

# Can I Make a Difference? The Role of General and Domain-specific Self-efficacy in Sustainable Consumption Decisions

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## **Abstract**

We report a study which explored sustainable development self-efficacy (SDSE) beliefs, that is, domain-specific self-efficacy beliefs concerning one's ability to foster sustainable development. We propose that the following aspects be considered when studying SDSE: Three dimensions of sustainable development (environmental preservation, social fairness, economic welfare) and direct as well as indirect behaviors influencing sustainable development. In an online survey among Norwegian consumers ( $N = 402$ ), we measured SDSE, general self-efficacy (GSE; Schwarzer, 1993), and two indicators of sustainable consumption. A factor analysis yielded four separable facets of SDSE: The perceived ability (i) to encourage others to act sustainably, (ii) to promote environmental preservation by one's own actions and consumption decisions, (iii) to promote social fairness and economic welfare through one's consumption, and (iv) to promote social fairness and economic welfare through one's actions in general. Self-efficacy concerning encouraging others turned out to be the strongest predictor of sustainable consumption behavior, stronger

than self-efficacy concerning directly preserving the environment. The latter was a significant predictor only for choices of ecological produce. GSE did not contribute to predicting sustainable consumption. We discuss the structure of the SDSE concept, its role in shaping sustainable consumption decisions, and how it might be extended in future studies.

Key words: sustainable consumption, sustainable development, self-efficacy, environmental behavior

## Zusammenfassung

### **Kann ich etwas bewirken? Die Bedeutung von genereller und domänenspezifischer Selbstwirksamkeit für nachhaltige Konsumentscheidungen**

Wir berichten eine explorative Studie zum Konzept der Selbstwirksamkeit im Bereich nachhaltiger Entwicklung (sustainable development self-efficacy, SDSE). Wir verstehen darunter subjektive Überzeugungen über die eigene Fähigkeit, einen Beitrag zur nachhaltigen Entwicklung leisten zu können. Wir schlagen vor, folgende Aspekte zu unterscheiden: Einerseits drei Dimensionen nachhaltiger Entwicklung (Umweltschutz, soziale Gerechtigkeit, ökonomisches Wohlergehen), und andererseits sowohl direktes als auch indirektes nachhaltiges Verhalten. In einer Onlinebefragung Norwegischer Konsumenten (N = 402) wurden SDSE, generelle Selbstwirksamkeit (GSE; Schwarzer, 1993) und zwei Indikatoren nachhaltigen Konsums erhoben. Eine Faktorenanalyse ergab vier verschiedene Facetten von SDSE: Die wahrgenommene Fähigkeit (i) andere zu nachhaltigem Verhalten motivieren zu können, (ii) durch das eigene Handeln und die eigenen Konsumentscheidungen einen Beitrag zum Umweltschutz leisten zu können, (iii) durch das eigene Konsumverhalten so-

ziale Gerechtigkeit und ökonomisches Wohlergehen fördern zu können, und (iv) durch eigenes Verhalten (im Allgemeinen) soziale Gerechtigkeit und ökonomisches Wohlergehen fördern zu können. Selbstwirksamkeit im Hinblick darauf, andere Menschen zu nachhaltigem Verhalten motivieren zu können, erwies sich als der beste Prädiktor von nachhaltigem Konsumverhalten. Selbstwirksamkeit im Hinblick darauf, direkt auf den Umweltschutz Einfluss nehmen zu können, war weniger geeignet zur Vorhersage von nachhaltigem Konsumverhalten; lediglich die Wahl von nachhaltigem Obst und Gemüse wurde durch diese SDSE-Facette vorhergesagt. Wir diskutieren die Struktur des SDSE-Konzepts, die Bedeutung von SDSE für nachhaltiges Konsumverhalten und mögliche Erweiterungen des SDSE-Konzepts in zukünftigen Untersuchungen.

Schlüsselwörter: Nachhaltiger Konsum, Selbstwirksamkeit, nachhaltige Entwicklung, Umweltverhalten.

Do individual consumers believe that their purchase decisions can indeed make a difference in fostering sustainable development? The benefits of sustainable consumption arise from collective efforts. Consumers may thus feel that their own behavior makes little difference to sustainable development. It seems likely that such control beliefs play an important role in motivating sustainable consumption decisions. For example, many leading theories of behavioral prediction, such as the theory of planned behavior (e.g., Ajzen, 1991) and social cognitive theory (e.g., Bandura, 1986), assume that one important determinant of behavior is a person's sense of control over desired outcomes. The importance of such control be-

**The aim of the present paper is to explore the self-efficacy that consumers experience with respect to influencing sustainable development by their purchase decisions**

beliefs in shaping behavior has been documented across a variety of domains. With respect to environmental behavior, Stern (1992) concluded in his review of the psychological dimensions of global environmental change that personal control variables are even the only type of personal variable that shows systematic relationships to behavior. Thus, it seems that an important step in understanding sustainable consumption behavior is the study of personal control beliefs concerning sustainable development.

