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The effects of norms on pro-environmental behavior in student households

A survey study

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Abstract

The present study further investigated the effects of norms on pro-environmental behavior in student households following previous research by Noyon (2011), Van Wissen (2013), and Floris (2013). The study tested whether the relationships between injunctive and descriptive social norms and the pro-environmental behaviors ‘eating a vegetarian dinner’, ‘purchasing organic meat’, and ‘purchasing ecological products’, were moderated by the degree to which these behaviors affected the total environmental impact of the household and the visibility of the behaviors being performed. Moreover, the effects of trends in society, attitudes and behavioral constraints on these behaviors were investigated. The results did not show support for the moderating effects of impact and visibility. The findings did show support for the influence of attitude on ‘eating a vegetarian dinner’ and the influence of some constraining factors on ‘eating a vegetarian dinner’ and ‘purchasing ecological products’.

Introduction

Due to the threat of global warming and increasing CO₂ emissions it is of critical importance to understand why people do or do not perform pro-environmental behaviors; we need to understand the factors that influence pro-environmental behaviors to learn how to encourage pro-environmental behaviors. When thinking of pro-environmental behaviors and how these behaviors occur in small groups, such as families, an example of my own surroundings came to mind. When visiting my parents, I threw a plastic wrapper in the garbage bin. Immediately after, my father picked the plastic wrapper out of the bin stating: “In this house we separate our waste”. This is an example of an explicit social norm that was salient in my family home, and how not following this norm was frowned upon. Possibly similar everyday life examples were at the basis of the idea to research the effects of social norms on the performance of pro-environmental behaviors in small groups, such as families or student households. Previous studies in this line of research have been done by Noyon (2011), Floris (2013) and Van Wissen (2013). In the current study the normative processes that influence pro-environmental behavior are further investigated, building on the model as proposed by Noyon (2011).

The model

First, the model as proposed by Noyon (2011) is described in more detail. The model was developed to explain pro-environmental behavior. Noyon (2011) argues that a perceived injunctive norm can be internalized and can in turn become a personal norm, which can then lead to behavior (Bratt, 1999). Personal norms are in turn influenced by other factors besides this perceived social norm; Stern (2000) found that environmental concern positively influences the development of pro-environmental personal norms.

Social norms are also found to affect behavior, which will be described in more detail later on. Moreover, Noyon (2011) argues that this relationship between social norm and behavior is moderated by *cohesion*, which is defined as the degree to which people feel connected to each other in a group. This expectation was based on findings by Cornelissen (1993, as discussed by Noyon, 2011) who found that high school students complied more with the prevailing social norms when they were closer as a class. Additionally, Staats, Harland and Wilke (2004) found that cohesion influenced behavior in groups in which people were motivated to change their environmental behavior. They found that behavior was more influenced by intentions than by habits in high-cohesive groups, as opposed to low-cohesive groups. Thus Noyon (2011) expected that people would carry through their intentions to change more easily if they felt connected to a group with similar goals. Furthermore, Noyon (2011) took *visibility* and *impact* into account as moderators. Visibility is defined as the degree to which the performance of a pro-environmental behavior is visible to other family members. Impact is defined as the degree to which the performed behavior has an effect on the net environmental outcome (use of resources such as water, electricity or gas) of the entire household. This reasoning led to the model as presented in Figure 1.

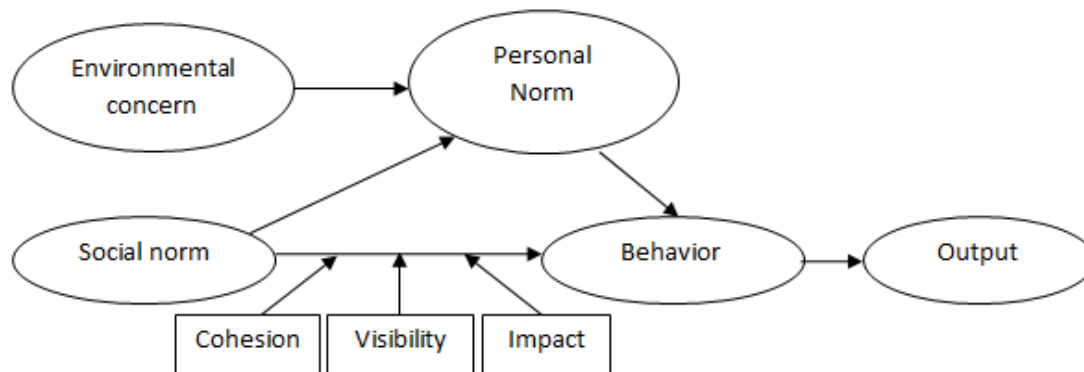


Figure 1. The research model as proposed by Noyon (2011).

Previous research

Noyon (2011) conducted a survey study among family households to test the model in a family setting. A diverse range of pro-environmental behaviors was included in the survey, such as ‘eating a vegetarian dinner’ and ‘taking the bike to work instead of taking the car’. Results showed that social norms could be internalized to personal norms, which in turn influenced behavior. The results did not show the expected moderating effect of visibility and impact and due to little variance in the cohesion measure it was impossible to investigate the effect of cohesion altogether. Thus, Noyon (2011) proposed to replicate the study in a less cohesive group.

Following this suggestion, the study was replicated among a different target group by Van Wissen (2013) and Floris (2013). Van Wissen (2013) and Floris (2013) argue that families are homogenous groups with high levels of cohesion. Based on this argument Van Wissen (2013) and Floris (2013) decided to conduct their study among students living in student households, as these households might show more variance in the degree of cohesion; this would make it possible to investigate cohesion as a moderator. Furthermore, there are power differences in families: parents often decide which (pro-environmental) behaviors are performed and the children follow their parent’s behavior. Student households are more heterogeneous groups with more power equality; within such groups there could be more variation in opinions and it might be more likely that these opinions are expressed. All in all, this makes students an interesting target group.

Next to investigating a different target group, Van Wissen (2013) and Floris (2013) added a moderator to Noyon’s model: *deliberation*, which is defined as the degree of communication between household members about the performance of a pro-

environmental behavior. They argue that communication about a pro-environmental behavior makes the social norm regarding the performance of this behavior more salient. Thus, they reason that more deliberation about a behavior within a household leads to a larger effect of social norm on that behavior.

Van Wissen (2013) investigated whether the relationship between injunctive social norms and the pro-environmental behaviors ‘eating a vegetarian dinner’, ‘turning off stand-by mode’, ‘recycling paper’ and ‘preventing food wastage’ were moderated by cohesion, deliberation, visibility and impact. The results merely showed support for the moderating effects of these variables on the relationship between social norm and behavior for ‘eating a vegetarian dinner’. Following these results, the decision was made in the current study to investigate the same target group (student households) and to further examine the pro-environmental behavior ‘eating a vegetarian dinner’. Next to that, another food related behavior is examined, namely ‘purchasing organic food’. For this behavior two different organic food groups were examined that are most regularly bought in the Netherlands: meat (‘purchasing organic meat’) and a range of products falling under the category of products with a long shelf-life (Rijksoverheid, 2013) (from here on ‘purchasing ecological products’). Furthermore, the model was expanded by looking at both the injunctive and the descriptive social norm, and by looking at factors besides social norms that could influence pro-environmental behavior, such as trend, attitudes and behavioral constraints.

Injunctive and descriptive social norms

The norm focus theory (Cialdini, Reno, & Kallgren, 1990) distinguishes two types

of social norms, namely injunctive norms and descriptive norms. Injunctive norms refer to what group members agree that should be done (thus this does not necessarily imply that group members actually perform the behavior) and descriptive norms refer to an individuals' perception of whether fellow group members actually perform a behavior. These two kinds of norms have been widely investigated in different settings and domains (e.g. Goldstein, Griskevicius & Cialdini, 2007; Schultz, Nolan, Cialdini, Goldstein & Griskevicius, 2007; Smith & Louis, 2008; Stauton, Louis, Smith, Terry & McDonald, 2014).

Noyon (2011), Van Wissen (2013) and Floris (2013) merely take injunctive social norms into account in their models. However, a distinction could be made between descriptive and injunctive norms, as the two norms do not always align; both are observed to predict behavior separately and in different directions. For instance, a study was done by Schultz and colleagues (2007) in which the influence of injunctive and descriptive norms on the energy consumption of a household was investigated. When households were provided with information about the average energy consumption of their neighbourhood, they adjusted their energy consumption to that average, regardless of whether that average was lower or higher than their own energy consumption. The average energy consumption of the neighbourhood worked as a descriptive norm, which affected behavior. However, the descriptive norm did not always change energy consumption for the better; when the provided descriptive norm was higher than their own energy consumption, a boomerang effect occurred which led to them adjusting their behavior to consuming more energy. When the descriptive norm was paired with an injunctive norm, messages providing positive or negative feedback about the household's

own energy consumption, this boomerang effect was counteracted. Stauton and colleagues (2014) on the other hand investigated if negative descriptive norms undermined the effect of a positive injunctive norm for healthy eating. The results showed that participants reported significantly lower intentions to eat healthy when a negative descriptive norm was made salient simultaneously to a salient positive injunctive norm, which is a finding that is consistent with findings of Smith and Louis (2008) and contrasting to findings that indicate that a positive injunctive norm can buffer against harmful effects of a negative descriptive norm (e.g. Schultz et al., 2007). All in all, aforementioned research suggests that it is important to look at both the descriptive and the injunctive social norms.

Own visibility and the visibility of others

Besides incorporating descriptive and injunctive norms as separate social norms in the research model, we argue that a descriptive and injunctive norm distinction could be made for the moderator ‘visibility’. Noyon (2011), Van Wissen (2013) and Floris (2013) define visibility as the degree to which other household members are able to observe the behavior a person performs. However, in the surveys that were conducted the item that was used to measure visibility was phrased in a more general sense. For example for the behavior ‘eating a vegetarian dinner’ the item was phrased as follows: “In our household *all the members* are aware of whether someone eats a vegetarian dinner or not”. This item does not merely focus on your own behavior that can be observed by others, but also on the behaviors of others observed by you. As a descriptive norm can be derived by observing the behavior of others (Bodimeade et al., 2014), we argue that there could be an overlap between visibility and the descriptive norm within

this item. Thus it is important to make the distinction between a form of visibility from which a descriptive norm can be derived (I am able to observe what others do – *visibility of others*) and a form of visibility from which an injunctive norm can be derived (others are able to observe what I do - *own visibility*). We argue that a similar distinction can be made for the moderator deliberation, which concerns the communication about the performed behavior. Deliberation could be separated into the injunctive ‘communication about what we should do’ and the descriptive ‘communication about what we actually do’¹. However, this thesis merely focusses on the distinction for the moderator visibility.

