040$.

General Discussion

Results indicate that descriptive norms referring to either a minority or majority group can influence intended and actual fruit intake. Two main findings must be considered. First, participants receiving minority norm information regarding a high identification group decreased their fruit intake compared to participants receiving majority norm information regarding the same high identification group, as well as compared to participants receiving information regarding a low identification group. Second, these studies suggest that, compared to a no-norm control condition, descriptive norm information may have absolute effects on fruit intake, albeit that the observed changes – though meaningful in terms of practical relevance – were not statistically significant (most likely due to a lack of power). While positive effects on health-protective behaviors are well-established for majority descriptive norms, the potentially negative effects of minority norms are novel. Given the fact that minority norms are frequently quoted in the media and even used in public health campaigns, these potential negative effects of minority norms have important implications: stating that only few people perform a desirable behavior may negatively influence the likelihood that others engage in that desirable behavior.

While it is well established in the literature that a negating statement (i.e. 'many people are *not* performing this desirable behavior'; Cialdini, 2003) has an undesirable influence on behavior, this can be understood from a social proof perspective. Such negating information still refers to a majority and influences behavior by providing consensus information. The current findings point to a different mechanism for the influence of minority norms on behavior: as the behavior is only performed by a minority, the social proof argument no longer applies. While it may be the case that a minority norm activates a thinking process in which people conclude that 'if only few people do it, most people must therefore not be doing it', thus effectively functioning as a kind of indirect negative social proof, it may also be the case that minority norm information becomes especially focal and exerts its influence through salience rather than social proof.

Support for this latter mechanism stems from our current finding that strong identification with the referent group seems more influential with minority norms than with majority norms (see also Moscovici & Lage, 1976). The effect of a majority norm was similar (and positive) regardless of the extent to which

participants identified with the norm group, while the effect of the minority norm strongly depended on identification strength: there seems to be a trend for the effect to reverse from positive when identification is weak to negative when identification is strong. Indeed, research on identity based motivation indicates that the behavior of a minority with which one identifies can constitute a strong (negative) motivator for (health) behavior (Oyserman, Fryberg, & Yoder, 2007).

Limitations and directions for future research

In Study 2, fruit intake increased in all participants, even in participants in the control condition, which can be attributed to the cover story about the importance of awareness of fruit intake and the beneficial effects of keeping a diary on this awareness. While the (relative) differences between the experimental conditions in fruit intake change were largely as expected, the actual (absolute) changes in terms of numbers of fruit portions may have been different had this cover story not been use. One could even expect actual decreases in fruit intake, especially in the minority norm / high identification condition. This points to the importance of further research into the workings of minority norm information on health behavior that circumvent the limitations of the current studies.

The normative manipulation in Study 2 occurred in the baseline questionnaire. We cannot preclude that the majority and minority norms had different effects on social desirable reporting. For example, it may be the case that participants confronted with the information that a majority of participants ate sufficient fruit in the research week felt more pressure to report high fruit consumption than those who received a minority norm. Moreover, the normative information was repeated daily during the seven day fruit diary of Study 2. Whether the same results would be obtained after only one single encounter with normative information remains subject to investigation. This question is especially interesting considering that fruit consumption – and eating behavior in general – does not consist of a one-time 'yes or no' decision, which may be relatively easy to influence with a one-time normative message, but rather of a continually ongoing decision-making process. Such a continuous process, in which multiple decision-making moments are encountered every day, may be less easily influenced by a single normative message. Future studies should investigate the longevity of the effect of normative messages on behavior.

In the current studies, participants who receive majority norm information, but do not (or only moderately) identify with the referent group show results comparable to participants who strongly identify with the referent group. This deviates somewhat from earlier studies showing that identification strength strongly influences the effects of majority descriptive norms on behavior. The current results indicate that, under certain conditions, people may always relate to majority norm information to some extent – even if they do not identify with the referent group. When minority norm information is provided, however, a strong identification with the referent group is especially crucial. When there is no such identification, the minority norm does not exert influence. Future research should further investigate this novel finding.

Implications

The current findings suggest that minority descriptive norm information can negatively influence health behavior when identification with the referent group is strong. The current study focused on fruit intake behavior in students. Whether the results generalize to other types of health behavior, and to other target groups where minority norm information is communicated, remains subject to investigation. The results may hold important implications for the way in which we communicate about (non)engagement in health practices to the public. While normative information seems, at face value, very factual, conveying minority norm information can evidently pose ironic (and unwanted) dangers for the health behavior of those receiving the information. Of course, if research indicates that – for example – very few people engage in cancer screening, this is a finding that must be communicated to the larger public. The solution therefore does not lie in simply not providing such information, but rather in framing such information carefully (for example by including information on the dangers of not engaging in the recommended behavior and the benefits perceived by those who do engage in it). The current results show that, when communicating these 'normative facts' to the public, we must remain attentive to the potential unintentional effects on people's behavior.

Chapter 6

How norms work: Self-identification, attitude and self-efficacy mediate the relation between descriptive social norms and vegetable intake

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Abstract

Descriptive social norms influence eating behavior. The current studies aim to replicate this finding for vegetable intake and to investigate three potentially underlying processes (self-identification, attitude and self-efficacy). In two studies, descriptive social norms regarding vegetable intake were manipulated (positive vs. negative). In Study 1, vegetable intake was assessed retrospectively after a one-week period. In Study 2, self-identification, attitude, self-efficacy and vegetable intake intentions were assessed after the manipulation. Study 1 showed that positive descriptive social norms led to higher vegetable intake (sufficient vegetable intake on 5.6 days of the week) than negative descriptive social norms (sufficient intake on 3.3 days), but only in participants identifying strongly with the norm referent group (p = .020). Study 2 showed a direct effect of the social norm manipulation on vegetable intake intentions (p < .001). Moreover, this direct effect was partly mediated by self-identification, attitude and self-efficacy (Sobel-test p's < .010). These studies shed first light on processes underlying the effect of descriptive social norms on health behavior. A norm describing the behavior of a salient social group leads people to identify more with, have more positive attitudes toward, and feel more self-efficacious regarding that behavior.

One important reason for the increasing number of overweight people is unhealthy eating behavior. In the so-called obesogenic food environment, calorie-dense unhealthy foods are cheap and easily accessible, and many people find it difficult to resist these tempting foods (e.g., Popkin, 2007; Rosenheck, 2008). Healthy food products such as fruits and vegetables, on the other hand, are consumed far too infrequently (Huang, Harris, Lee, Nazir, Born, & Kaur, 2003; Rolls, Ello-Martin, & Tohill, 2004). It is of crucial importance for public health to gain better insight into the processes that influence people's eating habits and subsequently use these insights to tailor interventions that will effectively curb the consumption of unhealthy foods and increase healthy eating. One factor that has been shown to exert powerful influence over health behavior, but of which the underlying processes are not yet fully understood, is that of descriptive social norms (Ball, Jeffery, Abbott, McNaughton, & Crawford, 2010; Sieverding, Decker, & Zimmermann, 2010). The current set of studies addresses both whether descriptive social norms influence eating behavior, more specifically vegetable intake, and if so, how this influence works.

Descriptive social norms

Descriptive social norms provide information regarding the acceptable or typical way to behave within a certain group; they describe what other group members actually *do* (Cialdini, Reno, & Kallgren, 1990; Deutsch & Gerard, 1955). Descriptive norms are a powerful motivator for behavior because of what Cialdini (2008) has called the *social proof principle*; the idea that if most people are behaving in a certain way, it must be the most appropriate or most effective way to behave. Indeed, a convincing body of literature exists to demonstrate that descriptive social norms constitute an important source of influence on behavior (Asch, 1951; Sherif, 1936), including health behavior (Ball *et al.*, 2010; Sieverding *et al.*, 2010). While less research has been conducted in the eating domain, several recent studies provide strong indications that descriptive norms play an important role in determining eating behavior too.

It has been shown, for example, that leaving snack bar wrappers of a supposed previous participant in the bin influenced subsequent participants to conform their snack choice to that of the supposed earlier participants (Burger *et al.*, 2010). Moreover, adolescents' perceptions of the descriptive eating norms among their peers strongly influenced their own consumption of both healthy

(fruit and vegetables) and unhealthy (soft drinks and unhealthy snacks) foods (Lally, Bartle, & Wardle, 2011). Similarly, giving individuals with positive descriptive norm information ('a majority of your peers eat sufficient fruits') increased fruit consumption relative to a control group that received no normative information, while a negative descriptive norm ('only a minority of your peers eat sufficient fruits') decreased subsequent fruit consumption (Stok, De Ridder, De Vet, & De Wit, 2012b).

Social norms thus seem to constitute a powerful tool for behavior change. Nevertheless, the mechanisms through which social norms work are not yet well understood (McAlaney & McMahon, 2007). A recent review article postulated that discovering *how* and *why* social norms influence behavior is a priority on the social norms research agenda (Burchell, Rettie, & Patel, 2013). The current studies aim to extend the literature with an investigation of how social norms influence eating behavior. In order to gain a better understanding of the underlying mechanisms of social norms, we turn to a seminal theory about intragroup processes, self-categorization theory.

Self-categorization theory

Self-categorization theory (Hornsey, 2008; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987) stipulates that when a certain social identity is made salient, a process called depersonalization occurs. Through this process, people perceive themselves (and others within the same social group) less as individual persons and more as prototypes of that particular social group. We propose that in a social norm intervention, this is exactly what happens: a norm referent group is made salient and that particular social identity becomes activated, prescribing group-appropriate attitudes and behaviors and motivating the individual to conform to the group's behavioral standards. Based on self-categorization theory, three mechanisms are proposed to underlie this shift toward norm-appropriate behavior. With this proposition about mechanisms underlying normative influence, we aim to contribute novel insight to the current literature.

First, it is proposed that if the norm referent group is an important part of one's identity and this social identity is made salient, group norms can become internalized (Hornsey, 2008). This will lead people to identify with the stipulated behavior more, potentially crossing over from that one social group's identity into the individual's personal identity. The first mechanism through which social

norms are thought to influence behavior is thus through boosting self-identification with the described standard behavior.

Second, to the extent that a relevant social group is perceived to perform a certain behavior, and one identifies positively with that social group, it is hypothesized that positive attitudes toward the behavior should increase. This is supported by theorizing from Terry, Hogg, and McKimmie (2000) who indicate that when depersonalization occurs, a positive association between the group's normative behavior and individual attitudes toward that behavior is expected. The second mechanism through which social norms are thought to influence behavior is thus through strengthening positive attitudes toward the behavior.