The aim of the present paper is to explore the perceived personal control that consumers experience with respect to influencing sustainable development by their purchase decisions concerning everyday products such as food or cosmetics. More specifically, we draw on Bandura's (e.g., 1977, 1997) concept of self-efficacy as capturing perceived personal control and address the following four research questions: First, what are the various facets of self-efficacy beliefs in the domain of sustainable development? Even though the concept of self-efficacy has been widely employed in various domains, only a few studies have investigated self-efficacy beliefs of consumers with respect to everyday purchases (Berger & Corbin, 1992; Ellen, Wiener & Cobb-Walgren, 1991; Roberts, 1996; Straughan & Roberts, 1999; Vermeir & Verbeke, 2006). Also, to our knowledge, there is no prior research providing a conceptual analysis of self-efficacy beliefs in the domain of sustainable development, which is a necessary first step for self-efficacy assessment in a new domain (Bandura, 2006). Identifying which

facets make up these beliefs will assist future efforts in tailoring self-efficacy measures to the domain of sustainable development. Second, what is the role of self-efficacy beliefs in predicting sustainable consumption? Provided that the first research question leads to the identification of different facets of self-efficacy, the question that follows is whether these facets differ in the degree to which they can explain sustainable consumption. Third, what is the relative contribution of self-efficacy beliefs at varying levels of specificity to predicting sustainable consumption? Many researchers conceive of self-efficacy as a domain-specific construct relating to specific behaviors and concrete outcomes, as was originally suggested by Bandura. Other approaches, in contrast, propose a concept of general self-efficacy, referring to the general belief that one is able to handle challenges and cope with adverse events in one's life (e.g., Schwarzer & Jerusalem, 1995). Such a general self-efficacy concept has the appeal of parsimony, as the same concept is applicable across domains. Our third research question investigates whether both domain-specific and general self-efficacy beliefs contribute to the prediction of sustainable consumption. Fourth, we address the question: Are domain specific and general self-efficacy beliefs related to each other?

We will now elaborate these four questions in turn, before we report a study in which we pursued the questions in a survey among a sample of Norwegian consumers.

## 1 Sustainable Development Self-Efficacy

Bandura (e.g., 1977, 1997, 2006) defines self-efficacy as the belief that one can successfully execute the behaviors required to produce certain desired outcomes. Self-efficacy is

akin to the concept of perceived behavioral control postulated in the theory of planned behavior (Ajzen, 1991; Fishbein & Ajzen, 2010). Perceived behavioral control refers to the belief that one is able to perform a certain desired behavior. In recent variants of the theory of planned behavior (Fishbein, 2000; Fishbein & Capella, 2006), the authors have even re-labeled perceived behavioral control to self-efficacy. We see a slight difference in that perceived behavioral control focuses on the perceived ability to perform a behavior whereas self-efficacy focuses more strongly on the perceived capability to bring about a desired outcome.

We use the term sustainable development self-efficacy (SDSE) to refer to people's self-efficacy beliefs regarding sustainable development; that is, to the degree to which people believe that their individual behavior can contribute to sustainable development. A natural first step in investigating self-efficacy is to specify the outcomes and behaviors of interest. For SDSE, sustainable development is the outcome of interest. With regard to the behaviors of interest, we address everyday behaviors in general, and consumption in particular. Sustainable development as an outcome domain is by far more abstract and complex than most domains to which self-efficacy has been applied (e.g., body weight management or school achievement). We will first discuss the characteristics of this outcome domain before we consider the characteristics of the relevant behaviors.

As outlined by the UN World Commission on Environment and Development (UNWCED), sustainable development can be conceived of as development that integrates three different dimensions: (a) the preservation of natural resources, (b) a fair distribution of resources, and (c) economic welfare. The UNWCED defined sustainable devel-

opment as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (1987, p. 43). The commission underlined that the needs of current and future generations can only be met if the three dimensions environmental preservation, social fairness, and economic viability are integrated into development policies.

Another crucial aspect of sustainable development is its collective nature. Many problems relating to sustainability – carbon dioxide emissions and climate change may serve as a case in point – are cumulative so that individual sustainable behaviors can contribute to sustainable development only if many people perform them. In addition, many decisions concerning sustainable behaviors, including sustainable consumption such as the purchase of ecological groceries, constitute social dilemmas (e.g., Joireman, Lasane, Bennett, Richards & Solaimani, 2001) in that disadvantages for the individual (e.g., higher prices) have to be traded off against benefits for the society (e.g., the preservation of the natural environment).

Research on social dilemmas has shown that consumers are more likely to choose behaviors that maximize collective interests (e.g., commuting by public transportation instead of by car in order to protect the environment) if they believe that other consumers will do the same (cf., Van Lange, Van Vugt, Meertens & Ruiters, 1998). Beliefs in the cooperation of other consumers might partly stem from confidence in one's ability to encourage others to act sustainably. We as-

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sume that people who feel capable of encouraging other consumers to purchase sustainable products experience a high sense of self-efficacy (even if they believe that the direct effects of their own individual actions on sustainable development are negligible). Therefore, we argue that when studying SDSE, indirect behaviors (i.e., behaviors that have an indirect effect on sustainable development, for example, exerting social influence by encouraging others) should be considered in addition to direct behaviors (i.e., behaviors that aim at directly promoting sustainable development, for example, by preserving the environment).