Trends

Moreover, current trends in society might be an influential factor. Trend is not a factor that plays a role in the small group setting, but it is not necessarily a factor that can be separated from norms, as it could be seen as a comprehensive descriptive norm; a norm that describes what people in your society are doing or what your peers do. Eating healthy and organic is becoming increasingly popular in the Netherlands since the last couple of years. Large companies, such as Unilever, seem to focus more and more on sustainable ways of producing and making their products Fairtrade or organic. Specialized organic lunchrooms and restaurants are becoming a common sight in cities. The purchase of organic products is becoming more accessible, as supermarkets are enlarging their assortments of organic products. Public debates about the bio-industry are taking place more often, such as the recent ‘plofkip’ debate. Moreover, there even is a television channel called 24Kitchen dedicated to preparing food, with an emphasis on

¹ This master thesis merely discusses the distinction between injunctive and descriptive visibility. As this thesis is part of a research project, readers whom are interested in the distinction between injunctive and descriptive deliberation or the moderating effect of cohesion are invited to read the master thesis by Van Der Velde (2015).

healthy and organic food. The observation of this ‘healthy and organic eating trend’ can be supported by research on consumption of organic food, which shows that there is a growing demand for organic food in Europe, which leads to a high import rate since the production rate falls behind on the demand (Kearney, 2010). We argue that this trend in the Dutch society can have a positive effect on pro-environmental behavior, especially on ‘eating a vegetarian dinner’ and ‘purchasing organic food’, since these behaviors are in line with the current trend. The trend might act as a descriptive norm, since individuals become aware that others are behaving pro-environmentally through their own observations and through attention in mainstream media. We expect trend to indirectly affect behavior by altering injunctive and descriptive social norms.

Attitudes

As mentioned before one of the aims of this study is to add to the previous model by including factors besides social norms that might also influence pro-environmental behavior. One of these factors might be attitudes; attitudes are general evaluative reactions towards a person, an object, an issue a behavior or other entity (Oskamp, 1977) and they play a role in behavior. The theory of planned behavior (TPB) (Ajzen, 1991) states that an attitude towards a certain behavior is one of three determinants of behavioral intention (next to subjective norms and behavioral control). Thus, the degree to which someone has a positive or negative evaluation of a certain behavior, has an effect on the intention to perform that behavior. So when an individual has a positive attitude towards a behavior, that person could have more intention to perform the behavior. Support for this notion can be found in meta-analyses that have shown that attitudes, perceived control and subjective norms together account for significant

variance in intention, but also for variance in observed behavior (Armitage & Conner, 2001; Manning, 2009, as described in Bodimeade et al., 2014).

Tarkainen and Sundqvist (2006) conducted a study to investigate the relationships between subjective norms and attitudes, and the intention to purchase organic bread and flour products by applying structural equation modelling. The results showed that a positive attitude toward purchasing organic products leads to a higher intention to purchase organic products, and more actual purchases of these products. Furthermore, they found that subjective norms indirectly influenced behaviour through influencing the attitudes formation towards purchasing organic food. As a distinction was made for the subjective norm in our model, both the influence of injunctive and the descriptive norms on attitudes will be addressed in this research model. However, this thesis will only focus on the effect of descriptive norms on attitudes².

Behavioral constraints

Behavioral constraints might affect behavior as well. Someone might have the intention to purchase organic products or to eat a vegetarian dinner, but can be prevented from actually performing the behavior by behavioral constraints. One of those constraints could be perceived uncertainty (Thøgersen, 2009), which regards the knowledge people have about organic products and preparing these products. An example of uncertainty about organic products might be that the consumers are uncertain of the truthfulness of the labels on the product. The ‘ik kies bewust-logo’ in the Netherlands for instance, is a logo to indicate whether a product is a responsible or healthy choice. However this logo is not developed by an independent third party, but by the food industry itself, which

² Readers interested in the effect of injunctive norms on attitudes are invited to read the master thesis by Van Der Velden (2015).

might lead people to be uncertain about the label. When the perceived uncertainty is high, this can impair the intention to buy organic products. Perceived uncertainty is also a factor in 'eating a vegetarian dinner'. When a person intends to eat vegetarian meals regularly, he/she needs to have knowledge about how to maintain a healthy diet and about how to prepare vegetarian meals. A high perceived uncertainty could then impair the intention to eat a vegetarian dinner.

Furthermore, money could be a constraining factor, as organic products are often more expensive than regular products and not everyone is able to afford those products. Krystallis, Fotopoulis and Zotos (2006) conducted a survey study among households to create a better profile of the organic consumer in Greece. The results showed that young people have a high willingness to pay (WTP) for organic products. However, the results also showed that this high WTP does not translate into a higher demand for organic products, because of the relatively low income of this group. This might be an important factor to take into consideration, because our target group (student households) is also a group consisting of young people with a relatively low income, thus money might especially be a constraining factor for this group.

Another constraint could be the perceived barriers for purchasing organic products (Thøgersen, 2009). Even though nowadays organic products are becoming increasingly accessible in common supermarkets, the range of organic products to choose from is still small compared to the offer of conventional products. Moreover, the organic products might not be easily recognized or might not be incorporated in your everyday shopping route. For a bigger assortment of organic products people can go to specialized organic stores such as 'Marqt'. Although these stores are becoming more popular in

bigger cities in the Netherlands, they are not as widely spread as common supermarkets and this could mean a longer distance to the store. Even when people are prepared to go the extra mile, it would still mean that they need to visit an extra store. Thøgersen (2009) found that perceived uncertainty and perceived barriers indeed dampened the demand for organic food. All in all, purchasing organic products takes extra time and effort, which might be a constraint for some people.

The current model

All the aforementioned factors were added to the previous model by Noyon (2011); this led to the research model as shown in Figure 2. Personal norms, injunctive norms and descriptive norms are thought to influence behavior directly. The relationship between the injunctive social norm and behavior is thought to be moderated by own visibility, injunctive deliberation, cohesion and impact. The relationship between descriptive social norm and behavior is expected to be moderated by the visibility of others, descriptive deliberation, cohesion and impact.³ Behavioral constraints have a direct effect on behavior. Environmental concern influences personal norm, trend influences both injunctive and descriptive norms. Attitude influences behavior directly and both injunctive and descriptive norms influence attitudes.

³ Only injunctive/descriptive visibility and impact are addressed in this master thesis.

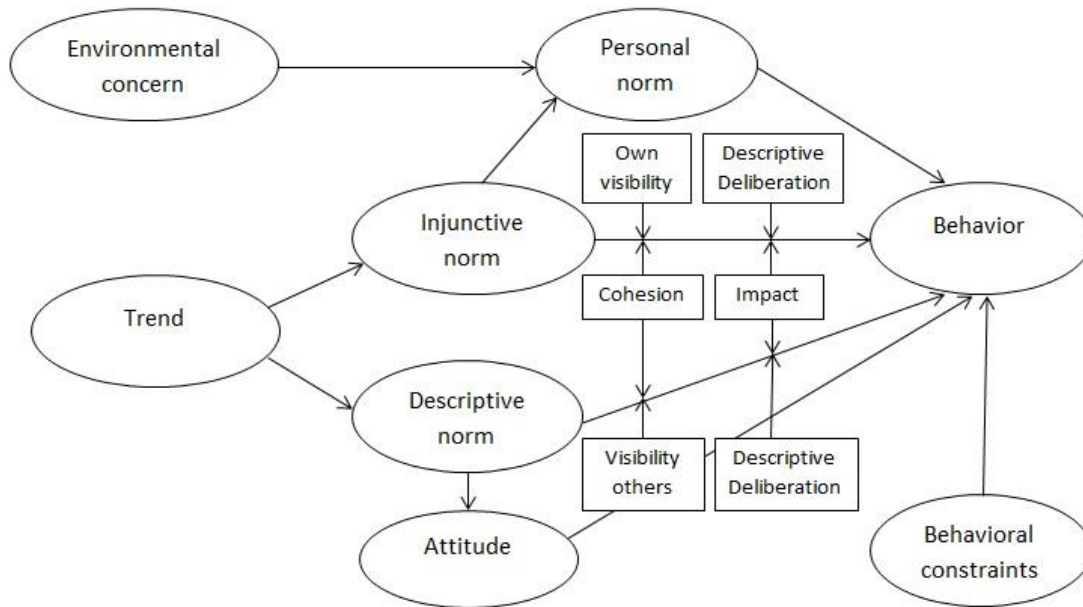


Figure 2. The current research model

The hypotheses

To test the current model the following hypotheses were formulated: First, it is expected that injunctive norms will influence personal norms (H1) as well as behavior (H2). The relationship between injunctive norms and behavior will be moderated by impact (H3) and own visibility (H4). Furthermore, it is expected that descriptive norms influence behavior (H5), a relationship which is moderated by impact (H6) and the visibility of others (H7). We also expect an influence of attitudes (H8) and an influence of behavioral constraints on behavior (H9). Attitudes will be influenced by descriptive norms (H10). Trend will influence both injunctive (H11) and descriptive (H12) norms. Further, environmental concern will influence personal norms (H13) and lastly, personal norm will influence behavior (H14).

Method

Participants

The study was conducted among students living in student houses in the Netherlands. In total 315 participants filled out an online survey. Participants were recruited through social networks (e.g. Facebook). To encourage students to participate, participants who completed the survey had the option to enrol in a lottery with the possibility to win a gift certificate of 50 euros (1 coupon per 100 participants). To fit the target group the students were required to live in a student household with at least one other person with whom they shared a bathroom, kitchen and front door; this was checked at the start of the questionnaire. If the required conditions were not satisfied the survey was discontinued after thanking participants for their participation. In total 196 (54 males, 130 females, and 14 unspecified, with an average age of 22.2) participants fit this condition and were suitable for participation. They were all fluent in Dutch with a mean number of roommates of 4.52. We experienced a high degree of participant attrition during the survey: 157 respondents completed the questions for the behavior 'eating a vegetarian dinner' and 128 respondents completed the questions for 'purchasing organic meat'. Especially for the behavior 'purchasing ecological products', the survey experienced a lot of attrition: 76 filled out this section, thus the results for this behavior should be interpreted with care. The high degree of attrition can be explained by both the length of the survey and the fact that respondents had the possibility to indicate that they were a vegetarian or that they did not buy ecological products: 13 participants indicated that they were a vegetarian and 55 participants indicated that they never bought

ecological products. Thus these participants did not fill out the questions regarding respectively ‘purchasing organic meat’ and ‘purchasing ecological products’.