Third, if an individual perceives that others similar to him are able to perform the stipulated behavior, this should induce a perception of personal control over the behavior in that individual (the idea that "if others like me can do it, I must be able to do it as well"). This idea is supported by evidence showing that perceptions of self-efficacy mediated the positive effect of making salient social identity on behavior in a public goods dilemma (De Cremer & van Vugt, 1998). The third mechanism through which social norms are proposed to influence behavior is thus through increasing self-efficacy for performing the behavior.

Current studies

In the current studies, a first step is taken toward testing the potential underlying processes that can explain the influence of social norms on behavior. Study 1 has two goals: to investigate the effect of a descriptive social norm message on vegetable intake over a period of a week and to determine whether self-identification, attitude and self-efficacy are related to vegetable intake. Study 2 then aims to investigate whether these three proposed mediators indeed underlie the influence of descriptive social norms on eating.

In both studies, a positive and a negative descriptive social norm are compared: people in the positive norm condition receive information that most people eat sufficient vegetables, while people in the negative norm condition receive information that only few people eat sufficient vegetables. Moreover, the extent to which people identify with the norm referent group is taken into account, as a large body of research indicates that social norms have a larger effect on behavior when participants identify with the norm referent group (e.g., Johnston & White, 2003; Stok *et al.*, 2012b).

Study 1

In this first study, we investigate (1) baseline scores on self-identification, attitude and self-efficacy (the three variables that will be tested for mediation in Study 2) as well as their relation with vegetable intake, and (2) the direct influence of a positive versus negative descriptive social norm on vegetable intake behavior. Participants are asked to complete a questionnaire including baseline measures, which ends with the norm manipulation. One week later, they return to complete a follow-up measurement asking for their vegetable intake during the past week. Expectations are, firstly, that the three proposed mediators are related to baseline vegetable intake, and secondly, that people receiving the positive descriptive norm would consume more vegetables throughout the week following the norm message than people receiving the negative descriptive norm. Importantly, we expect to find this effect only for participants who strongly identify with the norm referent group.

Method

Participants

Sixty-eight students from two Dutch universities (Utrecht and Wageningen)[1] filled out the first questionnaire with a mean age of 20.9 years (SD = 3.2). Eighty-four percent of the participants were women. Only 57 participants were present the next week to complete the follow-up measure (29 participants in the positive norm condition, 28 in the negative norm condition). Participants who dropped out did not differ from participants who returned in terms of age and baseline vegetable consumption, both F's (1,65) < 1, nor in terms of gender, χ^2 (1, N = 68) = 1.19, p = .275.

Procedure

Participants were asked to fill out a short questionnaire in class. They recorded their date of birth (to be able to match their responses to the follow-up measure one week later) and gender. Participants were then asked about the number of days during the previous week on which they had eaten sufficient

[1]To correct for a potential clustering effect at university level, all analyses were also run using complex sample analysis with the two universities as strata. The design effect was very small (the square root of the design effects deviated maximally 0.014 from 1.00), which indicates that the standard errors changed by ~1.4% when the university level was taken into account. Because the findings were not different for both types of analyses, regular linear regression analyses are reported here for ease of interpretation.

vegetables (indicating that two ounces per day qualified as 'sufficient'), constituting the baseline measure, as well as (1) their self-identification as a person who eats sufficient vegetables, (2) their attitude toward eating vegetables, and (3) their self-efficacy for eating sufficient vegetables (see below for more details on these measures). Participants were subsequently asked to report on their strength of identification with the norm referent group (more details below). Following this, participants had to turn the form over, after which they read the norm manipulation. The form ended with a bogus question about the importance of eating sufficient vegetables, meant to cover up the true meaning of the norm manipulation.

Exactly one week later in the same class, participants received a follow-up form. On this form, they again recorded their date of birth and gender (for matching purposes) and a question asking them to indicate the number of days during the previous week on which they had eaten sufficient vegetables, which constituted the main dependent variable. It was again explained that two ounces qualified as 'sufficient'.

Measures

Self-identification: Self-identification as a person who eats sufficient vegetables was assessed with two items: 'eating sufficient vegetables is something that fits with who I am' and 'I see myself as someone who eats sufficient vegetables', assessed on a 5-point scale ranging from 1 (totally disagree) to 5 (totally agree). The items correlated strongly ($r = .805$, $p < .001$) and one average self-identification score was computed.

Attitude: Participants' attitude toward eating vegetables was assessed by putting four pairs of words with opposite valence (nice-stupid, sensible-insensible, pleasant-unpleasant, bad-good) on both ends of a scale. Participants had to indicate which point on the 7-point scale best corresponded with their attitude toward vegetable consumption. One average attitude score was computed (Cronbach's alpha = .76).

Self-efficacy: Self-efficacy for eating sufficient vegetables was assessed on a five-point scale ranging from 1 (not at all) to 5 (very much so) with two items, 'eating sufficient vegetables is in my own hands' and 'I find it difficult to eat sufficient vegetables' (reverse coded). Both items were correlated ($r = .238$, $p = .050$) and one average self-efficacy score was computed.

Identification with the norm referent group: The extent to which participants identified with the norm referent group was assessed with three items (e.g., 'I feel a strong connection to Utrecht [Wageningen] university students) assessed on a 5-point scale ranging from1 (not at all) to 5 (very much so). As this variable is analyzed as a moderator of the effect of the norm manipulation on the follow-up dependent variable, scores from the sample present at follow-up are described. One average norm referent group identification score was computed (Cronbach's alpha = .87). Because scores were not normally distributed (a K-S test showed that $D(57) = .13$, $p = .018$) and because most participants scored around the mean, indicating a nonlinear effect and attenuating the hypothesized influence that the norm manipulation might have on high identifiers, scores on this variable were categorized (see Becher, 2005) as either weak identification (below or equal to -1 SD, $N = 10$), moderate identification (between -1 SD and + 1 SD, $N = 35$) or strong identification (equal to or above +1 SD, $N = 12$).

Norm manipulation

The norm manipulation was delivered in the form of a short informational text that began the same for both conditions: "Everybody knows that it is important to eat sufficient vegetables (at least two ounces per day). Nevertheless, we also know that many people do not meet this guideline – most people do not eat a sufficient amount of vegetables." The text then continued with a final sentence that was different for both conditions. Participants in the positive norm condition read: "Previous research has shown that Utrecht [Wageningen] university students, however, do very well: *a full 73% of Utrecht [Wageningen] university students eat sufficient vegetables.*" Participants in the negative norm condition read: "Previous research has shown that Utrecht [Wageningen] university students do not do very well either: *27% of Utrecht [Wageningen] university students eat sufficient vegetables*."

Results

Results regarding the three mediator variables and baseline vegetable consumption were calculated across the whole group ($N = 68$). Results regarding identification with the referent group and the follow-up measure of vegetable consumption were calculated in the sample present at follow-up ($N = 57$). This is clearly indicated in the text.

Descriptive statistics

Participants scored moderately high on all three supposed mediators (*M* self-identification = 3.43, *SD* = 0.92; *M* attitude = 6.00, *SD* = 0.67, *M* self-efficacy = 3.63, *SD* = 0.73) and they had eaten sufficient vegetables on an average of 4.1 days (*SD* = 1.7) of the week before the first part of the study. During the week after receiving the norm manipulation, participants who were present at follow-up had eaten sufficient vegetables on an average of 4.6 days (*SD* = 1.6). These participants on average indicated moderately identifying with the norm referent group of Utrecht [Wageningen] university students (*M* = 3.02, *SD* = 0.84). The three identification groups consisted of participants scoring 2.19 or lower (weak identification group; scores ≤ -1 *SD*), those scoring between 2.20 and 3.85 (medium identification group, -1 *SD* < scores < +1 *SD*) and those scoring 3.86 and higher (strong identification group, scores ≥ +1 *SD*).

Correlations between proposed mediators and baseline vegetable intake

As expected, there were significant positive correlations between the proposed mediator variables and baseline vegetable intake. More specifically, self-identification (r = .586, p < .001), attitude (r = .381, p = .001) and self-efficacy (r = .556, p < .001) were all strongly correlated with vegetable intake.

Randomization check

As a randomization check, a MANOVA was conducted in the follow-up sample with experimental condition as independent factor and age, gender, number of days on which participants had consumed at least two ounces of vegetables at pre-test, self-identification as a person who eats sufficient vegetables, attitude toward eating vegetables, self-efficacy for eating sufficient vegetables, and strength of identification with the norm referent group as dependent variables. This analysis indicated that randomization was successful, F (7,48) < 1. The obtained univariate effects indicated that participants in the two experimental conditions did not differ from each other on any of the aforementioned variables, all F's (1,54) < 2.80, all p's > .100.

Influence of norm manipulation on vegetable intake

A custom-model ANCOVA in the follow-up sample with experimental condition, strength of identification with the norm referent group, the interaction between these two, and baseline vegetable consumption as independent variables and the follow-up measure of vegetable consumption as dependent variable indicated that there was a positive main effect of baseline vegetable consumption,

F (1,49) = 14.68, p = .001, $p\eta^2$ = .231. Moreover, the main effect of experimental condition was marginally significant, F (1,49) = 2.96, p = .091, $p\eta^2$ = .057. Participants receiving the positive norm tended to eat sufficient vegetables on more days (M = 4.9, SD = 1.6) than participants receiving the negative norm (M = 4.2, SD = 1.6). Importantly, while there was no main effect of identification with the norm referent group, F (2,49) < 1, the main effect of experimental condition was qualified by a marginally significant interaction effect with identification strength, F (2,49) = 2.91, p = .064, $p\eta^2$ = .106 (see Figure 1). The descriptive social norm significantly influenced vegetable consumption when participants strongly identified with the norm referent group, t(11) = -2.82, p = .020, but not when identification was moderate, t(33) = -0.41, p = .684 or weak, t(9) = -0.266, p = .798. Among strong identifiers, participants ate sufficient vegetables on 5.6 (SD = 1.2) days of the week after receiving the positive norm manipulation, and on 3.3 (SD = 1.6) days of the week after receiving the negative norm manipulation.