To summarize, we propose that when studying SDSE, the following facets be included: (a) self-efficacy with respect to fostering three dimensions of sustainable development: the preservation of natural resources, a socially fair distribution of resources, and economic welfare, and (b) self-efficacy with respect to direct as well as indirect behaviors.

In our study, we included two more aspects, which may be less essential to the structure of SDSE beliefs, but which we assumed to be valuable additions. First, people should find it easier to make small- than large-scale changes. For example, they may see themselves as capable of fostering economic welfare in their own country by, say, purchasing domestic products, but find it impossible to do the same at a continental or even global level. Therefore, we distinguished self-efficacy with respect to different geographical scales (regional vs. global) of sustainable development. Second, climate change is among the most prominent outcomes and urgent problems associated with sustainable development, and it is an issue of public debate and media attention. We therefore in-

cluded climate change in order to find out whether self-efficacy with regard to mitigating climate change differs from self-efficacy regarding nature preservation in general. Moreover, we assumed that climate change as a concept might be more familiar, given its media coverage, than sustainable development in general.

Our first research question addresses the structure of SDSE beliefs: What are the dimensions of SDSE beliefs and do the above mentioned aspects show up as separable facets of SDSE?

## 2 Self-efficacy Beliefs and Sustainable Consumption

A number of studies have documented the relationship between control-related beliefs such as perceived behavioral control (Knussen, Yule, MacKenzie & Wells, 2004) or locus of control (e.g., Allen & Ferrand, 1999; Smith-Sebasto, 1994) to environmental behavior such as recycling, conservation, environmental activism, or energy conservation. However, not much research exists that has studied self-efficacy in particular as the control-related variable and sustainable consumption as the behavior.

Some studies investigated a concept called consumer effectiveness, which refers to the extent to which consumers believe that they, as individuals, can solve environmental resource problems through their consumption activities. Consumer effectiveness has been shown to predict a variety of purchase decisions (Ellen, Wiener & Cobb-Walgreen, 1991), for example buying biodegradable products (Berger & Corbin, 1992) and sustainable dairy products (Vermeir & Verbeke, 2006). Consumer effectiveness even turned out to be a better predictor of pro-environmental consumer behavior than other vari-

ables such as environmental concern and political ideology (Roberts, 1996; Straughan & Roberts, 1999).

Consumer effectiveness can be interpreted as self-efficacy with respect to one of the three dimensions of sustainable development: the preservation of natural resources. Thus, consumer effectiveness is narrower in scope than SDSE. Two other dimensions of sustainable development, a socially fair distribution of resources and economic welfare, are missing. Also, consumer effectiveness focuses on direct behaviors and does not capture how much consumers believe that they can influence sustainable development indirectly by encouraging other people to act sustainably.

Behavior is influenced by many personal and situational variables (needs, goals, values, attitudes, habits, knowledge, situational barriers, to name just a few). Therefore, from a theoretical perspective, there is no reason to expect a very strong relationship between self-efficacy as a single predictor and behavior. Empirically, consumer effectiveness (i.e., consumer's self-efficacy concerning environmental preservation) turned out to be one of the strongest predictors of pro-environmental consumption (Roberts, 1996; Straughan & Roberts, 1999). Thus, these studies provide support for the assumption that consumers high on self-efficacy are more likely to purchase environmentally friendly products than consumers low on self-efficacy. Self-efficacy beliefs concerning a socially fair distribution of resources, economic welfare, and indirect behaviors have not been studied before so that it is difficult to derive expectations as to their differential weight as predictors.

Studies on sustainable consumption often focus on specific purchases such as one par-

ticular product category (e.g., dairy products, Vermeir & Verbeke, 2006) or – if they cover a larger range of behaviors – include non-habitual, high cost behaviors (e.g., the purchase of household appliances) and conservation behaviors that are not purchases (e.g., energy saving practices) (e.g., Straughan & Roberts, 1999). A great potential for fostering sustainable consumption patterns lies in everyday product purchases. Food, in particular, accounts for 20% of greenhouse gas emissions world wide (Hertwich & Peters, 2009) and leads to a number of other detrimental consequences such as farmland erosion, excess sewage, avoidable waste, and loss of species (Tanner & Wölfing Kast, 2003). Therefore, we decided to concentrate on the everyday purchase of groceries (such as food products or cosmetics).

In our second research question, we investigate whether SDSE predicts the purchase of sustainable groceries. Provided that our first research question yields separable facets of SDSE (e.g., direct versus indirect behaviors, the three dimensions of sustainable development), we will further ask whether these facets differ in the extent to which they are related to sustainable consumption.