Procedure

Before filling out the survey online, participants were notified that their participation was anonymous and that they were able to end their participation at any preferred time. After giving their informed consent, participants filled out the survey which consisted of questions about the behaviors ‘eating a vegetarian dinner’, ‘purchasing organic meat’ and ‘purchasing ecological products’. All questions were in Dutch. The survey contained items regarding personal, injunctive and descriptive norms about the behaviors. The survey also contained items about own visibility, others’ visibility and the impact of the behaviors. Moreover, questions were asked about the participants’ general attitudes towards the behaviors, their environmental concern and possible behavioral constraints regarding the performance of the behaviors (amount of money available, perceived barriers and perceived uncertainty). Items about the awareness of a current trend in society regarding healthy and organic eating were included as well. All the aforementioned items were measured on a 7-point Likert scale, except for the questions about how often the behaviors were performed, which were measured on an 8-point Likert scale. Furthermore, the survey contained questions about demographics, such as age and gender, and about the number of household members. Participants were not able to skip questions, however it was possible for them to stop the survey and complete it at a later time. At the end of the survey participants were given the opportunity to indicate whether they preferred to be informed about the results and the goal of the study after the research had ended.

Design

This was a correlational study with dependent measure behavior and independent measures injunctive social norm, descriptive social norm, personal norm, own visibility, visibility of others, impact, environmental concern, trend, attitude, and behavioral constraints (perceived uncertainty, perceived barriers and money).

Dependent measure

The dependent measure was how often people performed the three pro-environmental behaviors. The self-reported behavior was used as a proxy for actual behavior. Based on the results of previous research, we used the pro-environmental behavior ‘eating a vegetarian dinner’, ‘purchasing organic meat’ and ‘purchasing ecological products’. For ‘eating a vegetarian dinner’ we used two items: ‘*In general I eat a vegetarian dinner [...] days a week*’ and ‘*I ate a vegetarian dinner [...] days during the past week*’, both measured on an 8-point Likert scale ranging from ‘0 days a week’ to ‘7 days a week’. The reliability analysis showed a Cronbach’s α of .96, which means this is a very reliable scale.

For ‘purchasing organic meat’ and ‘purchasing ecological products’ we used the item ‘*How often do you buy organic meat/ecological [...] on average?*’ (‘0 days a week’ to ‘7 days a week’). Additionally, two items from Thøgersen and Ölander (2006) were adapted and used, namely: ‘*How often did you buy organic meat in the last week?*’ and ‘*How often was this meat organic?*’, both measured on an 8-point Likert scale ranging from ‘0 days’ to ‘7 days’. This scale turned out not to be reliable with Cronbach’s α .56 for ‘purchasing organic meat’ and .42 for ‘purchasing ecological products’. For these behaviors we decided to only use the first item, which we trust to be sufficient to measure

the behaviors. The behaviors were coded in way that higher scores expressed a more environmental friendly response. For ‘purchasing ecological products’ a list of products was provided from which participants were able to select the product which they purchased most often. Chocolate ($N=19$) and tea ($N=14$) were the products that were selected most often.

Independent measures

The following measures were used as the independent variables:

Personal norm.

To measure personal norm, four items were adapted from Harland and Staats (1995), for example: ‘*I would feel guilty if I would eat meat for dinner every day.*’ (*I do not agree at all – I totally agree*). Based on the recommendation by Fishbein and Ajzen (2010), we appealed to strictly personal opinions. The scale was found to be reliable for all three tested behaviors, with a Cronbach’s α ranging from .90 to .94.

Social norm.

Injunctive social norm was measured using two items adapted from Fishbein and Ajzen (2010): ‘*my roommates generally think that I should eat a vegetarian dinner every day*’ and ‘*my roommates would disapprove if I would not eat a vegetarian dinner every day*’ (*I do not agree at all – I totally agree*). The reliability of this scale turned out to be low with a Cronbach’s α ranging from .02 to .17 for the behaviors ‘eating a vegetarian dinner’ and ‘purchasing organic meat’, which might be explained by the double negative in the second item. For ‘purchasing ecological products’ the Cronbach’s α was .72. Thus the decision was made to only use the first injunctive social norm item in the analysis for ‘eating a vegetarian dinner’ and ‘purchasing organic meat’, which is the item that was

also used in the analysis of Van Wissen (2013) and Floris (2013). For ‘purchasing ecological products’ we used the scale as intended.

Descriptive social norm was measured using two items adapted from Ajzen (2006) : ‘*most of my roommates eat a vegetarian dinner every day.*’ and ‘*when it comes to eating a vegetarian dinner I want to be like my roommates.*’ (I do not agree at all – I totally agree). Again the reliability analysis showed a low Cronbach’s α for this scale ranging from .15 to .54 for ‘eating a vegetarian dinner’ and ‘purchasing organic meat’ and .79 for ‘purchasing ecological products’. Thus, only the first item was used to analyse descriptive social norm for the behaviors ‘eating a vegetarian dinner’ and ‘purchasing organic meat’. For ‘purchasing ecological products’ the intended scale was used.

There were also two items incorporated in the survey to measure social norm, that were also in the survey of Van Wissen (2013) and Floris (2013), namely: ‘*whether I eat a vegetarian dinner or not, does not have an influence on the life of my roommates*’ and ‘*whether I eat a vegetarian dinner or no, does not make a difference for my roommates*’ (I do not agree at all – I totally agree). These two items together showed a reliable scale (Cronbach’s α ranging from .71 to .88). However, in our opinion these items alone do not measure social norm sufficiently, as these items only focus on the impact of the behavior on the roommates and not on whether the roommates react to that behaviour or have an opinion about that behavior. Moreover, Van Wissen (2013) and Floris (2013) eventually did not use these items in their analysis, which also rules out the argument to use these items for comparability reasons. Thus, we decided to use the items for injunctive and descriptive norm as intended.

Visibility.

To measure visibility the items used by Noyon, (2011) Van Wissen (2013) Floris (2013) were adapted by making the distinction between own visibility and the visibility of others. For own visibility, the following item was used: *'my roommates are aware of whether I prepare a vegetarian dinner or not'* (*I do not agree at all – I totally agree*). For the visibility of others, we used the item: *'I am aware of whether my roommates prepare a vegetarian dinner or not'* (*I do not agree at all – I totally agree*). The correlation matrices (Table 4 through 6) showed that the two visibility items were strongly correlated, with correlations ranging with $r=.75$ for 'purchasing ecological products', $r=.79$ for 'eating a vegetarian dinner' and $r=.88$ for 'purchasing organic meat'. In our opinion the constructs do measure separate constructs and should be handled as such in the analysis. The two items are never used in the same analysis, thus there is no risk of multicollinearity.

Impact.

To measure the impact of the pro-environmental behaviors two items were used: *'When I purchase organic meat this reduces the total environmental impact of my household.'* and *'When I purchase organic meat it has practical consequences for my roommates'*, both with answering scale *'I do not agree at all – I totally agree'*. The reliability analysis showed that the Cronbach's α for the scale varied between .47 and .54; this means that the scale is not very reliable. The first item better fits the definition of impact used in this study. Thus the decision was made to only use the first item to measure impact, which was also the item used by Van Wissen (2013) and Floris (2013). The first item alone is thought to be sufficient to measure impact.

Attitudes.

Attitudes towards the pro-environmental behaviors were measured using three items adapted from Ajzen (2006): ‘*When you think about eating a vegetarian dinner every day of the week, do you consider this behavior to be:*’, measured on a 7 point semantic-differential scale ranging from ‘*bad-good*’, ‘*unpleasant-pleasant*’ and ‘*unattractive-attractive*’. All items were scored in a way that a high score means a positive attitude towards the behavior. The reliability analysis showed that the Cronbach’s α for this scale ranged from .81 to .91, which suggests a reliable scale.

Environmental concern.

To examine environmental concern the New Ecological Paradigm (NEP) scale was used (Dunlap, Van Liere, Mertig, & Emmet Jones, 2000), which consists of 15 items. In the previous studies six items were added to the scale, and the scale was translated into Dutch. The reliability analysis showed that the scale with a total of 21 items had a Cronbach’s α of .86.

Trend.

To examine trend we used items that were intended to measure the degree to which the participant thought that others in society buy organic meat or eat a vegetarian dinner. For example: ‘*Most people in society purchase organic meat every day.*’ and ‘*Currently more people eat a vegetarian dinner regularly as opposed to ten years ago*’ (*I do not agree at all – I totally agree*). The reliability analysis showed a low Cronbach’s α ranging from .33 to .54, which suggests low reliability of the scale. We are not confident that one item would suffice to measure trend in society and thus decided not to address the hypotheses that trend influences both social norms in our analysis.

Constraining factors.

To measure constraining factors items about perceived barriers, perceived uncertainty and available money were used, which were all scored in a way that a higher score means a higher degree of constraint. For perceived barriers, we used two items adapted from Thøgersen (2009), for example: *'In general, for me to buy organic meat instead of conventional meat would be...'* with response categories ranging from *'difficult'* to *'easy'*. The reliability analysis gave Cronbach's α ranging from .75 to .88. This indicates a reliable scale.

To measure perceived uncertainty five items were used, for example: *'I know quite a lot about the preparation of a vegetarian dinner'* (*I totally agree - I do not agree at all*). The reliability analysis showed a Cronbach's α ranging from .74 to .88, which suggests a reliable scale.