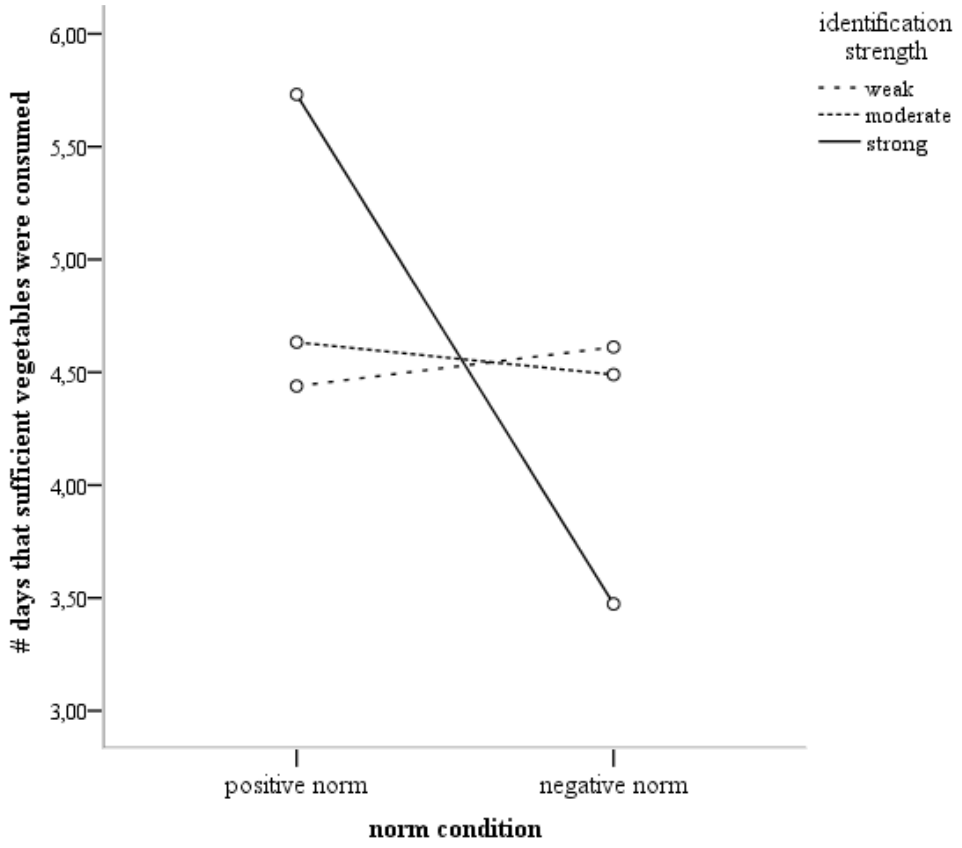

Figure 1. The interaction effect of positive and negative social norms and level of identification with the norm referent group on vegetable intake.

Discussion

The current study indicated that a descriptive norm manipulation influenced participants' vegetable intake over a period of a week; people receiving a positive norm ate sufficient vegetables on more days of the week than people receiving a negative norm. This effect was only found for people who identified with the norm referent group strongly. Furthermore, the three proposed mediating variables were found to be correlated with vegetable intake. This presence of a correlation between the proposed mediators and general vegetable intake suggests that it is likely that these variables may influence eating behavior, rendering support to the mediation hypothesis that will be tested in Study 2.

Study 2

Study 1 demonstrated two things: firstly, the direct effect of a social norm manipulation on vegetable intake was significant for people strongly identifying with the norm referent group, replicating earlier findings, and secondly, the three variables proposed to mediate this effect were correlated with baseline vegetable intake. Study 2 is conducted to bring these two parts together, investigating if part of how descriptive norms influence behavior is through the three proposed mediating variables. To that end, this study examines whether descriptive social norms about eating sufficient vegetables influence (1) self-identification as a person who eats sufficient vegetables, (2) attitude toward eating vegetables, and (3) self-efficacy for eating sufficient vegetables. Hypotheses are that a positive norm, as compared to a negative norm, will lead to higher self-identification, more positive attitudes and more self-efficacy regarding the target behavior. Moreover, it is hypothesized that these variables in turn mediate (part of) the influence of the descriptive norm manipulation on participants' intention to consume sufficient vegetables. Further improvements compared to Study 1 were the inclusion of height and weight measurements.

Method

Participants

Participants were 60 university students from Utrecht university. Seven participants indicated not identifying with Utrecht university students (scoring below 2.5 on identification, the midpoint of the scale) and one participant did not respond to the norm referent group identification questions. As Study 1 showed

that identification with the norm referent group is a necessary condition for a norm message to influence behavior, these participants were excluded from analyses, leaving a sample of 52 participants for analyses[2]. Participants had a mean age of 23.5 years (*SD* = 2.5) and 73% were female. They had a mean BMI of 21.3 (*SD* = 2.4).

Procedure

Participants were asked to fill out a short form. They first recorded their date of birth, age, gender, height and weight. Participants then indicated the number of days during the previous week on which they had eaten sufficient vegetables. It was explained that two ounces qualified as 'sufficient'. After this, their strength of identification with the norm referent group was assessed. Participants then had to turn the form over, after which they received the experimental manipulation. This was followed by an assessment of self-identification as a person who eats sufficient vegetables, attitude toward eating vegetables, self-efficacy for eating sufficient vegetables, and intention to eat sufficient vegetables (more detailed information about these measures is provided below).

Materials

BMI: Body mass index was computed from participants' self-reported height and weight.

Identification with the norm referent group: Participants' strength of identification with the norm referent group was assessed identical to Study 1. One average referent-group-identification score was computed (Cronbach's alpha = .96).

Self-identification: Self-identification as a person who eats sufficient vegetables was assessed with three items: (e.g., 'eating sufficient vegetables is something that fits with who I am') assessed on a 5-point scale ranging from 1 (not at all) to 5 (very much so). One average self-identification score was computed (Cronbach's alpha = .95).

[2]Leaving these seven participants in the sample did not substantially change any of the results, but did moderate the strength of the effect of the norm manipulation on all dependent measures (self-identification, attitude, self-efficacy and behavioral intention). Including these participants made the influence of the norm manipulation on these variables less significant (though not non-significant). The group of seven participants is too small to meaningfully conduct separate analyses on, but we would expect that, in line with previous literature the effect of the norm manipulation would not be significant for these non-identifiers.

Attitude: Participants' attitude toward eating vegetables was assessed identical to Study 1. One average attitude score was computed (Cronbach's alpha = .84).

Self-efficacy: Self-efficacy for eating sufficient vegetables was assessed with two items: 'I find it hard to eat sufficient vegetables' (recoded) and 'it is easy for me to eat sufficient vegetables, assessed on a five-point scale ranging from 1 (totally disagree) to 5 (totally agree). The items correlated strongly (r = .592, p < .001) and one average self-efficacy score was computed.

Intention: Participants' intention to eat sufficient vegetables in the near future was assessed with four items: I plan to/want to/expect to/will eat sufficient vegetables in the near future. One average intention score was computed (Cronbach's alpha = .97).

Norm manipulation

The norm manipulation was identical to the manipulation used in Study 1.

Data treatment and analysis

Answers from five participants who indicated a number of days on which they had consumed sufficient vegetables in the previous week higher than 7 were set to missing for that specific variable only. These participants were retained for the other analyses and only excluded for the analyses including this specific measure (leaving a sample of N = 47 for the analyses including the measure of vegetable consumption).

Mediation analyses were conducted for each of the three supposed underlying factors (self-identification, attitude and self-efficacy) separately. Each mediation analysis consisted of five steps, with each step having to be significant in order to proceed to the next step (Baron & Kenny, 1986). The steps examined (1) the direct influence of the independent variable on the dependent variable; (2) the influence of the independent variable on the mediator; (3) the influence of the mediator on the dependent variable, controlling for the independent variable; (4) the remaining direct influence of the independent variable on the dependent variable, controlling for the indirect path through the mediator; and (5) whether the beta-drop of the direct path when including the indirect (mediation) path was significant, using a Sobel-test.

Results

Descriptive statistics

Participants strongly identified with students of Utrecht university (M = 4.17, SD = 0.78). Participants indicated that on average, they ate sufficient vegetables on 4.4 days (SD = 2.0) of the week previous to the study. Moreover, they reported a rather strong intention to eat sufficient vegetables in the near future (M = 4.02, SD = 0.85).

Randomization check

A MANOVA with experimental condition as independent factor and age, gender, BMI, number of days on which participants had consumed at least two ounces of vegetables in the previous week at pre-test, and strength of identification with the norm referent group as dependent variables indicated that randomization was successful, F (5,42) < 1. The obtained univariate effects indicated that participants in the two experimental conditions did not significantly differ from each other on any of the aforementioned variables, all F's (1,46) < 1.5, all p's > .230.

Main analyses

In order to determine whether the norm manipulation influenced participants' intention to consume sufficient vegetables, an ANOVA was conducted with experimental condition as independent factor and mean intention as dependent variable. Results indicated that participants in the positive norm condition reported a higher intention to consume sufficient vegetables (M = 4.55, SD = 0.54) than participants in the negative norm condition (M = 3.45, SD = 0.75), F (1,50) = 37.42, p < .001, $p\eta^2$ = .428.

To examine the hypothesis that the influence of the descriptive norm manipulation on intention is partly mediated by the proposed three factors of self-identification as a vegetable eater, attitude toward vegetable consumption and self-efficacy for eating vegetables, it was first investigated whether the norm manipulation influenced these factors. A MANOVA was conducted with experimental condition as independent factor and self-identification, attitude and self-efficacy as dependent variables. The multivariate effect was significant, F (3,48) = 5.72, p = .002, $p\eta^2$ = .263. Moreover, the univariate effect for every separate dependent variable was also significant, indicating that the norm manipulation influenced self-identification (F (1,50) = 15.96, p < .001, $p\eta^2$ = .242), attitude (F (1,50)

= 11.23, p = .002, $p\eta^2$ = .183) and self-efficacy (F (1,50) = 11.13, p = .002, $p\eta^2$ = .182) alike. Scores per condition for each mediator variable are depicted in Table 1.

Subsequently, it was analyzed whether the influence of the norm manipulation on participants' intention to consume sufficient vegetables was (partially) mediated by the changes in self-identification, attitude and self-efficacy. Results from the mediation analyses are depicted in Table 2 and showed that for all three mediators, each step in the mediation analysis was significant. The norm manipulation predicted the intention to consume sufficient vegetables (Step 1) and also predicted each of the three mediator variables (Step 2). Each mediator predicted the intention to consume sufficient vegetables (while controlling for the norm manipulation; Step 3). Controlling for the indirect path caused a drop in significance of each direct path (Step 4), although each direct path did also remain significant. Finally, a Sobel-test indicated that the indirect mediation path was significant, causing a significant beta-drop in the direct path (Step 5).