### 3 General versus Domain-Specific Self-Efficacy

Bandura introduced self-efficacy as a domain-specific construct. He sees self-efficacy as the perceived ability to perform concrete actions in order to achieve specific outcomes (Bandura, 1994, 1997). Accordingly, he suggests that instruments to measure self-efficacy be adapted to the content domain, based

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on an analysis of the multifaceted ways in which self-efficacy beliefs operate in the domain (Bandura, 2006). It is one of the aims of the present paper to provide such a characterization of self-efficacy beliefs for the domain of sustainable development.

Specificity is a matter of degree, though, so that even within a domain a decision has to be made concerning the level of generality at which self-efficacy beliefs are to be studied. The question of generality has to be addressed for both, the actions and the outcome under investigation. Often, measures of self-efficacy specify only one of these two components and ask for the ability either to perform certain actions (e.g., “How confident are you that you can recycle newspaper on a regular basis if you wanted to?” Lindsay & Strathman, 1997, p. 1808) or to attain a certain outcome (e.g., “I can deal with pollution in domestic contexts,” Homburg & Stolberg, 2006, p. 2). As self-efficacy is made up of both components, we think that both of them need to be specified to capture the concept adequately. With respect to actions, we distinguish direct and indirect behaviors, and with respect to outcomes, we distinguish the three dimensions of sustainable development. To us, this seems a promising and informative level of analysis, even though more specific levels are conceivable.

A different level of analysis has been chosen by Schwarzer and his colleagues (e.g., Schwarzer & Jerusalem, 1995). These authors investigate general self-efficacy (GSE), which refers to a generalized belief that one can succeed in a new or difficult task or cope with adverse events, across content domains. Their concept may be illustrated by the items that they use to measure GSE, for example “It is easy for me to stick to my aims and accomplish my goals.”

Presumably, self-efficacy beliefs exist at various levels of generalization, from the very specific (e.g., I am able to save 50 liters of gasoline each month by riding my bike to work) to the very general (e.g., I am able to accomplish anything). The strongest source of efficacy beliefs are mastery experiences (Bandura, 1994). If a person experiences accomplishments across a variety of tasks and situations, she or he may well develop a generalized sense of mastery. We assume that self-efficacy beliefs at varying levels of generality depend on each other. The process of generalization just mentioned describes the bottom-up inference of general beliefs from more specific ones. Conversely, specific beliefs may be derived in a top-down process from general ones by differentiation (Homburg & Stolberg, 2006), and in that people with high GSE are more likely to approach specific situations with more confidence in their ability to master the situation than people with lower GSE.

To our knowledge, there is no prior research in the environmental psychological literature that compared domain-specific and GSE beliefs. We will do so with respect to two questions. The first question (our third research question) is whether both SDSE and GSE beliefs contribute to predicting sustainable consumption. The domain-specific SDSE concept matches the behavior’s level of specificity more closely than GSE and may therefore be expected to be the better predictor. A smaller percentage of explained variance by GSE would nevertheless be regarded as a valuable contribution, as GSE provides a very parsimonious concept and measure that is applicable across a large range of domains. The second question (the fourth research question) is whether SDSE and GSE are related.

In the following, we present a study among Norwegian consumers. We applied a questionnaire which aimed to tap the various aspects of SDSE that we described in the theoretical section (three dimensions of sustainable development, direct and indirect behaviors, regional and global scopes of sustainable development, and climate change as a prominent issue related to sustainable development). In addition, we measured GSE as proposed by Schwarzer and Jerusalem (1995). Furthermore, we included two measures of sustainable consumption: a purchase habit questionnaire and a product choice. We address the research questions which we outlined earlier: (i) What is the correlational structure of SDSE, that is, which of the various aspects measured constitute distinct facets of SDSE? (ii) Can we predict sustainable purchase behavior from SDSE and what is the differential weight of different SDSE facets as predictors? (iii) Do both domain-specific and GSE beliefs explain sustainable consumption? (iv) Are domain specific and GSE beliefs related to each other?

## 4 Method

### 4.1 Participants

A total of 402 Norwegian consumers living in the Bergen community participated in the study. The sample was randomly drawn from the online panel of a marketing research institute and consisted of 219 female and 183 male consumers aged 18 to 64 years ( $M = 41.64$  years;  $SD = 12.14$ ). The sample composition represented the socio-demographic structure of the Bergen community with respect to gender and age. Participation in the study was voluntary. All participants were offered a package of produce as an incentive to take part in the study.

### 4.2 Measures

We measured general and domain-specific self-efficacy beliefs, and sustainable consumption by means of an online questionnaire. The questionnaire was part of a bigger survey that included additional, unrelated questions.

#### 4.2.1 Sustainable development self-efficacy

SDSE was assessed by 20 questionnaire items which are listed in Appendix A. Participants indicated how much they agreed to each of the 20 statements on a four-point scale ranging from 1 ('strongly disagree') to 4 ('strongly agree'). The SDSE questionnaire covered the aspects of SDSE that are discussed in the theoretical part of this paper. We included self-efficacy beliefs regarding actions in general and buying behavior in particular.