To measure available four money items were used such as: *'A vegetarian dinner is less expensive than a dinner with meat.'*, with an answering scale ranging from *'I do not agree at all'* to *'I totally agree'*. The reliability analysis showed a Cronbach's α of .83 for the behavior 'eating a vegetarian dinner' after removal of the item: *'If I had a higher income I would buy organic meat more often'* (*I do not agree at all - I totally agree*). For 'purchasing organic meat' the Cronbach's α of .47 showed that the reliability of the scale was low, thus only the following item was used for this behavior: *'The price of organic meat is higher than the price of regular meat'* (*I do not agree at all- I totally agree*). We are confident that this item is sufficient as the available money measurement. For 'purchasing ecological products' a scale containing only the items: *'ecological [...] are*

cheaper than regular [...]’ and ‘ecological [...] are more expensive than regular [...]’ (I do not agree at all – I totally agree) was used, with a Cronbach’s α of .73.

Results

Exploring the data

Before looking into the hypotheses, the data was explored. Tables 1 through 3 display the means, standard deviations and number of participants for each of the three behaviors. The number of participants per behavior again showed that the survey endured a high degree of participant attrition. The means and standard deviations showed that for the behavior measure of the pro-environmental behaviors the means ranged between 1.6 ($SD=1.0$) for ‘purchasing organic meat’ and 2.9 ($SD=1.9$) for ‘eating a vegetarian dinner’.

Table 1. Means, standard deviations and number of participants of the dependent variable behavior (measured on an 8 point Likert scale) and the independent variables (all measured on a 7 point Likert scale) for the behavior ‘eating a vegetarian dinner’.

	<i>M</i>	<i>SD</i>	<i>N</i>
Behavior	2.9	1.9	173
Personal norm	2.7	1.7	173
Injunctive social norm	1.7	1.2	157
Descriptive social norm	1.9	1.2	157
Own visibility	4.0	1.9	157
Visibility of others	4.2	1.8	157
Impact	3.7	1.7	157
Environmental concern	4.6	.71	130
Attitude	4.9	1.4	142
Perceived uncertainty	4.0	1.5	143
Money	4.7	1.3	143
Perceived barrier	3.2	1.3	130

Table 2. Means, standard deviations and number of participants of the dependent variable behavior (measured on an 8 point Likert scale) and the independent variables (all measured on a 7 point Likert scale) for the behavior ‘purchasing organic meat’.

	<i>M</i>	<i>SD</i>	<i>N</i>
Behavior	1.6	1.0	130
Personal norm	3.1	1.6	130
Injunctive social norm	2.2	1.5	128
Descriptive social norm	1.9	1.2	128

Own visibility	3.2	1.9	128
Visibility of others	3.3	2.0	128
Impact	3.8	1.6	128
Environmental concern	4.6	.71	130
Attitude	5.4	1.2	127
Perceived uncertainty	4.3	1.1	127
Money	1.7	1.2	127
Perceived barrier	3.8	1.3	122

Table 3. Means, standard deviations and number of participants of the dependent variable behavior (measured on an 8 point Likert scale) and the independent variables (all measured on a 7 point Likert scale) for the behavior ‘purchasing ecological products’.

	<i>M</i>	<i>SD</i>	<i>N</i>
Behavior	1.9	1.0	81
Personal norm	3.2	1.7	81
Injunctive social norm	1.9	1.1	78
Descriptive social norm	2.0	1.3	78
Own visibility	2.6	1.7	78
Visibility of others	3.0	1.9	78
Impact	3.3	1.6	78
Environmental concern	4.6	.71	130
Attitude	5.6	1.1	78
Perceived uncertainty	4.4	1.0	78
Money	4.0	.56	78
Perceived barrier	3.1	1.2	76

Correlation matrices were created to get an idea about the general correlational relationships amongst the dependent variables and independent variables. These correlations (presented in Tables 4 through 6) showed that all three behaviors were significantly and positively correlated with personal norm, as well as with injunctive and descriptive social norm. Both social norms were significantly and positively correlated with personal norm and with each other. Both social norms were highly correlated, but not high enough to suspect multicollinearity. Own visibility and visibility of others were highly correlated (between $r=.75$ and $r=.88$), this already has been discussed in the independent measures section (page 17). As expected, attitude correlated highly with ‘eating a vegetarian dinner’ ($r=.63$), and perceived uncertainty highly negatively

correlated with ‘eating a vegetarian dinner’ ($r=-.62$). Moreover, attitude and perceived uncertainty are (highly) correlated with personal norm for all three behaviors.

Table 4. Correlations between the independent variable behavior (BH), the independent variables personal norm(PN), injunctive social norm (ISN), descriptive social norm(DSN), own visibility (OwnVS), visibility of others (VSothers), impact (IM), environmental concern (EC), attitude (AT), perceived uncertainty (PU) and money (MO) for the behavior ‘eating a vegetarian dinner’.

	BH	PN	ISN	DSN	OwnVS	VSothers	IM	EC	AT	PU	MO
PN	.73***										
ISN	.35***	.35***									
DSN	.37***	.29***	.57***								
OwnVS	-.025	.14	.06	.03							
VSothers	-.038	.07	.08	.07	.79**						
IM	.30***	.36***	.32***	.23**	.10	.12					
EC	.33***	.48***	.07	.12	-.12	-.16	.42***				
AT	.63***	.65***	.25**	.25**	.00	-.02	.40***	.46***			
PU	-.62***	-.64***	-.07	-.19*	-.01	-.01	-.10	-.26**	-.45***		
MO	-.34***	-.32***	-.14	-.15	-.16	-.14	-.16	-.02	-.17*	-.33***	
PB	-.49***	-.40***	-.07	-.13	-.03	.02	-.05	-.15	-.37***	.65***	.44***

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 5. Correlations between the independent variable behavior (BH), the independent variables personal norm(PN), injunctive social norm (ISN), descriptive social norm(DSN), own visibility (OwnVS), visibility of others (VSothers), impact (IM), environmental concern (EC), attitude (AT), perceived uncertainty (PU) and money (MO) for the behavior ‘purchasing organic meat’.

	BH	PN	ISN	DSN	OwnVS	VSothers	IM	EC	AT	PU	MO
PN	.34***										
ISN	.34***	.47***									
DSN	.29***	.27**	.62***								
OwnVS	-.02	.07	.20*	.08							
VSothers	.02	.16	.16	.07	.88***						
Impact	.09	.31***	.34***	.27**	.19*	.15					
EC	.10	.38***	.14	.12	-.14	-.09	.25*				

AT	.28***	.54***	.17	.04	-.14	-.12	.22*	.28**			
PU	-.22*	-.31***	.01	.02	-.04	-.05	-.04	-.13	-.22*		
MO	-.10	.13	-.10	-.21*	.15	.15	-.12	.07	.09	-.02	
PB	-.15	-.18*	.12	-.00	.01	-.03	.21*	-.05	.13	.21*	.04

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 6. Correlations between the independent variable behavior (BH), the independent variables personal norm (PN), injunctive social norm (ISN), descriptive social norm (DSN), own visibility (OwnVS), visibility of others (VSothers), impact (IM), environmental concern (EC), attitude (AT), perceived uncertainty (PU) and money (MO) for the behavior 'purchasing ecological products'.

	BH	PN	ISN	DSN	OwnVS	VSothers	IM	EC	AT	PU	MO
PN	.33**										
ISN	.28*	.58***									
DSN	.32**	.31**	.71***								
OwnVS	.16	.27*	.35**	.50***							
VSothers	.21	.26*	.34**	.49***	.75***						
Impact	.11	.39***	.28*	.09	.26*	.07					
EC	.20	.38***	.15	.05	.03	.01	.44***				
AT	.04	.43**	.17	.14	.08	.01	.21	.36***			
PU	-.19	-.37***	-.11	-.15	-.20	-.21	-.20	-.35**	-.30**		
MO	-.07	-.00	-.05	-.10	-.12	-.14	.14	.08	.05	-.07	
PB	-.22	-.26*	-.01	-.13	-.17	-.18	-.09	-.15	-.15	.31**	.24*

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

The last step before testing the hypotheses was to check the assumptions for a hierarchical regression analysis. While checking for outliers it was discovered that there were two outliers on the environmental concern scale. After a closer look it turned out that these participants filled out the scale with the same value (all 1's and all 2's) for each of the 21 items, while not all questions were phrased in the same direction; this indicates low involvement of the participants and thus these cases were excluded from the analysis. There were some outliers for social norm as well, but there was no reason to exclude those cases. The behaviors showed some skewness, with a most participants indicating

that they did not perform the pro-environmental behaviors often. For the behavior ‘eating a vegetarian dinner’ there was a peak at the other extreme, which represents people who only eat vegetarian dinners. This should not pose a problem for our analysis. The assumption of linearity and homoscedasticity was checked by plotting the residuals against the predicted values. Furthermore, the assumption of normally distributed residuals was checked through a PP-plot. All in all, there were no reasons for concern. Thus, next the hypotheses could be tested. For clarity, the results are discussed per hypothesis instead of per behavior.

Testing of hypotheses

In the first hypothesis we expected that injunctive social norms would influence personal norm (H1). Moreover, we predicted that environmental concern would influence personal norm (H13). To test these hypotheses a hierarchical regression analysis was performed for the effect of injunctive social norm and environmental concern on personal norm for each of the three tested behaviors. The results (presented in Table 7) showed that injunctive social norm was a predictor of personal norm for each of the three behaviors. This means that the stronger the injunctive social norm is to perform a behavior, the stronger the personal norm is to perform that behavior. Thus the first hypothesis is supported by these results (H1). Moreover, the results indicated that environmental concern was a predictor of personal norm as well for the behaviors ‘eating a vegetarian dinner’, ‘purchasing organic meat’ and ‘purchasing ecological products’; a higher degree of environmental concern leads to a stronger personal norm to eat a vegetarian dinner and to purchase ecological products. Thus hypothesis thirteen is also supported by these results (H13).

Table 7. Injunctive social norm (ISN) and environmental concern (EC) as predictors of personal norm for the behaviors 'eating a vegetarian dinner' (VEGA), 'purchasing organic meat' (BIO) and 'purchasing ecological products' (ECO).

	model	β	F	R ² (adjusted R ²)	R ² change
VEGA	ISN	.28***	11.23***	.08(.07)	.08***
	ISN	.25***	25.92***	.29(.28)	.21***
	EC	.46***			N=130
BIO	ISN	.46***	31.93***	.21(.21)	.21***
	ISN	.42***	26.67***	.31(.30)	.10***
	EC	.32***			N=120
ECO	ISN	.58***	36.50***	.33(.32)	.33***
	ISN	.53***	26.28***	.41(.40)	.09***
	EC	.30***			N=76

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

The second hypothesis was that injunctive social norm would influence behavior directly (H2). To test this hypothesis a regression analysis was conducted for the effect of injunctive social norm on behavior. The results, presented in Table 8, supported the hypothesis; injunctive social norm was a significant predictor of all three behaviors. Thus the stronger the injunctive social norm to perform a behavior, the more likely it is that the behavior is actually performed.