Table 1: Mean scores (and standard deviations) on self-identification, attitude and self-efficacy per condition in Study 2

measure	**positive norm** (N = 27)	**negative norm** (N = 25)
self-identification *(scale 1-5)*	4.28 (0.79)	3.39 (0.83)*
attitude *(scale 1-7)*	6.15 (1.07)	5.21 (0.94)*
self-efficacy *(scale 1-5)*	4.26 (0.79)	3.48 (0.90)*

Note: * indicates that values differed significantly between conditions at $p < .005$.

Discussion

A descriptive norm manipulation about vegetable intake altered participants' intention to eat sufficient vegetables, with higher scores for people receiving a positive norm than for people receiving a negative norm. The norm manipulation also influenced self-identification, attitude and self-efficacy regarding vegetable intake, again with higher scores when receiving a positive norm as compared to a negative norm. Importantly, changes in these three variables mediated the direct effect of the descriptive norm on behavioral intention. These results thus indicate that norm messages partially affect people's health behavior intentions by influencing self-identification with the target behavior, attitudes toward the target

behavior and self-efficacy for the target behavior – as would also be predicted by self-categorization theory. However, as the direct path from norms to intentions also remained significant, the results also show that these three mediators together cannot fully explain how descriptive norms influence health behavior; part of the variance in intentions is caused by yet other factors.

Table 2: Stepwise results per mediator

	mediator 1: self-identification		mediator 2: attitude		mediator 3: self-efficacy	
	ß	*p*	ß	*p*	ß	*p*
Step 1: independent variable → dependent variable	-.654	< .001	-.654	< .001	-.654	< .001
Step 2: independent variable → mediator	-.492	< .001	-.428	.002	-.427	.002
Step 3: mediator → dependent variable (controlling for independent variable)	.623	< .001	.461	< .001	.551	< .001
Step 4: independent variable → dependent variable including indirect path	-.348	< .001	-.457	< .001	-.419	< .001
Step 5: Sobel-test	z = -3.48	< .001	z = -2.71	.007	z = -2.92	.003

General Discussion

The first of the current studies replicates earlier research (e.g., Burger *et al.*, 2012; Stok *et al.*, 2012b) showing that a descriptive norm manipulation influences eating behavior. Participants who received a positive descriptive norm, stating that most other referent group members eat sufficient vegetables, themselves consumed sufficient vegetables on more days in the week following the norm manipulation than participants who received a negative norm, stating that only few referent group members eat sufficient vegetables. This effect was only present for people who strongly identified with the norm referent group however, a finding which is in line with previous literature (e.g., Johnston & White, 2003; Stok *et al.*, 2012b). Moreover, the study demonstrated a correlation between the three variables proposed to mediate this effect (self-identification, positive attitudes and

self-efficacy) and an uninfluenced (i.e., measured before any experimental manipulations took place) measure of vegetable intake.

The second study provides a first step in uncovering how such norm manipulations exert their influence. Results showed that a positive descriptive norm increased self-identification, positive attitudes and self-efficacy regarding vegetable intake behavior as compared to a negative descriptive norm. These changes in turn partially mediated the effect of the norm manipulation on participants' behavioral intentions, indicating that norm manipulations influence health behavior (intentions) in part because they affect changes in these cognitive variables.

Social norm interventions: a powerful combination of identity and behavior

Self-categorization theory stipulates that when a social identity is made salient, which is what happens in a descriptive norm manipulation, people come to perceive themselves less as individuals and more as a prototype of the social group. This motivates the individual to be like other group members and conform to the group's behavioral standards. Importantly, a norm manipulation does more than just make salient social identity: it also indicates explicitly the typical behavior of the social group, thus giving individuals a strong pointer on how to put their motivation to conform to the group's behavioral standard into practice. This combination of (1) making salient a social identity and (2) making explicit the behavioral standard belonging to that social identity is inherent to descriptive social norms.

The current studies indicate that this combination provides a promising tool for influencing behavior, and also provide first insight into the mechanism underlying this influence. Results showed that a descriptive social norm manipulation triggers three cognitive processes; self-identification, attitudes and self-efficacy. In more detail, a positive norm message, as compared to a negative norm message, leads people to identify more with the stipulated behavior; they indicated seeing eating vegetables as something that was representative of who they were to a larger extent. Moreover, a positive norm message gave people more self-efficacy as compared to a negative norm message; knowing that most others like them were able to carry out the stipulated behavior seemed to give them a boost of confidence in their own ability, too. Finally, a positive norm made people more favorable toward the consumption of vegetables than a negative norm. In

other words, if most people (as compared to only few people) of one's social group perform a certain behavior, attitudes toward that behavior take a turn for the positive.

Limitations and suggestions for future research

A first potential limitation is that a no-norm control group was not included in the studies' designs, meaning that we cannot draw conclusions regarding the directionality of the effect of norm manipulations compared to a situation where no norms are provided. Does the positive norm make people (intend to) eat more vegetables and score higher on the mediating variables, or does the negative norm rather decrease consumption and scores on the mediating variables? There is some evidence indicating that the effect in fact goes both ways. An earlier study (Stok *et al.*, 2012b) showed that, as compared to a no-norm control condition, participants receiving a positive norm ate 1/3 daily portion of fruit more during a one-week follow up fruit diary, whilst participants receiving a negative norm ate 1/3 daily portion of fruit less. While this provides at least some idea of the directionality of descriptive norm manipulations, future research should certainly replicate and expand on this finding, taking into account the specific caveats of no-norm control conditions mentioned before.

Study 2 showed that the descriptive norm manipulation significantly affected three cognitive variables that were assumed to underlie the influence of social norms on behavior. Moreover, it was demonstrated that the influence of the norm manipulation on vegetable intake intentions was mediated by these three variables, rendering support to said assumption. It should be noted, however, that the dataset in Study 2 was cross-sectional whereas mediation analyses assume a causal pattern and should therefore, ideally, be conducted on prospective data (Maxwell & Cole, 2007). In addition, the dependent variable in this analysis was vegetable intake intention rather than actual vegetable consumption. While intention and behavior are certainly strongly related (in a meta-analysis by Sheeran, 2002, the average correlation between the two was found to be .530, which is qualified as a large effect size by Cohen, 1992) there nevertheless is a gap between the two (for a review, see Sheeran, 2002). The current research has taken an important first step in demonstrating that self-identification, attitude and self-efficacy mediate the relation between a descriptive norm intervention and vegetable intake intentions. This finding should be replicated and expanded upon

in future research, employing prospective designs and including measures of actual behavior.

Conclusions and implications

Novel to these studies was the investigation of how social norms work, something that until now is not yet well understood (McAlaney & McMahon, 2007). The current studies show that a descriptive social norm manipulation influences (1) the extent to which people identify with the norm group's standard behavior, in this case eating sufficient vegetables, (2) the extent to which they feel self-efficacious in eating sufficient vegetables, as well as (3) their attitudes toward eating vegetables, and that these three variables in turn predict vegetable intake intentions. Moreover, results show that this indirect path partially mediates the direct influence of norms on behavioral intentions, thus suggesting that these mediators are part of the mechanism underlying normative influence on health behavior.

With this finding, this study contributes to what has been posited as one of the main questions in the field of social norm interventions: uncovering *how* and *why* social norms work (Burchell *et al.*, 2013). While further research, replicating and expanding upon the current results, is certainly necessary, the current findings provide a first step toward answering this important question, hopefully bringing us closer to developing successful interventions.

Chapter 7

Summary and General Discussion

The overall aim of this dissertation was to advance understanding of how and when social norms influence eating behavior in young people, more specifically in the context of promoting healthy eating behavior. Our research aims were threefold. We aimed to a) review previous literature to determine if peer group norms are related to young people's eating behavior, and if changing young people's perceptions of existing peer group norms could be a potentially useful tool for the promotion of healthier eating behavior; b) investigate which specific types of peer group norms play a role in young people's eating behavior; and c) examine how social norms affect young people's eating behavior. In the previous five chapters, we presented a systematic review and a total of six empirical studies that addressed these research aims. In this last chapter, we summarize and discuss the main findings from the review and the studies reported in the empirical chapters, before describing in more detail how the current findings advance understanding of the effects of peer norms on young people's eating behavior. Subsequently, we describe limitations of the studies that were conducted and suggest avenues for future research. Finally, we discuss implications for practice that emerge from this dissertation. Please note that because the studies presented in two of the empirical chapters (Chapter 4 and Chapter 5) were also included in our systematic review (presented in Chapter 2), this general discussion will overlap to some extent with the discussion of the systematic review in Chapter 2.

Summary Of Findings

Chapter 2 described a systematic review of studies investigating the influence of peer group norms on young people's eating behavior. Fourteen observational and twelve experimental studies were reviewed. Together, these studies provided clear evidence, firstly, that social norms are associated with young people's eating behavior and secondly, that intervening in the peer norms governing eating behavior can affect young people's food consumption. However, the review also indicated that social norms do not always influence young people's eating behavior. Most notably, an important boundary condition seemed to be that peer norms affect young people's intake of only those types of food that are associated with peers (such as snacks and soft drinks). Another relevant finding from the review was that social norms may not always influence young people's eating behavior in the intended and desired (that is, healthy) direction, but may, under certain circumstances, backfire and in fact lead to unhealthier

eating behavior. The systematic review also identified a number of crucial moderators of the effect of social norms on young people's eating behavior. These moderators were self-control, habitualness of the behavior, closeness to the norm referent group, and forcefulness of the norm.

Chapter 3 reported a study that investigated whether self-reported perceived peer group norms were associated with three different outcomes: adolescents' intention to eat healthily and their self-reported intake of both healthy and unhealthy foods. We investigated associations with two types of peer group norms: norms that encourage healthy eating (i.e., 'my peers encourage me to eat healthily') and norms that discourage unhealthy eating (i.e. 'my peers discourage me from eating unhealthily'). Results showed that perceived peer norms that encourage healthy eating were associated both with adolescents' intention to eat healthily and their consumption of both healthy and unhealthy foods. Interestingly, different results were found for perceived peer norms that discourage unhealthy eating. Perceived peer discouragement of unhealthy eating was only related (inversely) to healthy eating intentions, but not to actual intake of either healthy or unhealthy foods. These findings suggest that, if health promoters want to use social norms to influence young people's eating behavior, it might be better to communicate norms that encourage healthy eating than norms that discourage unhealthy eating. We speculated that this may be due to young people's preference for positively framed health communication – young people seem to prefer being encouraged to behave healthily rather than being discouraged from behaving unhealthily.