More specifically, the questionnaire taps the following aspects of SDSE, the corresponding items are given in parentheses (cf. Appendix A): (a) self-efficacy with respect to a *direct* influence of one's own actions on sustainable development (SDSE 1 to 6, 9 to 14), (b) self-efficacy with respect to the *indirect* effects that one's own actions have on sustainable development via influencing the behavior of others (SDSE 15 to 20), (c) self-efficacy with respect to achieving positive outcomes on three dimensions of sustainable development: environmental preservation (SDSE 1, 2, 7 to 10, 15, 16), socially fair distribution of resources (SDSE 3, 4, 11, 12, 17, 18), and economic welfare (SDSE 5, 6, 13, 14, 19, 20). Geographical scope was varied as "in this country" (SDSE 3, 5, 11, 13, 17, 19) versus "around the world" (SDSE 4, 6, 12, 14, 18, 20). Three items addressing self-efficacy regarding climate change were



adopted from Kellstedt, Zahran, and Vedlitz (2008) (SDSE 1, 7, 15).

#### 4.2.2 *General self-efficacy*

GSE was assessed by the generalized perceived self-efficacy scale (e.g., Schwarzer & Jerusalem, 1995; Schwarzer, Mueller, & Greenglass, 1999). The scale consists of ten statements that measure a person's perceived capability to bring about desired outcomes and to deal with stressors in life. Participants indicate how much each statement is true for themselves on a scale from 1 ('not at all true') to 4 ('very true'). Example item: "When I am confronted with a problem, I can usually find several solutions." In the present study, we used a Norwegian translation of Schwarzer et al.'s (1999) GSE scale provided by Leganger, Kraft, and Røysamb (2000).

#### 4.2.3 *Incentive choice*

Participants received a package with fruit and vegetables as an incentive for taking part in the study. They could choose between packages of ecological produce and packages of conventionally grown produce.

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Participants' incentive choice was assessed with a separate product choice form prior to the main survey. The incentive choice task was designed so as to simulate an actual purchase decision between sustainable and unsustainable groceries. Participants received a voucher for their participation which could be redeemed for a package of produce. Participants could choose between four packages of produce: two packages of ecological pro-

duce (i.e., the sustainable choices) and two packages of conventionally grown produce (i.e., the unsustainable choices). The packages containing ecological produce were signified as such by the term "ecological" as well as by the Norwegian Debio eco-signet (Debio integrates organic standards of the Norwegian government and the Demeter standards for biodynamic production). There were two pairs of matched packages. That is, two packages each (one ecological and one conventional) contained the same kinds of produce. The ecological package, however, contained somewhat lower quantities than the conventional package. This was meant to reflect the higher purchase price of ecological groceries and thus to create a trade-off between price (in this case represented by the offered product quantity) and added-value (in this case ecological quality of the product) which is typical for choices between sustainable and unsustainable products. Participants' incentive choices were binary coded (i.e., sustainable choice versus unsustainable choice) for further analyses.

#### 4.2.4 *Purchase habits concerning sustainable groceries*

A second measure of sustainable behavior consisted of a questionnaire measuring purchase habits with respect to sustainable groceries (see Appendix B). It served to measure how often participants choose sustainable product alternatives in their everyday purchase of groceries. Various qualities of sustainable groceries (e.g., environmentally friendly production, energy-efficient shipping of the product) were addressed in the questionnaire and respondents were asked to indicate how frequently they buy products with these qualities.

This purchase habit (PH) questionnaire was constructed on the basis of a prior study (Hanns & Böhm, 2010). It is very difficult to decide from a normative perspective which product characteristics can count as being sustainable. For example, a regional product may be more sustainable than an imported product if all other qualities are kept constant. However, if other aspects differ between the two products, it may well be that the imported one is more sustainable overall. The regional product may, for example, be off season and require intense conservation or cooling. The sustainability of a product is impossible to tell without a complex life cycle assessment (e.g., Tanner & Jungbluth, 2003). Therefore, we followed a descriptive approach and selected product characteristics which were *perceived* as indicating sustainability by a sample of Norwegian consumers in the prior study. We asked consumers to rate for 14 product characteristics (e.g., regional production, recyclable packaging, and fair payment of producers) how important they are for sustainable groceries and for sustainable cosmetics. Product characteristics that received high importance ratings were integrated into the PH questionnaire. Moreover, consumers rated 19 product labels according to how familiar they were with each of them and according to the extent to which they thought the labels signaled sustainable product characteristics. We included three labels with high familiarity and sustainability ratings (i.e., Demeter, Fairtrade, and Scandinavian Swan) and one label with low familiarity and sustainability ratings (i.e., Demeter) into the PH questionnaire. We also added one label that was not addressed in the prior study: the UK Soil Association label.

### 4.3 Procedure

Data collection was conducted in the autumn of 2008. A total of 1873 panelists received an email invitation to the study. The email invitation stated that the study would address various issues of everyday life and consumption. The invitation also announced that all participants would receive a package of fruits and vegetables as a compensation for completing the questionnaire.