Table 8. Injunctive social norm (ISN) as predictor of the behaviors 'eating a vegetarian dinner' (VEGA), 'purchasing organic meat' (BIO) and 'purchasing ecological products' (ECO).

Behavior	N	β	F	R ² (adjusted R ²)	p
VEGA	157	.35	21.46	.12(.12)	***
BIO	128	.34	15.89	.11(.11)	***
ECO	78	.28	6.29	.08(.06)	*

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

The effect of injunctive social norm on behavior, moderated by impact.

Furthermore, for the third hypothesis (H3) it was expected that the relationship

between injunctive social norms and behavior was moderated by impact. To test this hypothesis hierarchical regression analyses were performed for the interaction between social norm and impact for each of the three behaviors. This analysis was controlled for environmental concern, personal norm and attitude. To correct for multicollinearity standardized values were used to calculate all the interactions. The results are presented in Tables 9 through 11.

Table 9. Hierarchical regression analysis for the interaction between impact and injunctive social norm for the behavior 'eating a vegetarian dinner', controlled for environmental concern and personal norm (N=130).

model	β	F	R²(adjusted R²)	R² change
Personal norm	.72 ^{***}	139.50 ^{***}	.52(.52)	.52 ^{***}
Personal norm	.73 ^{***}	69.29 ^{***}	.52(.51)	.00
Environmental concern	-.02			
Personal norm	.72 ^{***}	46.16 ^{***}	.52(.51)	.00
Environmental concern	-.02			
Injunctive social norm	.04			
Personal norm	.72 ^{***}	34.35 ^{***}	.52(.51)	.00
Environmental concern	-.02			
Injunctive social norm	.04			
Impact	.01			
Personal norm	.72 ^{***}	27.27 ^{***}	.52(.51)	.00
Environmental concern	-.02			
Injunctive social norm	.04			
Impact	.01			
Injunctive social norm * impact	.01			

p<.1; **p*<.05; ***p*<.01; ****p*<.001.

Table 10. Hierarchical regression analysis for the interaction between impact and injunctive social norm for the behavior 'purchasing organic meat', controlled for environmental concern and personal norm (N=120).

model	β	F	R²(adjusted R²)	R² change
Personal norm	.37 ^{***}	18.96 ^{***}	.14(.13)	.14 ^{***}
Personal norm	.39 ^{***}	9.57 ^{***}	.14(.13)	.00
Environmental concern	-.05			
Personal norm	.31 ^{**}	7.47 ^{***}	.16(.14)	.02 ^(<i>p</i>=.089)
Environmental concern	-.04			
Injunctive social norm	.17 ^(<i>p</i>=.089)			
Personal norm	.32 ^{**}	5.57 ^{***}	.16(.13)	.00

Environmental concern	-.04			
Injunctive social norm	.17 ^(p=.088)			
Impact	-.03			
Personal norm	.31 ^{**}	4.42 ^{***}	.16(.13)	.00
Environmental concern	-.04			
Injunctive social norm	.16			
Impact	-.02			
Injunctive social norm *	.01			
impact				

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 11. Hierarchical regression analysis for the interaction between impact and injunctive social norm for the behavior 'purchasing ecological products', controlled for environmental concern and personal norm (N=76).

model	β	F	R ² (adjusted R ²)	R ² change
Personal norm	.33 ^{**}	9.07 ^{**}	.11(.10)	.11 ^{**}
Personal norm	.30 [*]	4.75 [*]	.12(.09)	.01
Environmental concern	.08			
Personal norm	.21	3.56 [*]	.13(.09)	.01
Environmental concern	.10			
Injunctive social norm	.15			
Personal norm	.23	2.73 [*]	.13(.08)	.00
Environmental concern	.12			
Injunctive social norm	.16			
Impact	-.08			
Personal norm	.21	2.70 [*]	.16(.10)	.03
Environmental concern	.10			
Injunctive social norm	.22			
Impact	-.08			
Injunctive social norm *	-.18			
impact				

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

The results showed no significant interaction effect of injunctive social norm and impact for each of the three behaviors. Thus, our third hypothesis is not supported by these results (H3). Moreover, injunctive social norm was no longer a significant predictor of behavior, when controlled for personal norm and environmental concern. However for the behavior 'purchasing organic meat' the effect of injunctive social norm approached significance ($p=.09$). These results do not support our second hypothesis (H2). Finally the results did show support for the fourteenth hypothesis; personal norm was a

significant predictor of ‘eating a vegetarian dinner’, ‘purchasing organic meat’ and ‘purchasing ecological products’(H14). This means that the stronger the personal norm is to perform a behavior the more likely that the behavior is performed. However, for ‘purchasing ecological products’, personal norm lost its significance when controlled for injunctive social norm. This only partly confirms the fourteenth hypothesis.

The effect of injunctive social norm on behavior, moderated by own visibility.

The fourth hypothesis was that the relationship between injunctive norms and behavior is also moderated by own visibility (H4). This was again tested by conducting hierarchical regression analyses with the interaction between social norm and own visibility, while controlling for personal norm and environmental concern, for each of the three behaviors. The results are presented in Table 12 through 14.

Table 12. Hierarchical regression analysis for the interaction between own visibility and injunctive social norm for the behavior ‘eating a vegetarian dinner’, controlled for environmental concern and personal norm (N=130).

model	β	F	R²(adjusted R²)	R² change
Personal norm	.72**	139.50***	.52(.52)	.52***
Personal norm	.73***	69.29***	.52(.51)	.00
Environmental concern	-.02			
Personal norm	.72***	46.16***	.52(.51)	.00
Environmental concern	-.02			
Injunctive social norm	.04			
Personal norm	.76***	37.67***	.55(.53)	.02*
Environmental concern	-.06			
Injunctive social norm	.05			
Own visibility	-.16*			
Personal norm	.76***	30.41***	.55(.53)	.00
Environmental concern	-.06			
Injunctive social norm	.04			
Own visibility	-.16*			
Injunctive social norm *	.07			
Own visibility				

p<.1; **p*<.05; ***p*<.01; ****p*<.001.

Table 13. Hierarchical regression analysis for the interaction between own visibility and injunctive social norm for the behavior 'purchasing organic meat', controlled for environmental concern and personal norm (N=120).

model	β	F	R ² (adjusted R ²)	R ² change
Personal norm	.37***	18.96***	.14(.13)	.14***
Personal norm	.39***	9.57***	.14(.13)	.00
Environmental concern	-.05			
Personal norm	.31**	7.47***	.16(.14)	.02 ^(p=.089)
Environmental concern	-.04			
Injunctive social norm	.17 ^(p=.089)			
Personal norm	.32**	6.22***	.18(.15)	.02
Environmental concern	-.07			
Injunctive social norm	.19 ^(p=.052)			
Own visibility	-.13			
Personal norm	.31**	5.14***	.18(.15)	.01
Environmental concern	-.07			
Injunctive social norm	.22*			
Own visibility	-.14			
Injunctive social norm*	-.08			
Own visibility				

p<.1; *p<.05; **p<.01; ***p<.001.

Table 14. Hierarchical regression analysis for the interaction between own visibility and injunctive social norm for the behavior 'purchasing ecological products', controlled for environmental concern and personal norm (N=76).

model	β	F	R ² (adjusted R ²)	R ² change
Personal norm	.33**	9.07**	.11(.10)	.11**
Personal norm	.30*	4.75**	.12(.09)	.01
Environmental concern	.08			
Personal norm	.21	3.56*	.13(.09)	.01
Environmental concern	.10			
Injunctive social norm	.15			
Personal norm	.21	2.70*	.13(.06)	.00
Environmental concern	.10			
Injunctive social norm	.13			
Own visibility	.06			
Personal norm	.20	2.21*	.14(.08)	.00
Environmental concern	.09			
Injunctive social norm	.16			
Own visibility	.06			
Injunctive social norm*	-.07			
Own visibility				

p<.1; *p<.05; **p<.01; ***p<.001.

The results did not show support for the fourth hypothesis (H14). No significant interaction effect was found for injunctive social norm and own visibility on the behaviors. However, there was an unexpected significant negative direct effect of own visibility ($\beta=-.15$) on ‘eating a vegetarian dinner’; the more visible the own behavior, the less likely it is that people eat a vegetarian dinner. Moreover, there was no longer a significant effect of injunctive social norm on the behaviors, when controlled for personal norm and environmental concern. However, the effect of injunctive social norm was marginally significant ($p=.089$) for the behavior ‘purchasing organic meat’ and when own visibility was added in the model it approached significance very closely ($p=.052$). When the interaction effect was added in the model injunctive social norm became a significant predictor of ‘purchasing organic meat’ ($\beta=.22$) (H2). Further, the results indicated that personal norm was a significant predictor of ‘eating a vegetarian dinner’ and ‘purchasing organic meat’, when controlled for injunctive social norm. This supports the fourteenth hypothesis (H14); the higher the personal norm to perform a behavior, the more likely that the behavior is performed. For environmental concern, personal norm was a significant predictor of behavior, but was no longer significant when we controlled for injunctive social norm. This partly confirms the fourteenth hypothesis.

The fifth hypothesis stated that descriptive social norm had an effect on behavior (H5). To test this a hierarchical regression analysis was performed, controlling for injunctive social norm. The results are shown in Tables 15 through 17.