In Chapter 4, we compared the efficacy of two types of social norm manipulations in promoting adolescents' fruit intake, namely a descriptive and an injunctive norm manipulation. Building on the findings reported in Chapter 3, both types of norms were formulated such that they reflected peer promotion of healthy eating (i.e., along the lines of 'most adolescents eat healthily themselves' and 'most adolescents think other adolescents should eat healthily' for the descriptive and injunctive norm, respectively). Results from the study reported in this chapter suggested that, after communicating an injunctive peer norm, adolescents actually reported lower fruit intake intentions than adolescents who received no normative information. After communicating a descriptive peer norm, on the other hand, we found no effect on intended fruit consumption (which was similar to that of the control group), but indications were found that fruit

consumption was (marginally significantly) higher than that of adolescents who received no normative information. This suggests that an injunctive norm may not be efficacious in promoting adolescents' fruit intake, and may even lead to lower intentions to consume fruit, while a descriptive norm did successfully increase fruit consumption.

Having found indications that descriptive norms might be more efficacious than injunctive norms when looking to promote healthy eating behavior in young people, descriptive norms became the focus of the remaining chapters. Chapter 5 described two studies in which we investigated if the influence of a descriptive norm manipulation on eating behavior would be moderated by young people's identification with the peer group whose behavior is described in the social norm message. Results from both studies indicated that the extent to which students feel similar to their fellow students, and identified with them, may be a crucial moderator of the impact of the descriptive norm manipulation on their fruit intake. In both studies, the descriptive norm manipulation only influenced (intended) fruit intake if identification with the norm referent group was high. Another important finding emerging from Chapter 5 was that when a descriptive norm was presented as a minority norm (i.e., along the lines of 'only few people eat healthily'), this led to lower fruit intake intentions and actual fruit intake as compared to the more traditional majority norm (i.e. 'most people eat healthily'). Also, fruit intake following this minority norm intervention was lower than in a control condition. This finding has imperative implications for, for example, public health campaigns, in which such minority norms are frequently communicated. While this is done with the intention to alert the population to their low engagement in healthy behaviors and to steer them into performing these healthy behaviors more often, our findings imply that communication of minority norms may in fact result in the exact opposite.

Continuing our investigation of descriptive norms, Chapter 6 aimed to increase understanding of how descriptive social norms exert their influence on behavior. This chapter reported on two studies investigating three variables that potentially underlie the influence of social norm manipulations on eating behavior. Study 6.1 replicated the findings from Chapter 5 and found that a majority descriptive norm may lead to higher healthy food intake (in this case of vegetables) than a minority descriptive norm. Again, this effect appeared to be present only in people who strongly identified with the norm referent group.

Study 6.2 showed that students to whom a majority norm was communicated reported higher self-identification as a vegetable eater, more positive attitudes toward eating vegetables and higher self-efficacy for eating vegetables, as compared to students to whom a minority norm was communicated. Moreover, self-identification, attitude and self-efficacy partially mediated the effect of the majority norm on participants' intentions to consume a sufficient amount of vegetables in the near future. This suggests that increases in self-identification, attitude and self-efficacy might be part of the mechanism through which descriptive social norm interventions lead to positive effects on eating behavior.

In sum, the systematic review and empirical chapters all contributed to the overall aim of this dissertation, which was to further understanding of how and when social norms influence eating behavior in young people, more specifically in the context of promoting healthy eating behavior. Taken together, our results indicate that social norms may play a substantial role in young people's eating behavior, and that they may therefore constitute a useful tool for promoting young people's healthy eating behavior.

Moderating Conditions And Underlying Processes Of Peer Norm Influence

The research presented in this dissertation advances understanding of peer norm influence on young people's eating behavior in various ways. Below, we describe a number of moderators and underlying processes of the effect of peer group norms. Research in this dissertation mostly focused on descriptive rather than injunctive social norms. This focus was based on the finding, reported in Chapter 3, that the communication of injunctive norms did not improve young people's fruit intake (and even reduced fruit intake intentions). We therefore begin with describing moderators and underlying processes of descriptive norms.

Identification with the norm referent group

Studies 5.1, 5.2 and 6.1 showed that descriptive social norms only influenced behavior when young people strongly identified with the referent group described in the norm. In other words, stating that, for example, 'most young people eat healthily' will only influence healthy eating behavior in those who identify with the referent group of 'young people'. This replicates previous findings (Louis, Davies, Smith, & Terry, 2007; Nordrehaug Åstrøm & Rise, 2001; Yun & Silk, 2011), but also extends these findings in a meaningful way. While each of these previous

studies found that identification moderated the influence of descriptive norms on young people's *intention* to eat healthily, results in this dissertation indicated that identification with the norm referent group similarly modifies the effect of descriptive norms on young people's actual consumption.

One of the reasons why identification with the norm group is a moderator of the effect of descriptive norms may be that descriptive norms provide so-called 'consensus information' (Thibaut & Kelley, 1959): they indicate what is the typical, and therefore probably correct, way to behave for members from a certain social group (Jacobson, Mortensen, & Cialdini, 2011). Crucially, such descriptive normative information should motivate behavior only when one in fact feels part of that specific social group or aspires to become part of that social group: only in that case, it is relevant to behave similar to other group members. What is more, it has been shown that behaving in accordance with fellow group members induces positive emotions (Christensen, Rothgerber, Wood, & Matz, 2004), providing another reason to conform to the descriptive norms of groups one identifies with. If one does not feel part of a group, or does not want to be associated with that group, behaving in line with the groups' members is not important. A descriptive norm should therefore have less influence on the behavior of someone who does not identify with the norm's referent group.

Underlying processes: self-identification, attitude, and self-efficacy

Studies 6.1 and 6.2 provided first indications that descriptive norms may strengthen participants' self-identity, attitude and self-efficacy with regard to the behavior promoted in the norm. We also found indications that such bolstering effects in turn may partially mediate the effect of descriptive norms on intentions to engage in the behavior, thereby providing insight into the underlying mechanism of descriptive social norms. Because the underlying processes of social norm influence are not yet fully understood (Burchell, Rettie, & Patel, 2013; McAlaney & McMahon, 2007), our findings constitute a theoretical contribution to social norms research.

Importantly, the effect of each of these three mediators hinges on strong identification with the norm referent group. In the case of self-identification, the idea is that if one identifies with a social group, the norms of that group may be internalized and can become part of one's self-identity (Hornsey, 2008). If young people perceive a health-promoting social group norm, then, they may come to

identify personally with this healthy behavior. In the case of attitudes, it has been shown that to the extent that a relevant social group, which one strongly identifies with, is perceived to perform a certain behavior, positive attitudes toward that behavior should increase (Terry, Hogg, & McKimmie, 2000). Finally, in the case of self-efficacy, if young people perceive that others similar to them are able to eat more healthily, this should induce a perception of personal control over the behavior (cf. De Cremer & van Vugt, 1998). Together, these three processes of self-identification, changing attitudes, and increasing self-efficacy may contribute to the influence that social norms exert on young people's eating behavior.

Descriptive norms as heuristics

Our findings partially corroborated the account that descriptive norms function as a behavioral heuristic (Jacobson *et al.*, 2011), influencing behavior automatically and without effortful processing of the norm being necessary. In Chapter 3, we reported the finding that communicating a health-promoting descriptive norm did not change adolescents' intention to consume fruit. As reporting on their intentions requires participants to deliberate rather explicitly, it is understandable that this process may not necessarily be affected by a norm that is thought to exert its influence heuristically. Previous research has shown that people are generally unaware that descriptive social norms influence their behavior at all (Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008), providing additional evidence that descriptive norms may exert their influence on behavior mostly automatically. Indeed, participants in the studies by Nolan and colleagues (2008) actually *reported* that their motivation to engage in a certain behavior (in this case, energy conservation) was least affected by descriptive norms, and more by other factors (such as, in this case, self-interest and environmental concerns). The results showed, however, that their behavior was in fact *most* affected by descriptive norms, providing clear indications that descriptive norms influence behavior in an automatic manner that people are not necessarily aware of.

We should also note, however, that various studies included in the systematic review (Chapter 2) and our own studies 5.1 and 6.2 may not be in accordance with this account. These studies showed that in some cases, descriptive norms *do* seem to influence behavioral intentions. These seemingly contradictory findings may be resolved by looking more closely at the designs of these studies.

In the relevant studies in the systematic review, participants had to self-report perceptions of descriptive norms. This means they had to deliberately consider the norms, which may well account for the presence of an association with the (also deliberately considered) outcome of behavioral intentions. Moreover, the effects of descriptive norms on intention observed in studies 5.1 and 6.2 reflect differences between two experimental conditions (a minority or majority norm), rather than between a descriptive norm and a control condition. This may account for the differences in the presence or absence of an effect on behavioral intentions. More research is clearly required to increase our understanding of when and how descriptive norm manipulations influence behavioral intentions.

Injunctive norms

Injunctive norm manipulations were found not to influence young people's fruit intake behavior in the studies reported in Chapter 4, and to even negatively influence fruit intake intentions. In Chapter 3, however, we focused on *subjective* norms (Ajzen, 1991), which, in the manner we operationalized them, were in fact a type of injunctive norms (Knight Lapinski & Rimal, 2005). Surprisingly, we found that these (subjective) injunctive norms *were* in fact associated with healthier food intake in adolescents. Similarly, in the systematic review reported in Chapter 2, a number of studies found that a compound norm measure, combining items measuring both descriptive and injunctive norms, had a positive influence on young people's eating behavior. A factor that may be relevant in explaining this apparent inconsistency is the *forcefulness* of the injunctive norm. The operationalization of injunctive norms differed between the studies in which a health-promoting effect was found and the studies that found null effects or negative effects. This difference lay in the extent to which the norm was formulated as a forceful expectancy. In the studies that found positive effects on eating behavior, the injunctive norm measure employed a word that implies a suggestion: e.g., 'my friends *encourage* me to eat more healthily' or 'my friends *support* me to consume more fruit'. In the studies that found no or negative effects, on the other hand, the injunctive norm measure employed a word that implies a prescription; e.g., 'my friends think I *should* eat more healthily' or 'my friends say I *ought* to eat more fruit'. This second type of norm may give young people the feeling that a certain behavior is forced upon them, and young people are thought to be extremely sensitive to anything that they perceive as an outside attempt to

steer their thoughts and behaviors (Burgoon, Alvaro, Grandpre, & Voulodakis, 2002; Miller, Lane, Deatrick, Young, & Potts, 2007). Such perceived threats to their freedom to decide how to think and behave may cause feelings of resistance in young people, which in turn could cause them to actually go against the injunctive norm and do exactly the opposite of what the norm stipulated, a process known as psychological reactance (Brehm, 1966). It thus seems that, when using injunctive norms in a social norm intervention aimed at promoting healthier eating behavior, forcefulness of the norms is something that should be taken into account: suggesting or encouraging to behave in accordance with healthy peer expectations seems to result in healthier eating behavior than enforcing norm-conforming behavior.