Four hundred and thirty-five panel members (23.2% of those who were invited) chose to participate and accessed the online platform via a link provided in the email invitation. During this first session, participants were presented with the incentive choice. After having chosen an incentive, participants were informed that they would receive a link to the questionnaire via email and that the chosen fruit and vegetable package would be delivered to their homes through a grocery delivery service after they had completed the full study. This concluded the first session. We separated the incentive choice task from the remaining questionnaire because we wanted participants to make their incentive choices free from any assumptions that their decisions for either ecological or conventional produce might be of interest for the study.

Of those panelists who had filled in the incentive choice form,  $n = 402$  (i.e., 21.5% of those who were initially invited to participate) accessed the online platform for a second session and completed the questionnaire. About one week lay between first and second session.

The questionnaire contained the measures of GSE, SDSE, and purchase habits. The GSE and the SDSE scales were presented in random order and before the purchase habit

questionnaire. We placed the purchase habit assessment at the end of the questionnaire to separate it as far as possible from the incentive choice task.

## 5 Results

We report the results in four steps. In step 1, we address the dimensionality of sustainable development self-efficacy beliefs and explore whether different SDSE facets can be distinguished. This step corresponds to research question 1. In step 2, we proceed analogously for participants' purchase habits and explore whether different types of sustainable purchase habits can be distinguished. In step 3, we describe the relationship between self-efficacy beliefs (general and domain specific) and sustainable consumption (measured by the incentive choice and by the purchase habit questionnaire). Step 3 addresses research questions 2 and 3. In step 4, corresponding to research question 4, we analyze the relationship between domain specific and GSE beliefs.

### 5.1 Facets of Sustainable Development Self-efficacy

Table 1 shows the covariances and bivariate correlations between the twenty SDSE items. We performed a factor analysis (PCA, Varimax rotation) on the twenty items to explore if distinct dimensions of SDSE could be distinguished. We retained four factors with an Eigenvalue greater than 1, which accounted for 72 % of the total variance ( $N = 402$ , i.e., no missing values). The factor loadings of the SDSE items are given in Table 2.<sup>1</sup>

Factor 1 ('Influence on others') represents beliefs about whether one's own actions to foster sustainable development motivate

others to do the same. Factor 2 ('Influence on the environment') reflects beliefs about the influence of one's own actions and of humans in general on the environment. Both Factor 3 and Factor 4 represent beliefs about one's capability to contribute to a socially fair distribution of resources and to economic welfare. Factors 3 and 4 are distinct in that Factor 3 is made up of items referring to the influence of consumption and buying behaviors, whereas Factor 4 refers to the influence of actions in general. For each of the factors, we computed an index for further analyses by averaging the ratings with high loadings (marked bold in Table 2) on the respective factor. The internal consistencies of the indices were satisfactory, as indicated by Cronbach's alpha values of  $\alpha = 0.92$  (Factor 1),  $\alpha = 0.85$  (Factor 2),  $\alpha = 0.90$  (Factor 3), and  $\alpha = 0.90$  (Factor 4).

The results of this factor analysis indicate the structure of SDSE beliefs and thus address research question 1. We can distinguish these four factors as distinct facets of SDSE. The following aspects of this structure are noteworthy: (a) Influencing others (i.e., indirect behavior; Factor 1) constitutes a distinct type of behavior which is separated from direct behaviors (Factors 2 to 4) and for which different outcomes (environmental preservation, socially fair distribution, economic welfare) are not distinguished. (b) Direct behaviors are separated into those targeting at environmental preservation on the one hand (Factor 2) and those targeting at a socially fair distribution of resources or at economic welfare on the other (Factors 3 and 4). The latter two are not separated. (c) Direct influence on the environment (Factor 2) is one distinct behavior type, for which it makes no difference whether it refers to actions in general or consumption in particular or whether it aims at the miti-