Table 15. The direct effect of descriptive social norm (DSN) on behavior for ‘eating a vegetarian dinner’, controlled for injunctive social norm (ISN) (N=157).

model	β	F	R² (adjusted R²)	R² change
DSN	.37***	24.22***	.14(.13)	.14***
DSN	.25**	15.07***	.16(.15)	.03*

ISN	.21*
-----	------

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 16. Direct influence of descriptive social norm (DSN) on behavior for ‘purchasing organic meat’, controlled for injunctive social norm (ISN) (N=128).

model	β	F	R ² (adjusted R ²)	R ² change
DSN	.29***	11.39***	.08(.08)	.08***
DSN	.13	8.72***	.11(.10)	.04*
ISN	.25*			

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 17. Direct influence of descriptive social norm (DSN) on behavior for ‘buying ecological products’, controlled for injunctive social norm (ISN) (N=78).

model	β	F	R ² (adjusted R ²)	R ² change
DSN	.32**	8.49**	.10(.09)	.10**
DSN	.24	4.44*	.11(.08)	.01
ISN	.10			

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

For ‘eating a vegetarian dinner’ the correlation between the two social norms was .57, which is not high enough to suspect multicollinearity. Moreover, the *VIF*-statistic was 1.49, which is below 10, thus multicollinearity is most likely not an issue. For ‘purchasing organic meat’ the correlation between the two norms was .62 with a *VIF*-statistic of 1.63 and for ‘purchasing ecological products’ the correlation was .71, with a *VIF*-statistic of 2.01. For both multicollinearity most likely is not an issue.

The results showed that descriptive social norm has a significant effect on all of the three behaviors; the stronger the descriptive social norm, the more likely it is that the person performs the behavior. However, when controlled for injunctive social norm, descriptive social norm was no longer a significant predictor of ‘purchasing organic meat’ and ‘purchasing ecological products’. It did remain a significant predictor of behavior for ‘eating vegetarian dinner’. The hypothesis is thus only partly confirmed by

these results. Even though the descriptive social norm did not predict behavior significantly above and beyond injunctive social norm for two of the three behaviors, it did predicted the behaviors directly. Thus the analyses for descriptive social norms for the behaviors ‘purchasing organic meat’ and ‘purchasing ecological products’ were performed as intended.

The effect of descriptive social norm on behavior, moderated by impact.

The sixth hypothesis was that impact influenced the relationship between descriptive social norm and behavior (H6). To test this hypothesis a hierarchical regression analysis was conducted for the interaction between descriptive social norm and impact, controlled for personal norm and environmental concern. The results are presented in Tables 18 through 20.

Table 18. Hierarchical regression analysis for the interaction between impact and descriptive social norm for the behavior ‘eating a vegetarian dinner’, controlled for environmental concern and personal norm (N=130).

model	β	F	R²(adjusted R²)	R² change
Personal norm	.72 ^{***}	139.50 ^{***}	.52(.52)	.52 ^{***}
Personal norm	.73 ^{***}	69.29 ^{***}	.52(.51)	.00
Environmental concern	-.02			
Personal norm	.68 ^{***}	50.06 ^{***}	.54(.53)	.02 [*]
Environmental concern	-.01			
Descriptive social norm	.16 [*]			
Personal norm	.68 ^{***}	37.26 ^{***}	.54(.53)	.00
Environmental concern	-.01			
Descriptive social norm	.16 ^{**}			
Impact	-.01			
Personal norm	.68 ^{***}	29.85 ^{***}	.55(.53)	.00
Environmental concern	-.01			
Descriptive social norm	.13 ^(p=.06)			
Impact	.00			
Descriptive social norm *	.05			
Impact				

p<.1; **p*<.05; ***p*<.01; ****p*<.001.

Table 19. Hierarchical regression analysis for the interaction between impact and descriptive social norm for the behavior 'purchasing organic meat', controlled for environmental concern and personal norm (N=120).

model	β	F	R ² (adjusted R ²)	R ² change
Personal norm	.37***	18.96***	.14(.13)	.14***
Personal norm	.39***	9.57***	.14(.13)	.00
Environmental concern	.05			
Personal norm	.35***	7.42***	.16(.14)	.02
Environmental concern	-.05			
Descriptive social norm	.15			
Personal norm	.36***	5.53***	.16(.13)	.00
Environmental concern	-.05			
Descriptive social norm	.15			
Impact	-.02			
Personal norm	.36***	4.42***	.16(.13)	.00
Environmental concern	.06			
Descriptive social norm	.18			
Impact	-.03			
Descriptive social norm *	-.04			
Impact				

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 20. Hierarchical regression analysis for the interaction between impact and descriptive social norm for the behavior 'purchasing ecological products', controlled for environmental concern and personal norm (N=76).

model	β	F	R ² (adjusted R ²)	R ² change
Personal norm	.33**	9.07**	.11(.10)	.11**
Personal norm	.30*	4.75*	.12(.09)	.01
Environmental concern	.08			
Personal norm	.21	5.31**	.18(.15)	.07*
Environmental concern	.11			
Descriptive social norm	.27*			
Personal norm	.22 ^(p=.08)	3.98**	.18(.14)	.00
Environmental concern	.12			
Descriptive social norm	.27*			
Impact	.05			
Personal norm	.23 ^(p=.077)	3.64**	.21(.15)	.02
Environmental concern	.08			
Descriptive social norm	.32**			
Impact	-.04			
Descriptive social norm *	-.17			
Impact				

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

The results did not support the sixth hypothesis; there were no significant interaction effects for descriptive social norm and impact on any of the three behaviors (H6). The results of the behaviors 'eating a vegetarian dinner' and 'purchasing ecological products' did show additional support for the fifth hypothesis; for these behaviors the descriptive social norm still had a significant effect on behavior controlled for personal norm, environmental concern, impact and the interaction effect. This means that the stronger the descriptive social norm is to perform the behavior, the more likely it is that the behavior is actually performed. These results were not observed for the behavior 'purchasing organic meat'(H5). Moreover the results for the behaviors 'eating a vegetarian dinner' and 'purchasing organic meat' indicated additional support for the fourteenth hypothesis (H14); personal norm had a significant effect on these behaviors. For 'purchasing ecological products' at first personal norm had a significant effect on behavior. When controlled for descriptive social norm the effect was no longer significant, but it approached significance again when impact was entered into the analysis ($p=.08$ and $p=.08$).

The influence of descriptive social norm on behavior, moderated by visibility of others.

The seventh hypothesis stated that visibility of others influenced the relationship between descriptive social norm and behavior (H7). To test this hypothesis a hierarchical regression analysis was conducted for the interaction between descriptive social norm and impact, controlled for personal norm and environmental concern. The results are presented in Tables 21 through 23.

Table 21. Hierarchical regression analysis for the interaction between the visibility of others and descriptive social norm for the behavior 'eating a vegetarian dinner', controlled for environmental concern and personal norm (N=130).

model	β	F	R ² (adjusted R ²)	R ² change
Personal norm	.72 ^{***}	139.50 ^{***}	.52(.52)	.52 ^{***}
Personal norm	.73 ^{***}	69.29 ^{***}	.52(.51)	.00
Environmental concern	-.02			
Personal norm	.68 ^{***}	50.01 ^{***}	.54(.53)	.02 [*]
Environmental concern	-.01			
Descriptive social norm	.16 ^{**}			
Personal norm	.70 ^{***}	39.43 ^{***}	.56(.54)	.01 [*]
Environmental concern	-.04			
Descriptive social norm	.17 ^{**}			
Visibility of others	-.12 [*]			
Personal norm	.70 ^{***}	31.33 ^{***}	.56(.54)	.00
Environmental concern	-.04			
Descriptive social norm	.17 [*]			
Visibility of others	-.12 [*]			
Descriptive social norm *	-.02			
visibility of others				

p<.1; *p<.05; **p<.01; ***p<.001.

Table 22. Hierarchical regression analysis for the interaction between the visibility of others and descriptive social norm for the behavior 'purchasing organic meat', controlled for environmental concern and personal norm (N=120).

model	β	F	R ² (adjusted R ²)	R ² change
Personal norm	.37 ^{***}	18.96 ^{***}	.14(.13)	.14 ^{***}
Personal norm	.39 ^{***}	9.57 ^{***}	.14(.13)	.00
Environmental concern	-.05			
Personal norm	.35 ^{***}	7.42 ^{***}	.16(.14)	.02
Environmental concern	-.05			
Descriptive social norm	.15			
Personal norm	.37 ^{***}	5.80 ^{***}	.17(.14)	.01
Environmental concern	-.07			
Descriptive social norm	.15			
Visibility of others	-.09			
Personal norm	.37 ^{***}	4.65 ^{***}	.17(.13)	.00
Environmental concern	-.07			
Descriptive social norm	.14			
Visibility of others	-.08			
Descriptive social norm *	.04			
visibility of others				

p<.1; *p<.05; **p<.01; ***p<.001.

Table 23. Hierarchical regression analysis for the interaction between the visibility of others and descriptive social norm for the behavior ‘purchasing ecological products’, controlled for environmental concern and personal norm (N=76).

model	β	F	R ² (adjusted R ²)	R ² change
Personal norm	.33**	9.07**	.11 (.10)	.11**
Personal norm	.30*	4.75*	.12(.09)	.01
Environmental concern	-.08			
Personal norm	.21	5.31**	.18(.15)	.07*
Environmental concern	.11			
Descriptive social norm	.27*			
Personal norm	.20	3.87**	.18(.14)	.00
Environmental concern	.11			
Descriptive social norm	.25 ^(p=.080)			
Visibility of others	.05			
Personal norm	.20	3.14*	.18(.13)	.00
Environmental concern	.11			
Descriptive social norm	.27 ^(p=.080)			
Visibility of others	.04			
Descriptive social norm * visibility of others	-.02			

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

The results did not support the seventh hypothesis, there were no significant interaction effects for descriptive social norm and other visibility on any of the three behaviors (H7). The results did indicate a direct effect of visibility of others on eating a vegetarian dinner. This was a negative effect which means that the more the behaviors of others is visible the less likely it is that a person eats a vegetarian dinner.

The results of the behaviors ‘eating a vegetarian dinner’ and ‘purchasing ecological products’ again showed additional support for the hypothesis that descriptive social norm has an effect on behavior. Again these results were not observed for the behavior ‘purchasing organic meat’ (H5). Moreover, the results for the behaviors ‘eating a vegetarian dinner’ and ‘purchasing organic meat’ indicated additional support for the fourteenth hypothesis; personal norm had a significant effect on these behaviors. For ‘purchasing ecological products’ at first personal norm had a significant effect on

behavior. When controlled for descriptive social norm this effect was no longer significant, but it did approach significance again when impact was entered into the analysis ($p=.08$ and $p=.08$).