Summary

To summarize, this dissertation made various theoretical contributions that advance understanding of the moderating conditions and underlying processes of peer norm influence. Specifically, we found that identification with the norm referent group is an important moderator of the influence of descriptive peer norms on young people's eating behavior. Extending previous studies, which found this effect for intended consumption, we found that identification also moderates actual intake of healthy (fruits and vegetables) foods. Furthermore, our results increase knowledge of how social norms may work, by indicating that self-identity, attitude and self-efficacy partially mediate the effect of descriptive norms on intended healthy intake. We also found indications that descriptive social norms may exert their influence automatically and that effortful processing of the norm may not be necessary for it to have an effect on eating behavior. Finally, we found indications that injunctive norms, when posed in a forceful manner, may induce reactance and may in fact have negative effects on (intended) healthy eating.

Limitations

Some methodological limitations of the current studies have to be noted. One limitation pertains to the target population of young people. In all of our empirical studies, as well as in the systematic review, we focused on young people: either adolescents or young adults. We should note that we never included both age groups in one and the same study, which means that the generalization of our

results to 'young people' may not be fully justified; it is after all theoretically possible that the results of each of our studies would have been different had the study been conducted in the other age group. However, both groups share important characteristics that shape each life phase. Notably, both adolescents and emerging adults typically find themselves in transitional life phases that require adaptation and adjustment (Erikson, 1968; Gall, Evans, & Bellerose, 2000), which has been associated with changes in dietary practices (LaCaille, Nichols Dauner, Krambeer, & Pederson, 2011; Shepherd & Dennison, 1995). Also, the systematic review provided some support for the idea that there are no large differences between both age groups because no systematic differences were observed in the effects of social norms on eating behavior between studies in adolescent or young adult samples. Nevertheless, there are also substantial differences between both age groups (such as home environment, development of executive functions, and level of education) which may limit generalizability of results found in one of age group to the overall population of young people.

Another limitation pertains to the design of our experimental studies. We investigated how social norm manipulations affected eating behavior in the short term, ranging from immediately after the manipulation to a maximum of one week after the manipulation was delivered. Consequently, the longevity of the effect of social norm communications remains to be established. As people are exposed to myriad influences related to their eating behavior and frequently make food-related decisions, perhaps as often as 200 times per day (Wansink & Sobal, 2007), it is unclear how pervasive the influence of a one-time social norm manipulation on eating behavior may be. A related issue is that in our experimental designs we consistently manipulated one specific social norm. It is highly likely, however, that young people will come into contact with many different norms in their daily lives, and it is also quite likely that some of these norms may be in contradiction to the social norms that were communicated in our studies. When young people, after being exposed to a social norm manipulation, subsequently find themselves in an environment filled with contradictory normative messages (such as peers eating unhealthy snacks, peer expectancies to conform to unhealthy standards, and advertisements showing happy people eating unhealthy foods), the likelihood that the one intervention norm will continue to hold up against so many contrasting normative influences may not be very high (cf. Marteau, Ogilvie, Roland, Suhrcke, & Kelly, 2011). While it is thus

likely that the potential scope of a one-time, one-norm manipulation is limited, our results nevertheless indicated that the effect of such a manipulation can last up to at least one week. Effects of a norm manipulation across one week have been observed in two of our studies (study 5.2 – although it should be noted that the one norm was repeated every day, and study 6.1 – in which one norm was delivered only once). These findings show that social norm interventions do have the potential to reach across time and across situations.

A further limitation pertaining to the design of the studies is that a control condition was not always included in our designs. Of the four studies investigating the differences between minority and majority descriptive norms, only one (study 5.2) included a control condition; the other three (studies 5.1, 6.1 and 6.2) did not. The lack of a control condition in these three studies limits our ability to draw conclusions about the directionality of the effect. That is, does a minority norm lead to lower healthy intake, does a majority norm to higher healthy intake, or do both effects occur simultaneously? Results from study 5.2, which did include a control condition, showed that in absolute numbers, fruit consumption of participants receiving the majority norm increased more than that of participants in the control condition, and fruit consumption of participants receiving the minority norm increased less than that of participants in the control condition. While this finding suggests that the effect may go both ways, it needs to be replicated in additional studies.

The fact that we used fictitious norms in our norm manipulations may also be considered a limitation of our experimental studies. We believe that, in order to demonstrate the efficacy of social norm manipulations, use of very clear and specific social norms is a necessary condition. However, it may not be possible or desirable to employ such fictitious norms in actual interventions. The ethical aspects of communicating untrue behavioral norms to the public have to be considered. Besides, it seems plausible (and results from pilot studies in Chapter 5 corroborated this idea) that norms have to be believable in order to affect behavior.

A last limitation pertains to the measurement of our outcome variables. We did not measure actual intake, but rather relied on self-reported consumption. Previous research has shown that self-report measures of eating are not always reliable (Livingstone, Robson, & Wallace, 2004). However, in various studies steps were taken to improve the reliability of the self-report measures by having

participants report intake over several days (the study reported in Chapter 4, study 5.2, and study 6.1) and in one case employing a food diary, which has been shown to be a rather reliable self-report measure of consumption (Day, McKneown, Wong, Welch, & Bingham, 2001).

Avenues For Future Research

Throughout this chapter, we have already identified a few topics where additional research would provide valuable contributions to the current body of knowledge. Below, we outline three broad avenues for future research.

First, in the current thesis, we have focused primarily on descriptive norm manipulations. It would be important to focus future research efforts on injunctive norms, too – especially since other researchers have suggested that injunctive norms may, in fact, have a more positive impact on eating behavior than descriptive norms (Mollen, Ruiter, & Kok, 2012). Our results are indicative of the opposite: communication of a healthy descriptive norm resulted in higher intake of fruits than communication of a healthy injunctive norm. Nevertheless, we agree that injunctive norm interventions, too, may be helpful for the promotion of young people's healthy eating behavior, as long as normative expectations are not enforced upon them. We believe that the forcefulness of an injunctive norm is a quintessential factor shaping their potential efficacy. As described above, forceful injunctive norms may be more likely to result in feelings of reactance, actually leading to resistance against the behavior promoted by the norm. This is corroborated by research from the field of health communication, which shows that engagement in a healthy behavior is higher if the behavior is suggested than if it is enforced (Miller *et al.*, 2007; Price Dillard & Shen, 2005), and by our own studies indicating that suggesting not to eat an unhealthy food leads to healthier behavior than enforcing non-consumption (De Vet, Stok, & De Ridder, 2013; Stok, De Vet, De Ridder, & De Wit, 2013).

Second, the current dissertation focused on using peer norm manipulations to promote healthy eating. In order to truly improve young people's dietary behavior, however, increasing their intake of healthy foods alone is not enough; it should be paired with a concurrent decrease in their intake of unhealthy foods. Results reported in Chapter 3 suggested that social norms may be less influential for unhealthy intake, which led to the focus of the current dissertation on increasing the intake of healthy foods. However, some of the studies included in

the systematic review in Chapter 2 provided indications that it also possible to decrease unhealthy eating with social norms (e.g., Pliner & Mann, 2004; Robinson, Benwell, & Higgs, 2013; Roth, Herman, Polivy, & Pliner, 2001). It should be noted that these were all studies in a laboratory setting; future research should therefore investigate if social norm interventions can be effective for the lowering of unhealthy intake in field settings.

Third, an important avenue for future research would be to assess the effects of dispersing social norms in more subtle ways than by explicitly communicating them. This is relevant because explicit norm communications may sometimes be too blunt or too obviously aimed at behavior change, especially for a population of young people who are typically averse to outside attempts to steer their behavior (e.g., Miller *et al.*, 2007). By communicating social norms more subtly, a normative intervention could take on the qualities of a nudge (Thaler & Sunstein, 2008), making the healthy choice the normal, automatic and easy choice. Various studies included in our systematic review employed such subtle designs, in which a norm was dispersed to young people through an environmental cue (such as a sign-up sheet showing that previous participants in a taste test consumed only a few cookies), rather than explicitly in a text message. However, such norms may be more limited in their reach, because they seem contingent upon a specific behavior in a contained situation (the sign-up sheet may influence consumption of cookies in that specific laboratory setting, but is not likely to also affect consumption of cookies once the participant is out of that setting again). Translating efficacious subtle social norm manipulations in laboratory settings to effective social nudges, applicable in field settings, constitutes a promising avenue for future research. An effective social nudge should steer a common healthy behavior, in a common situation, so that it has the potential to influence many people and on multiple occasions. Supermarkets may provide a fruitful environment for the implementation of effective social nudges. In this regard, a study showing that the use of social nudges in a virtual snack-stand promoted healthy choice-making provided some encouraging first steps in the direction of translating subtle norm manipulations to potentially effective norm interventions (Van Herpen, Van Trijp, & Van Amster, 2012).