**Table 1: Pearson Correlations, Covariances, and Variances of SDSE Items<sup>a</sup>**

SDSE Item No. <sup>b</sup>	SDSE 1	SDSE 2	SDSE 3	SDSE 4	SDSE 5	SDSE 6	SDSE 7	SDSE 8	SDSE 9	SDSE 10	SDSE 11	SDSE 12	SDSE 13	SDSE 14	SDSE 15	SDSE 16	SDSE 17	SDSE 18	SDSE 19	SDSE 20
SDSE 1	.667	.439	.270	.293	.231	.270	.298	.147	.416	.277	.246	.239	.220	.221	.328	.210	.213	.191	.163	.167
SDSE 2	.740	.528	.251	.256	.251	.255	.174	.170	.261	.274	.183	.189	.202	.201	.223	.202	.178	.165	.155	.167
SDSE 3	.435	.454	.577	.428	.395	.350	.163	.143	.207	.174	.327	.249	.329	.233	.275	.259	.275	.219	.250	.191
SDSE 4	.451	.443	.707	.633	.367	.512	.162	.121	.199	.183	.324	.380	.331	.387	.255	.246	.253	.308	.218	.292
SDSE 5	.367	.448	.676	.600	.591	.457	.093	.126	.150	.146	.268	.261	.402	.307	.202	.208	.234	.200	.294	.248
SDSE 6	.411	.437	.572	.800	.739	.647	.134	.116	.172	.174	.288	.359	.378	.425	.203	.201	.227	.290	.254	.339
SDSE 7	.460	.302	.271	.256	.153	.210	.629	.285	.388	.206	.157	.156	.130	.142	.245	.153	.151	.154	.103	.114
SDSE 8	.278	.363	.291	.236	.255	.224	.557	.417	.186	.201	.097	.105	.099	.093	.146	.167	.118	.122	.104	.108
SDSE 9	.625	.441	.334	.308	.240	.262	.601	.353	.663	.383	.247	.244	.220	.204	.280	.187	.180	.180	.140	.136
SDSE 10	.479	.532	.323	.324	.269	.307	.367	.441	.665	.500	.226	.230	.201	.215	.196	.205	.166	.151	.143	.168
SDSE 11	.381	.319	.544	.515	.440	.453	.250	.189	.383	.405	.626	.456	.451	.374	.293	.267	.307	.280	.265	.243
SDSE 12	.369	.328	.412	.602	.428	.561	.247	.204	.377	.410	.727	.630	.374	.500	.214	.194	.241	.324	.190	.284
SDSE 13	.337	.349	.543	.521	.654	.588	.205	.192	.338	.355	.714	.590	.638	.475	.240	.240	.258	.256	.318	.282
SDSE 14	.337	.345	.383	.607	.497	.659	.223	.180	.312	.378	.589	.785	.740	.644	.214	.207	.223	.301	.235	.332
SDSE 15	.492	.376	.444	.393	.322	.309	.379	.278	.421	.340	.454	.330	.368	.327	.666	.552	.413	.342	.347	.300
SDSE 16	.330	.356	.437	.398	.347	.321	.247	.332	.295	.371	.433	.314	.386	.331	.868	.607	.397	.338	.345	.328
SDSE 17	.357	.335	.495	.434	.415	.386	.261	.249	.302	.322	.531	.414	.441	.380	.692	.697	.535	.451	.420	.399
SDSE 18	.301	.292	.370	.499	.334	.464	.251	.243	.284	.276	.456	.526	.412	.497	.539	.558	.795	.603	.392	.520
SDSE 19	.266	.283	.437	.364	.509	.420	.173	.214	.228	.269	.445	.319	.530	.390	.565	.589	.765	.671	.565	.460
SDSE 20	.262	.311	.322	.471	.413	.540	.184	.216	.214	.304	.394	.459	.453	.532	.472	.541	.700	.860	.786	.607

Note. <sup>a</sup>Pearson correlations are shown below the diagonal (all  $r$  significant at the 0.01 level); covariances are shown above the diagonal.

<sup>b</sup>Wordings of the SDSE items are given in Appendix A.

Table 2: Factor Loadings of SDSE Items (Principal Components Analysis with Varimax Rotation)

SDSE Item No. <sup>a</sup>	SDSE Factors				<i>M</i> <sup>b</sup>	<i>SD</i>
	SDSE Factor 1 'Influence on others'	SDSE Factor 2 'Influence on the environment'	SDSE Factor 3 'Influence of <i>consumption</i> on socially fair distribution and economic welfare'	SDSE Factor 4 'Influence of <i>actions in</i> <i>general</i> on socially fair distribution and economic welfare'		
SDSE 1	.132	<b>.690</b>	.100	.412	2.97	.817
SDSE 2	.134	<b>.581</b>	.045	.533	3.07	.727
SDSE 3	.275	.241	.169	<b>.744</b>	2.88	.760
SDSE 4	.229	.176	.430	<b>.681</b>	2.54	.796
SDSE 5	.226	.075	.270	<b>.808</b>	2.75	.769
SDSE 6	.201	.090	.468	<b>.715</b>	2.45	.805
SDSE 7	.129	<b>.750</b>	.104	-.004	3.24	.793
SDSE 8	.178	<b>.615</b>	-.007	.128	3.56	.646
SDSE 9	.098	<b>.813</b>	.263	.047	2.91	.814
SDSE 10	.133	<b>.704</b>	.310	.093	3.08	.707
SDSE 11	.308	.243	<b>.672</b>	.236	2.68	.791
SDSE 12	.185	.225	<b>.840</b>	.193	2.57	.794
SDSE 13	.260	.127	<b>.654</b>	.435	2.66	.799
SDSE 14	.202	.137	<b>.822</b>	.290	2.48	.803
SDSE 15	<b>.729</b>	.411	.027	.182	2.75	.816
SDSE 16	<b>.779</b>	.296	.032	.198	2.80	.779
SDSE 17	<b>.853</b>	.182	.198	.191	2.69	.731
SDSE 18	<b>.782</b>	.112	.390	.095	2.46	.777
SDSE 19	<b>.809</b>	.042	.199	.258	2.60	.752
SDSE 20	<b>.768</b>	.032	.379	.168	2.41	.779
<i>M</i> <sup>b</sup>	2.62	3.14	2.60	2.66		
<i>SD</i>	.658	.568	.698	.683		
% <i>Var</i> <sup>c</sup>	21.45	17.33	16.65	16.20		

Note. <sup>a</sup> Wordings of the SDSE items are given in Appendix A.