Effects of attitude and behavioral constraints on behavior

The eighth hypothesis was that attitude would influence behavior (H8). Besides, behavioral constraints (perceived uncertainty, money and perceived barriers) were expected to have an influence on behavior (H9). A hierarchical regression analysis was conducted to test these hypotheses. This analysis was controlled for personal norm, environmental concern, injunctive social norm and descriptive social norm. The results are presented in Tables 24 through 26.

Table 24. Hierarchical regression analysis for the effect of attitude, perceived uncertainty, money and perceived barriers on 'eating a vegetarian dinner', controlled for personal norm, environmental concern, injunctive social norm, descriptive social norm (N=130).

model	β	F	R²(adjusted R²)	R² change
Personal norm	.69 ^{***}	37.68 ^{***}	.55(.53)	.02 [*]
Environmental concern	-.02			
Injunctive social norm	-.07			
Descriptive social norm	.20 [*]			
Personal norm	.55 ^{***}	35.80 ^{***}	.59(.57)	.04 ^{***}
Environmental concern	-.08			
Injunctive social norm	-.07			
Descriptive social norm	.18 [*]			
Attitude	.28 ^{***}			
Personal norm	.38 ^{***}	34.34 ^{***}	.63(.61)	.04 ^{***}
Environmental concern	-.05			
Injunctive social norm	-.00			
Descriptive social norm	.15 [*]			
Attitude	.26 ^{***}			
Perceived Uncertainty	-.26 ^{***}			
Personal norm	.35 ^{***}	30.39 ^{***}	.64(.62)	.01 ^(p=.08)
Environmental concern	-.04			
Injunctive social norm	-.01			
Descriptive social norm	.14 [*]			
Attitude	.26 ^{***}			

Perceived Uncertainty	-.24 ^{***}			
Money	-.10 ^(p=.08)			
Personal norm	.38 ^{***}	27.34 ^{***}	.64(.62)	.01 ^(p=.095)
Environmental concern	-.04			
Injunctive social norm	-.01			
Descriptive social norm	.14 [*]			
Attitude	.25 ^{***}			
Perceived Uncertainty	-.15 ^(p=.10)			
Money	-.07			
Perceived Barriers	-.13 ^(p=.095)			

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 25. Hierarchical regression analysis for the effect of attitude, perceived uncertainty, money and perceived barriers on 'purchasing organic meat', controlled for personal norm, environmental concern, injunctive social norm, descriptive social norm (N=120).

model	β	F	R ² (adjusted R ²)	R ² change
Personal norm	.32 ^{***}	5.77 ^{***}	.17(.14)	.17 ^{***}
Environmental concern	-.05			
Injunctive social norm	.11			
Descriptive social norm	.09			
Personal norm	.24 [*]	4.93 ^{***}	.18(.14)	.01
Environmental concern	-.06			
Injunctive social norm	.12			
Descriptive social norm	.11			
Attitude	.13			
Personal norm	.19	4.41 ^{***}	.19(.15)	.01
Environmental concern	-.06			
Injunctive social norm	.14			
Descriptive social norm	.11			
Attitude	.12			
Perceived Uncertainty	-.12			
Personal norm	.22	3.99 ^{***}	.20(.15)	.01
Environmental concern	-.05			
Injunctive social norm	.13			
Descriptive social norm	.08			
Attitude	.12			
Perceived Uncertainty	-.11			
Money	.10			
Personal norm	.27 [*]	4.18 ^{***}	.23(.18)	.03 [*]
Environmental concern	-.08			
Injunctive social norm	.15			
Descriptive social norm	.07			
Attitude	.13			
Perceived uncertainty	-.06			
Money	-.10			
Perceived barriers	-.19 [*]			

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 26. Hierarchical regression analysis for the effect of attitude, perceived uncertainty, money and perceived barriers on 'purchasing ecological products', controlled for personal norm, environmental concern, injunctive social norm, descriptive social norm (N=76).

model	β	F	R ² (adjusted R ²)	R ² change
Personal norm	.27 ^(p=.07)	4.11 ^{**}	.19(.14)	.19 ^{**}
Environmental concern	.10			
Injunctive social norm	-.14			
Descriptive social norm	.35 [*]			
Personal norm	.34 [*]	3.73 ^{**}	.21(.15)	.02
Environmental concern	.14			
Injunctive social norm	-.18			
Descriptive social norm	.38 [*]			
Attitude	-.17			
Personal norm	.32	3.11 ^{**}	.21(.14)	.00
Environmental concern	.13			
Injunctive social norm	-.17			
Descriptive social norm	.37 [*]			
Attitude	-.18			
Perceived Uncertainty	-.06			
Personal norm	.32 [*]	2.65 [*]	.21(.13)	.00
Environmental concern	.13			
Injunctive social norm	-.16			
Descriptive social norm	.36 [*]			
Attitude	-.18			
Perceived Uncertainty	-.06			
Money	-.04			
Personal norm	.29 ^(p=.08)	2.39 [*]	.22(.13)	.01
Environmental concern	.13			
Injunctive social norm	-.13			
Descriptive social norm	.33 [*]			
Attitude	-.18			
Perceived uncertainty	-.04			
Money	-.02			
Perceived barriers	-.10			

$p < .1$; $*p < .05$; $**p < .01$; $***p < .001$.

The results showed that attitude had a significant effect on eating a vegetarian dinner; when someone has a positive attitude towards 'eating a vegetarian dinner', it is more likely that that person eats a vegetarian dinner. These results were not found for the behaviors 'purchasing organic meat' and 'purchasing ecological products'(H9). Regarding the effect of behavioral constraints on behavior, the results showed that

perceived uncertainty had a significant negative effect on 'eating a vegetarian dinner'. Thus, for eating a vegetarian dinner a higher degree of uncertainty about the preparation of a vegetarian meal makes it less likely that a person eats a vegetarian meal. Money was not a significant predictor of 'eating a vegetarian dinner', but did have a marginally significant negative effect on 'eating a vegetarian dinner' ($p=.08$). No significant effects were found for perceived barriers on 'eating a vegetarian dinner' and as adding perceived barriers into the analysis caused perceived uncertainty and money to become less significant, this might be due to the fact that perceived barriers highly correlated with perceived uncertainty and money for this behavior (see Table 4).

For the behavior 'purchasing organic meat' there were no effects of the behavioral constraints variables on behavior. For 'purchasing ecological products' there only was a significant effect of perceived barriers on behavior (H10); the higher a person perceives the barriers to buy ecological products to be, the less likely it is that that person purchases ecological products.

Moreover, Tables 24 and 26 show that descriptive social norm had a significant effect on the behaviors 'eating a vegetarian dinner' and 'purchasing ecological products' above and beyond the effects of personal norm and injunctive social norm. This provides additional support for the fifth hypothesis (H5).

Lastly, the eleventh hypothesis stated that descriptive social norms had an effect on attitude. The results (presented in Table 27) showed that this was only true for the behavior 'eating a vegetarian dinner'; the higher the descriptive social norm to eat a vegetarian dinner is, the more likely it is that a person has a positive attitude towards

eating a vegetarian dinner. The hypothesis is only partly confirmed by these results (H11).

Table 27. Regression analysis for the influence of descriptive social norm on attitude for the behaviors 'eating a vegetarian dinner' (VEGA), 'purchasing organic meat' (BIO) and 'purchasing ecological products'(ECO).

	β	F	R^2 (adjusted R^2)
VEGA	.25**	9.56**	.06(.06)
BIO	.04	.224	.00(-.01)
ECO	.14	1.423	.02(.01)

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Discussion

The CO₂ emissions of households contribute to the increase in emissions of greenhouse gasses. In households these emissions consist of energy-related behaviors, directly through the use of electricity and gas or indirectly through the use of energy intensive products and services. Households account for 10% of the total emissions in the Netherlands (RIVM 2010) and are thereby contributing to the problem of global warming (Abrahamse, Steg, Vlek, & Rothengatter, 2007). Through encouragement of more environmental friendly behavior it is possible to make an impact in reducing these emissions. In order to encourage pro-environmental behaviors it is key to understand the processes that lead to the performance of these behaviors. In households normative influences might play a role and thus the current study focussed on the effects of norms on pro-environmental behavior ('eating a vegetarian dinner', 'purchasing organic meat', and 'purchasing ecological products') in student households. To examine this we drew upon and expanded the models developed in earlier studies by Noyon, (2011) Van Wissen (2013) Floris (2013) to develop a new model (see Figure 2). This model was tested through fourteen hypotheses.

The expectations that formed the basis of the model were that injunctive social norm and environmental concern would have an effect on personal norm. The results confirmed that social norm and environmental concern lead to personal norms. Moreover we expected that personal norm would in turn lead to behavior, this expectation was confirmed for all three behaviors with injunctive social norm. These findings are in line with previous findings of Noyon (2011), Van Wissen (2013) and Floris (2013).

Furthermore, it was hypothesized that injunctive and descriptive social norm would influence behavior. Injunctive social norm indeed had an effect on all of the three behaviors. When controlled for personal norm and environmental concern, this effect disappeared. This is probably due to the mediating effect of personal norm on the relationship between injunctive social norm and behavior. These findings are in line with findings of Noyon (2011) and partially in line with findings of Van Wissen (2013) and Floris (2013)

Descriptive social norm appeared to have a direct effect on all of the three behaviors. When controlled for injunctive social norm this effect disappeared for 'purchasing organic meat' and 'purchasing ecological products', which means that for 'eating a vegetarian dinner' descriptive social norm added to the model above and beyond the effect of injunctive social norm. When we controlled for personal norm, environmental concern and injunctive social norm, descriptive social norm had an effect for the behaviors 'eating a vegetarian dinner' and 'purchasing ecological products'. These findings add to the previous studies by providing evidence that descriptive social norm indeed can have an effect on behavior that goes above and beyond the influence of

injunctive social norm and personal norm. Thus descriptive social norm is an important factor to take into account in future research.

The key hypotheses of this study were that we expected impact (H3) and own visibility (H4) to moderate the effect of injunctive social norms on behavior and that we expected impact (H6) and other visibility (H7) to moderate the effect of descriptive social norms on behavior. No such moderation effects were found for any of the three behaviors. The findings of the current study did not replicate the findings of Van Wissen (2013) who found moderating effects of impact and visibility for the behavior 'eating a vegetarian dinner'. This is surprising as the current study investigated the same target group as in Van Wissen's (2013) study. Moreover, the current analysis of the moderating effect of impact on the relationship between injunctive social norm and behavior can be directly compared with the findings of Van Wissen (2013) and Floris (2013), as the same items were used to measure the constructs and to do the analysis. To also provide this comparability for the moderation effect of visibility an analysis was performed for injunctive social norm with the same visibility variable as used by our predecessors. The results of this analysis (reported in Appendix A) also did not replicate the finding that the normative effects on eating a vegetarian dinner are moderated by visibility.