Implications For Health Promotion

Several practical implications can be distilled from our results. One finding that has important implications for health promotion is that peer norms may not influence the intake of all types of food. More specifically, the influence of peer norms seems to be bound mostly to consumption of those types of foods that are typically consumed around peers. In the systematic review in Chapter 2, consistent associations were found between peer group norms and, for example, adolescents' consumption of snacks and soft drinks, which are arguably the types of food they will be more likely to eat in the company of peers. Associations were less consistent with, for example, *adolescents*' consumption of vegetables, which is a type of food they will typically consume at home with their parents. In *students*, on the other hand, vegetable consumption was found to be influenced by peer social norms (see also Chapter 6). As students move out of their parents' house and come to live on their own, peers seem to become a source of social influence for the foods typically consumed at home, as well. This finding is consistent with a focus theory of normative conduct account (Cialdini, Reno, & Kallgren, 1990), which suggests that a social norm may influence behavior only in situations that activate or make salient that specific norm. The overarching implication would then be that only the types of food associated with peers would render peer norms salient, and thus of influence on intake. Food types that are not associated with peers, on the other hand, would not typically activate peer norms (but may activate other norms, such as family or parental norms) and intake of these types of food would thus not be influenced by peer norms, either.

Another finding with substantial practical implications is that social norms promoting healthy eating behavior may, under certain conditions, backfire and result in less healthy eating. Chapters 4 and 6 both showed indications of such boomerang effects of social norm manipulations, in one case of an injunctive norm that lowered adolescents' intentions to consume fruit as compared to a control group, and in another case of a minority descriptive norm that, in a numerical sense but not statistically significantly, lowered students' actual fruit intake. These findings carry the implication that peer norms may have unintended and unexpected adverse effects on young people's (intended) eating behavior; this seems to occur when the norm is perceived as an imposition (in the case of an injunctive norm) or when the norm indicates that healthy eating is not a common behavior (in the case of minority norms). The idea that the use of social norms in

health interventions may have unintended negative effects has been also posited by others (e.g., Mollen *et al.*, 2012), and points to the necessity of a careful consideration of the potential effects of a social norm message before it is employed in a health intervention.

Results from the present research also indicate that norms may be more effective when they encourage healthy behavior, rather than discourage unhealthy behavior. This corresponds to findings from another study, in which adolescents were asked to indicate to which extent they would be supportive of various potential strategies aimed at improving their eating behavior (Stok, De Wit, & Nureeva, 2013). Adolescents systematically indicated higher support for those strategies that promoted the consumption of healthy foods (e.g., making healthy foods cheaper than for those strategies that discouraged the consumption of unhealthy foods (e.g., banning unhealthy snacks from the school canteen), indicating that they prefer a more positive approach to health promotion, aimed at promoting healthy behavior, over a more negative approach aimed at avoiding the unhealthy.

Conclusions

This dissertation has provided insight into the role of peer group norms in young people's eating behavior, advancing knowledge of how and when peer norms exert influence on food intake. Results suggest that peer social norms provide a potentially effective tool for the promotion of healthy eating. Interventions aimed at promoting healthier peer norms related to eating can, therefore, be part of a process in which changing norms – slowly but steadily – contribute to healthier eating among young people. In this regard, it is interesting to consider the case of smoking and tobacco control. It has been suggested that changes in tobacco legislation helped shift the prevailing, previously pro-smoking, social norms toward healthier anti-smoking descriptive and injunctive norms (Zhang, Cowling, & Tang, 2010). This process of shifting norms about smoking prevalence and acceptance is thought to have greatly contributed to the decrease in tobacco use during the past decades (Gutman, 2011; Zhang *et al.*, 2010). As unhealthy eating is thought to be similarly induced by unhealthy and ambiguous eating-related norms (De Ridder, De Vet, Stok, Adriaanse, & De Wit, 2013), intervening in peer group norms regarding eating behavior may, in time, lead to similar improvements for young people's dietary practices.

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Nederlandse Samenvatting

(Dutch Summary)

Mensen zijn sociale wezens. Onze identiteit wordt voor een groot deel gevormd door de verschillende sociale groepen waartoe we behoren, groepen die zo klein kunnen zijn als een gezin maar ook zo groot als een heel volk. De mensen om ons heen beïnvloeden wie we zijn: onze gedachten, onze emoties en ons gedrag worden voortdurend gevormd door anderen via een uitwisseling van ideeën, verwachtingen en gedragingen. Elke sociale groep heeft zijn eigen standaarden of *normen* voor gedrag, gebaseerd op de ideeën van de groep over wat goed of correct gedrag is. Deze sociale normen worden gewoonlijk niet expliciet gemaakt, maar blijken uit het gedrag van groepsleden en uit hun verwachtingen ten opzichte van het gedrag van medegroepsleden.

De invloed van sociale normen is wellicht het grootst onder jongeren, die nog op zoek zijn naar hun sociale identiteit en die daardoor bijzonder gevoelig zijn voor groepsinvloeden. In dit proefschrift onderzoeken we hoe sociale normen het gedrag van jongeren beïnvloeden in de context van eetgedrag. Sociale normen kunnen het eetgedrag van jongeren positief beïnvloeden: als veel leeftijdsgenoten tijdens de schoolpauze een stuk fruit eten, zal een jongere zelf ook eerder geneigd zijn om fruit te eten. Over het algemeen is het eetgedrag van jongeren echter niet zo gezond, en hetzelfde geldt voor de sociale normen omtrent hun eetgedrag. De focus in dit proefschrift ligt op de vraag of sociale normen effectief gebruikt kunnen worden ter bevordering van gezond eetgedrag onder jongeren.

Een Focus Op Jongeren

In de afgelopen decennia zijn jongeren steeds ongezonder gaan eten. Hun eetgedrag kenmerkt zich door ongezonde gewoontes zoals het overslaan van het ontbijt, veel snacken tussen de hoofdmaaltijden door en een overmatige consumptie van fastfood en frisdrank. Tegelijkertijd halen jongeren over het algemeen de dagelijks aanbevolen hoeveelheden groente en fruit bij lange na niet. Zulk ongezond eetgedrag kan ernstige gevolgen hebben voor de gezondheid van jongeren op zowel de korte en lange termijn, en zowel wat betreft de psychische als fysieke gezondheid. Ongezond eten hangt samen met uiteenlopende gezondheidsproblemen zoals overgewicht en obesitas, eetstoornissen, hart- en vaatziekten, type 2 diabetes en verschillende soorten kanker. Het is daarom van groot belang om te onderzoeken hoe gezond eetgedrag onder jongeren bevorderd kan worden, eens te meer omdat eetpatronen die worden ontwikkeld in de jeugd

en vroege volwassenheid vaak uitgroeien tot vaste gewoontes voor de rest van het leven.

Een mogelijke manier om het eetgedrag van jongeren te verbeteren is door in te grijpen in de sociale normen die bestaan rond eetgedrag. Sociale normen vormen een belangrijke bron van invloed op het gedrag van mensen van alle leeftijden, maar onderzoek heeft aangetoond dat jongeren in het bijzonder er erg gevoelig voor zijn. Dit heeft te maken met het feit dat de zoektocht naar een sociale identiteit en het gevoel 'bij de groep te horen' voor jongeren erg centraal staan, veel meer dan het geval is bij volwassenen. Gezien deze gevoeligheid voor sociale normen is het niet zo verwonderlijk dat veel jongeren ongezond eten; onderzoek toont namelijk aan dat de onder jongeren heersende normen omtrent eetgedrag over het algemeen vrij ongezond zijn. Gezond eten wordt onder jongeren vaak gezien als iets wat een beetje sullig is, terwijl ze door ongezond te eten kunnen laten zien dat ze hun eigen gang gaan en niet luisteren naar wat volwassenen hen zeggen. Die gevoeligheid voor sociale normen zou echter ook op een positieve manier ingezet kunnen worden: als we de heersende sociale normen gezonder zouden kunnen maken, zou het eetgedrag van jongeren ook gezonder moeten worden. In dit proefschrift onderzoeken we of aanpassingen aan de sociale normen, zodat die gezondere keuzes meer stimuleren, ook inderdaad kunnen leiden tot gezonder eetgedrag onder jongeren. Hierbij richten we ons op sociale normen die heersen binnen de eigen leeftijdsgroep.

Sociale Normen

Een sociale norm beschrijft welk gedrag normaal, standaard of typisch is. Normen zijn afhankelijk van de situatie: 'stil zijn' is de norm in een bibliotheek, maar dat betekent niet dat we ook stil moeten zijn in andere omgevingen. Belangrijk is ook dat normen sterk afhankelijk zijn van de sociale context. Een norm beschrijft welk gedrag standaard is *binnen een bepaalde sociale groep*. Binnen een gezin kan de norm bijvoorbeeld zijn om niet te schelden, maar de kinderen van dat gezin houden er in hun vriendengroep misschien weer een andere norm op na. Sociale normen kunnen op twee manieren gevormd worden: ze kunnen ontleend worden aan het gedrag van de groepsleden zelf, of aan de verwachtingen van de groep ten opzichte van andere groepsleden. Deze twee soorten normen worden descriptieve en injunctieve sociale normen genoemd. Descriptieve normen beschrijven het gedrag van de andere groepsleden (bijvoorbeeld, "de meeste

jongeren eten te weinig fruit"), terwijl injunctieve normen beschrijven welk gedrag de groep als correct beschouwt (bijvoorbeeld, "de meeste jongeren vinden dat leeftijdsgenoten voldoende fruit zouden moeten eten"). Het essentiële verschil is dus dat een descriptieve norm *be*schrijft wat daadwerkelijk *wordt gedaan*, terwijl een injunctieve norm *voor*schrijft wat gedaan *zou moeten worden*.

Hoewel beide soorten normen gedrag beïnvloeden, verschilt waarschijnlijk de manier waarop ze invloed uitoefenen op het gedrag. Injunctieve normen spelen in op de *interpersoonlijke* wens van mensen om goede relaties met medegroepsleden te koesteren en sociale sancties, zoals uitsluiting, te voorkomen. Als dus bijvoorbeeld mijn medegroepsleden vinden dat ik gezond zou moeten eten, en ik wil graag een goede band behouden met mijn medegroepsleden, dan kan ik inderdaad het best gezonder gaan eten. Descriptieve normen spelen in op het *intrapersoonlijke* doel van mensen om accuraat en efficiënt te handelen. Als dus bijvoorbeeld de meeste van mijn groepsgenoten een stuk fruit eten tijdens de lunch, dan zal fruit eten wel het correcte gedrag zijn in die situatie.

Doelstellingen

De centrale onderzoeksvraag in dit proefschrift is hoe en wanneer sociale normen gezonder eetgedrag onder jongeren zou kunnen bevorderen. Om tot een antwoord op deze vraag te komen zijn verschillende soorten studies (literatuuronderzoek, onderzoek met behulp van vragenlijsten en experimenteel onderzoek) uitgevoerd, die verdeeld over vijf hoofdstukken beschreven worden. Drie specifieke doelstellingen vormden daarbij de leidraad voor het onderzoek.

De eerste doelstelling was om, door een grondige en systematische analyse van eerdere studies, te bepalen of sociale normen inderdaad geassocieerd zijn met het eetgedrag van jongeren, en of het veranderen van sociale normen ook kan leiden tot gezonder eetgedrag.

De tweede doelstelling was om te onderzoeken welke *soort(en)* sociale normen wel en niet invloed kunnen hebben op het eetgedrag van jongeren. Daartoe onderzochten we ten eerste of een sociale norm beter gezond eten kon bevorderen (bijvoorbeeld, "de meeste jongeren eten voldoende fruit") of ongezond eten ontmoedigen (bijvoorbeeld, "de meeste jongeren proberen minder te snacken"). Ten tweede onderzochten we of er verschillen zijn tussen descriptieve en injunctieve normen wat betreft hun invloed op het eetgedrag van jongeren.

De derde doelstelling was om inzicht te verkrijgen in *hoe* sociale normen eetgedrag beïnvloeden. We onderzochten met name of de mate waarin jongeren zich identificeren met hun leeftijdsgenoten de invloed van sociale normen modereert, en wat mogelijke onderliggende mechanismen zijn van het effect van sociale normen op eetgedrag.

Resultaten

In Hoofdstuk 2 beschreven we een systematische analyse van eerdere studies omtrent 'sociale normen en eetgedrag van jongeren'. In deze *review* werden in totaal 26 studies besproken die samen duidelijk bewijs leveren voor enerzijds de hypothese dat sociale normen gerelateerd zijn aan het eetgedrag voor jongeren, en anderzijds de mogelijkheid om eetgedrag te veranderen door in te grijpen in de sociale normen. De review liet echter ook zien dat sociale normen niet altijd invloed hebben op het eetgedrag van jongeren, maar dat rekening gehouden moet worden met een aantal beperkende factoren. Zo bleken de normen voornamelijk invloed te hebben op de consumptie van etenswaren die vaak binnen de leeftijdsgroep geconsumeerd werden, zoals bijvoorbeeld snacks en frisdrank. Ook toonde de review aan dat sociale normen niet altijd het gewenste en bedoelde (gezonde) effect hebben, maar soms ook een tegengesteld (ongezond) effect kunnen sorteren. Uit de review kwam ook een aantal belangrijke moderatoren van het effect van sociale normen naar voren.

In Hoofdstuk 3 beschreven we onderzoek, uitgevoerd aan de hand van vragenlijsten, naar de samenhang tussen sociale normen en drie verschillende uitkomstmaten: de intentie om gezond te eten en de zelf-gerapporteerde consumptie van gezond en ongezond eten. We onderzochten de relatie met twee soorten sociale normen: een norm die gezond eten bevorderde en een norm die ongezond eten ontmoedigde. De resultaten laten zien dat een norm die gezond eten bevorderde samenhing met een sterkere intentie om gezond te eten, evenals met een hogere consumptie van gezond eten en een lagere consumptie van ongezond eten. Een norm die ongezond eten ontmoedigde was, daarentegen, alleen gerelateerd aan intenties, maar niet aan daadwerkelijk gedrag. Deze bevindingen suggereren dat, als we gezond eten willen bevorderen door in te grijpen in de sociale normen, we dat beter kunnen doen via normen die gezond eten bevorderen dan via normen die ongezond eten ontmoedigen. Een mogelijke verklaring voor deze discrepantie is dat jongeren een voorkeur hebben voor

positief gestelde gezondheidscommunicatie: ze prefereren mogelijk een aanmoediging om gezond te eten boven een afkeurende boodschap omtrent ongezond eten.

In Hoofdstuk 4 werden studies beschreven waarin we de werkzaamheid van twee verschillende sociale normmanipulaties ter bevordering van de consumptie van fruit onder adolescenten vergeleken: een descriptieve norm- en een injunctieve normmanipulatie. Behalve met elkaar vergeleken we deze twee manipulaties ook met een controleconditie, waarin adolescenten geen normatieve informatie kregen. Voortbouwend op de bevindingen beschreven in Hoofdstuk 3 zijn beide normen zodanig geformuleerd dat ze gezond eten bevorderden (respectievelijk: 'de meeste jongeren eten zelf voldoende fruit' en 'de meeste jongeren vinden dat andere jongeren voldoende fruit zouden moeten eten'). De resultaten wezen uit dat, na het lezen van een injunctieve norm, jongeren een lagere intentie rapporteerden om fruit te eten dan jongeren die helemaal geen normatieve informatie gelezen hadden. Het lezen van een descriptieve norm had geen effect op intentie, maar de daadwerkelijke fruitconsumptie ging wel omhoog in de twee dagen daarna. Deze resultaten suggereren dat een injunctieve normmanipulatie wellicht geen gezondheidsbevorderende effecten heeft en mogelijk zelfs tot lagere intenties leidt om gezond te eten, terwijl een descriptieve normmanipulatie wél tot een hogere fruitconsumptie leidde.

Met de wetenschap dat descriptieve normboodschappen mogelijk meer effectief zijn dan injunctieve normboodschappen in het bevorderen van gezond eetgedrag onder jongeren namen we descriptieve normen als onderwerp van onderzoek in de studies die aan de orde komen in volgende hoofdstukken. In de studies in Hoofdstuk 5 bekeken we of de invloed van een descriptieve normmanipulatie op fruitconsumptie gemodereerd wordt door de mate waarin jongeren zich identificeren met de groep leeftijdsgenoten wier gedrag in de descriptieve norm wordt beschreven (de *referentiegroep*). In twee studies toonden we aan dat deze mate van identificatie mogelijk een cruciale moderator is van de invloed van descriptieve normen op eetgedrag. In beide studies vonden we alleen een effect van de descriptieve norm op fruitconsumptie als de identificatie met de referentiegroep hoog was. Een tweede belangrijke bevinding beschreven in Hoofdstuk 5 is dat, als de descriptieve norm werd gepresenteerd als een *minderheidsnorm* (bijvoorbeeld, 'slechts weinig jongeren eten gezond'), dit leidde tot lagere intenties en minder daadwerkelijk gezond eetgedrag. Deze bevinding

heeft belangrijke implicaties voor bijvoorbeeld gezondheidscampagnes, waarin zulke minderheidsnormen regelmatig worden gecommuniceerd aan het publiek. Terwijl men dit doet met de intentie om mensen te waarschuwen voor de lage frequentie waarmee ze gezond gedrag vertonen en om ze te motiveren dit gedrag vaker te vertonen, impliceren onze bevindingen dat een dergelijke aanpak tot een tegengesteld en ongewenst effect zou kunnen leiden.

De studies beschreven in Hoofdstuk 6 hadden als doel om meer inzicht te krijgen in hoe descriptieve sociale normen mogelijk hun invloed uitoefenen op gedrag. In twee studies onderzochten we drie variabelen die mogelijk het effect van normen op eetgedrag kunnen verklaren: zelfidentificatie met het eten van groenten, een positieve attitude ten aanzien van het eten van groenten, en voldoende eigen effectiviteit met betrekking tot het eten van groenten. Uit de studies bleek dat studenten die een boodschap met een minderheidsnorm ontvingen lager scoorden op elk van deze drie variabelen dan studenten die een, in onderzoek meer gebruikelijke, boodschap met een *meerderheidsnorm* ontvingen. Bovendien wezen de resultaten uit dat zelfidentificatie, attitude en eigen effectiviteit de invloed van sociale normen op eetgedrag deels verklaren. Dit impliceert dat sociale normen werkzaam zijn, althans ten dele, omdat ze de zelfidentificatie als gezonde eter, de positieve attitude ten opzichte van gezond eten en de eigen effectiviteit om gezond te eten verhogen.

Conclusie

De centrale onderzoeksvraag in dit proefschrift was hoe en wanneer sociale normen gezonder eetgedrag onder jongeren bevorderen. Samen wijzen de onderzoeken in dit proefschrift uit dat sociale normen een substantiële rol spelen in het eetgedrag van jongeren en dat ze bruikbaar kunnen zijn in het bevorderen van gezonder eetgedrag onder jongeren, zolang hierbij verschillende moderatoren en beperkende factoren die in dit proefschrift beschreven worden in het oog gehouden worden. Gezondheidsbevorderaars zullen bijvoorbeeld het type sociale normen dat wordt beïnvloedt zorgvuldig moeten bepalen, evenals het type eetgedrag dat zij trachten aan te pakken met een sociale norminterventie. Als met zulke randvoorwaarden rekening gehouden wordt, dan kunnen interventies om gezondere sociale normen te bevorderen een effectief onderdeel zijn van een (waarschijnlijk langdurig) proces waarin veranderende normen kunnen bijdragen aan gezonder eetgedrag onder jongeren.

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Curriculum Vitae and Publications

Curriculum Vitae

Femke Marijn Stok was born on September 28, 1984 in Hengelo, the Netherlands. She attended bilingual secondary education at the Rijnlands Lyceum Wassenaar, from which she graduated (cum laude) in 2002. After a gap year of traveling, studying Spanish and doing volunteer work, Marijn started her undergraduate studies at University College Utrecht in 2003. She majored in Social Sciences, focusing mainly on psychology and anthropology, while minoring in linguistics and statistics. During her final year, she combined her studies with fulfilling the position of treasurer on the board of the University College Student Association. In 2006, she received her Bachelor's degree (summa cum laude) after which she continued her studies with the Psychological Health Research program in Utrecht. During the first year of this research master program, she also participated in the Dutch National Think Tank of 2006. Marijn received her MSc degree (cum laude) in 2008, winning the Utrecht University master thesis prize that same year. After fervently denying it throughout her undergraduate studies, she finally realized toward the end of her master program (aided by some subtle nudges from those around her) that conducting research might be what she wanted to do for a living after all. Upon finalizing her studies, she began working on a PhD project in the Self-Regulation Lab at the department of Clinical and Health psychology at Utrecht University in 2009. Marijn conducted her PhD research, which was part of the international EU FP-7 funded project TEMPEST, under the supervision of Prof. dr. Denise de Ridder, Prof. dr. John de Wit and Dr. Emely de Vet. Throughout the course of her PhD research, she has kept in touch with her other passion – figure skating – by devoting one day a week to coaching. Along the way, she has helped her pupils win several Dutch national championships.

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