The moderating effect of impact found by van Wissen (2013) was not very large, but the moderating effect of visibility on the other hand was highly significant. Furthermore, the current study might not have had a sufficient sample size, but it did not differ a lot from the sample size of Van Wissen's (2013) study ($N=148$). Replication with a sufficient sample size is needed to clarify if Van Wissen (2013) falsely detected an effect that is not present or if the current study failed to detect an effect that is present.

Another surprising finding in the current study was that both own visibility and visibility of others appeared to negatively affect ‘eating a vegetarian dinner’. In the additional analysis (provided in Appendix A) we also see a negative effect of visibility on the behavior ‘purchasing organic meat’. These effects are all not very large, however a negative effect is found for both norms and we cannot explain it at this time. Replication of this study with a larger sample size might give more insight into whether this is a real effect or a falsely detected effect. Moreover, only one item was used to measure the various kinds of visibility; a replication study might benefit from a larger reliable scale.

Finally, the model was expanded with the constructs attitude and behavioral constraints which were expected to influence pro-environmental behavior. Attitude appeared to have an effect on ‘eating a vegetarian dinner’, even when controlled for personal norm, environmental concern, and both social norms. This finding is in line with the theory of planned behavior (Ajzen, 1991), which states that next to subjective norms, attitude can lead to behavioral intent. The finding adds to the previous studies by proving that attitude can influence whether someone eats a vegetarian dinner or not. These results were not found for the other two behaviors.

Behavioral constraints were measured through three subscales; perceived uncertainty was found to predict ‘eating a vegetarian dinner’, controlled for personal norm, environmental concern, both social norms and attitude. No effects were found for the other two behaviors. This is surprising as Thøgersen (2009) found that (perceived) uncertainty could dampen the demand for organic products.

For available money we found no effects when controlled for personal norm,

environmental concern, both social norms, attitude, and perceived uncertainty. This does not confirm the expectations and is not in line with the findings of Krystallis, Fotopoulos and Zotos (2006) who did find that a lack of money could have a constraining effect on pro-environmental purchasing behavior. The scale used to measure available money was not reliable for all of the behaviors, thus future research might benefit from a more reliable scale to measure the constraining effects of money.

For perceived barriers we found an effect on ‘purchasing ecological products’, controlled for personal norm, environmental concern, both social norms, attitude, perceived uncertainty and money. This finding is in line with results found by Thøgersen (2009), who found that (external) barriers could dampen the purchase of organic products. However we did not find this effect for the other two behaviors. The findings in general contribute some evidence that constraining factors are important to take into consideration when trying to predict pro-environmental behaviors.

Finally, it was expected that descriptive social norm would predict attitude. This expectation turned out only to be supported for ‘eating a vegetarian dinner’ and not for ‘purchasing organic meat’ and ‘purchasing ecological product’, which is somewhat surprising as a previous finding by Tarkiainen and Sundqvist (2005) showed that subjective social norms influenced the attitudes towards purchasing organic food. The fact that we did not find an effect for the two purchasing behaviors in the current study might be due to the use of descriptive social norm to check this hypothesis, while Tarkiainen and Sundqvist (2005) looked at the more inclusive subjective norm.⁴

⁴ For the effect of injunctive norm on attitude interested readers are invited to read the thesis by Bart van der Velden (2015).

Limitations and implications for future research

As mentioned earlier the survey endured a lot of participant attrition. This resulted in small sample sizes for the behaviors ‘purchasing organic meat’ and ‘purchasing ecological products’, thus the results for these behaviors should be interpreted with care. Especially for these two behaviors we found some marginally significant effects, which might have reached significance with a larger sample size. The attrition can be due to length of the survey; filling out the survey took the participants between 20 and 30 minutes, which might have led people to lose interest and quit the study halfway through. Moreover, the majority of the questions were the same for all three behaviors, which might have contributed to a certain loss of interest and involvement. Furthermore, the participants were able to indicate whether they were a vegetarian, which resulted in a loss of participants for the behavior ‘purchasing organic meat’. For the behavior ‘purchasing ecological products’ people could indicate that they did not buy these products altogether. 55 of our participants indeed indicated this and thus did not fill out the questions regarding this behavior. The high number of people who selected that they never buy these products, indicates that the purchase of ecological products is not an often performed pro-environmental behavior among students.

The high level of attrition was also a problem observed in the studies of Van Wissen (2013) and Floris (2013). In general the current study and the studies by Noyon (2011) Van Wissen (2013) and Floris (2013) found most of the significant effects for the behavior ‘eating a vegetarian dinner’; this behavior was measured at the beginning of each of the surveys and thus was the behavior that endured the least attrition and possibly the least loss of involvement. A recommendation for future research might be to measure

a different behavior at the beginning of the survey, as a decrease of involvement of the participants might have affected the results for the other behaviors. Moreover, we would recommend to make the survey shorter or to measure fewer constructs at once. It might also be interesting to explore experimental ways of investigating this model.

Another limitation to this research is that the scales intended for the measurement of injunctive social norm, descriptive social norm and impact were not reliable. Only one item was used to analyse these constructs. Moreover, own visibility and visibility of others were measured with only one item. For future research it might be better to use more items or to try to find a more reliable scale to measure these constructs. However, as mentioned before it is important to be vigilant that the survey does not become too long; a balance should be found. Furthermore, the scale for trend was not reliable, which made it impossible to check the trend hypotheses. Future studies might try to measure the impact of trend on behavior using a more reliable scale.

Finally, another limitation of survey studies in general is that these studies might be victim to social desirable answers. This risk might especially be present when surveys handle a subject such as pro-environmental behavior; pro-environmental behavior involves social dilemmas in which there could be a conflict between personal and public interests, which might lead people to behave differently in private as opposed to how they claim to behave in public. Even though the answers were treated anonymously, which was explicitly mentioned in the survey to prevent social desirable answers as much as possible, social desirable answers still might have coloured the responses.

Conclusion

In conclusion this study provided additional evidence for the basis of the model as proposed by Noyon (2011). The finding that social norm and environmental concern predict personal norm, which in turn predicts behavior was replicated. The main finding of Van Wissen (2013) was not replicated; no moderation effects were found of impact and visibility on the relationship between (injunctive and descriptive) social norm and behavior. Replication of the study with a larger sample size could provide clarity. However, the study did add to the model by showing that descriptive social norms can have an effect on behavior that goes above and beyond the effect of personal norm and injunctive social norm and by showing that attitude, perceived uncertainty and perceived barriers can also influence the performance of pro-environmental behavior.

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Appendix A

For comparability reasons a hierarchical regression for the relationship between injunctive social norm on behavior was performed using the same visibility item as used by Noyon (2011), Van Wissen (2013) and Floris (2013) for ‘eating a vegetarian dinner’. For the other two behaviors, we used similar items, such as: ‘*In our house we as roommates know when someone of us eats a vegetarian dinner*’ (*I do not agree at all – I totally agree*). The injunctive social norm item is the same as the social norm item that was used by Van Wissen (2013) and Floris (2013). A hierarchical regression analysis was performed, controlled for personal norm and environmental concern. The results are displayed in Table 28 through 30, for each of the three behaviors.

Table 28. Hierarchical regression analysis for the interaction between visibility and injunctive social norm for the behavior ‘eating a vegetarian dinner’, controlled for environmental concern and personal norm (N=130).

model	β	F	R²(adjusted R²)	R² change
Personal norm	.72 ^{***}	139.50 ^{***}	.52(.52)	.52 ^{***}
Personal norm	.73 ^{***}	69.29 ^{***}	.52(.51)	.00
Environmental concern	-.02			
Personal norm	.72 ^{***}	46.16 ^{***}	.52(.51)	.00
Environmental concern	-.02			
Injunctive social norm	.04			
Personal norm	.75 ^{***}	36.29 ^{***}	.54(.52)	.01 ^(p=.056)
Environmental concern	-.03			
Injunctive social norm	.05			
Visibility	-.12 ^(p=.056)			
Personal norm	.75 ^{***}	29.27 ^{***}	.54(.52)	.00
Environmental concern	-.03			
Injunctive social norm	.04			
Visibility	-.11			
Injunctive social norm*	.07			
Visibility				

p<.1; **p*<.05; ***p*<.01; ****p*<.001.

Table 29. Hierarchical regression analysis for the interaction between visibility and injunctive social norm for the behavior 'purchasing organic meat', controlled for environmental concern and personal norm (N=120).

model	β	F	R ² (adjusted R ²)	R ² change
Personal norm	.37***	18.96***	.14(.13)	.13***
Personal norm	.39***	9.57***	.14(.13)	.00
Environmental concern	-.05			
Personal norm	.31**	7.47***	.16(.14)	.02
Environmental concern	-.04			
Injunctive social norm	.17			
Personal norm	.33***	7.16***	.20(.17)	.04*
Environmental concern	-.07			
Injunctive social norm	.20*			
Visibility	-.20*			
Personal norm	.32**	5.85***	.20(.17)	.69
Environmental concern	-.07			
Injunctive social norm	.23*			
Visibility	-.20*			
Injunctive social norm*	-.07			
Visibility				

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 30. Hierarchical regression analysis for the interaction between visibility and injunctive social norm for the behavior 'purchasing ecological products', controlled for environmental concern and personal norm (N=76).

model	β	F	R ² (adjusted R ²)	R ² change
Personal norm	.33**	9.07**	.11(.10)	.11**
Personal norm	.30*	4.75*	.12(.09)	.01
Environmental concern	.08			
Personal norm	.21	3.56*	.13(.09)	.01
Environmental concern	.10			
Injunctive social norm	.15			
Personal norm	.20	3.35*	.16(.11)	.03
Environmental concern	.14			
Injunctive social norm	.06			
Visibility	.20			
Personal norm	.20	2.71*	.16(.10)	.00
Environmental concern	.14			
Injunctive social norm	.09			
Visibility	.20			
Injunctive social norm*	-.07			
Visibility				

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.