<sup>b</sup> SDSE items were measured on a four-point rating scale ranging from 1 'strongly disagree' to 4 'strongly agree'.

<sup>c</sup> % *Var*: Percent of total variance explained by the factor (after rotation).

gation of climate change or at preservation of natural resources. Thus, climate change is not different from nature preservation in terms of self-efficacy beliefs. (d) Only for

behaviors targeted at social fairness or economic welfare is consumption behavior (Factor 3) distinguished from actions in general (Factor 4).<sup>2</sup>

Mean values across the items of the SDSE indices (see Table 2) were similar and moderate for Factor 1 ( $M = 2.62$ ,  $SD = .66$ ), Factor 3 ( $M = 2.60$ ,  $SD = .70$ ), and Factor 4 ( $M = 2.66$ ,  $SD = .68$ ). For Factor 2 'Influence on the environment' the mean was somewhat higher ( $M = 3.14$ ,  $SD = .57$ ).

## 5.2 General Self-efficacy

The internal consistency of the GSE scale turned out to be satisfactory,  $\alpha = .86$ . We calculated one general self-efficacy index (i.e., the mean score across all ten items of the scale). The scores of this GSE index variable ranged from 2.0 to 4.0 ( $M = 3.13$ ,  $SD = .39$ ).

## 5.3 Purchase Habits

We coded participants' answers to the PH questionnaire numerically from 1 ("rarely") to 5 ("usually"). If participants indicated that they never bought the respective product category (i.e., by choosing the response alternative "I never buy ..."), we treated these answers as missing values in the analysis.

In order to explore the dimensionality of sustainable purchase habits we performed a factor analysis (PCA, Varimax rotation) on the seventeen PH items. This analysis is based on a reduced sample ( $n = 262$  after listwise deletion), because of missing values resulting from respondents who never buy a product category (see above). Little's MCAR test (Little, 1988) indicates that missing values are completely at random,  $\chi^2(df = 802) = 822.643$ ,  $p = .29$ , which allows for listwise deletion (Garson, 2009). Four factors were retained (Eigenvalue  $> 1$ ); they accounted for 60 % of the total variance. Table 3 provides the factor loadings of the PH items.

PH Factor 1 ('Domestic-seasonal') refers to the choice of domestic groceries and seasonal produce. Choice of certified ecological and fair-trade groceries is represented by PH Factor 2 ('Eco-fair-trade'). PH Factor 3 ('Animals-cosmetic') reflects the treatment of animals in grocery production and the environmental sustainability of cosmetics. More specifically, the factor covers the choice of animal products that guarantee a humane treatment of animals and the choice of cosmetics that (a) have not been tested on animals and (b) are environmentally friendly. PH Factor 4 ('Packing-energy') represents the choice of products with environmentally sustainable packing and the choice of products that have been shipped with little use of energy.

For each of the factors, we computed an index variable by averaging the ratings with high factor loadings (marked bold in Table 3). The indices were computed for all participants, not only the subsample which had entered the factor analysis. The internal consistencies of these indices were satisfactory with the exception of the index for PH Factor 1 for which it was only moderate:  $\alpha = 0.62$  (PH Factor 1),  $\alpha = 0.81$  (PH Factor 2),  $\alpha = 0.75$  (PH Factor 3), and  $\alpha = 0.77$  (PH Factor 4).<sup>3</sup>

The mean of the index variable for PH Factor 1 'Domestic-seasonal' ( $M = 3.39$ ,  $SD = .75$ ) was considerably higher than for the other factor indices (PH Factor 2:  $M = 1.70$ ,  $SD = .69$ ; PH Factor 3:  $M = 2.41$ ,  $SD = 1.00$ ; PH Factor 4:  $M = 2.27$ ,  $SD = .88$ ). Consumers reported to choose domestic groceries and seasonal produce more than half of the time when shopping these products. Products that guarantee a humane treatment of animals as well as products with environmentally sustainable packing and energy-efficient products are reported

**Table 3: Factor Loadings of Purchase Habit (PH) Items (Principal Components Analysis with Varimax Rotation)**

PH Item No. <sup>a</sup>	PH Factors				<i>M<sup>b</sup></i>	<i>SD</i>
	PH Factor 1 'Domestic-seasonal'	PH Factor 2 'Eco-fair-trade'	PH Factor 3 'Animals-cosmetic'	PH Factor 4 'Packing-energy'		
PH 1	<b>.757</b>	-.135	.194	.107	3.66	.969
PH 2	.136	-.009	.054	<b>.834</b>	3.14	1.15
PH 3	.313	.254	.188	<b>.622</b>	2.14	1.13
PH 4	.084	.304	.363	<b>.535</b>	1.85	1.12
PH 5	.187	<b>.636</b>	.350	.255	2.05	1.06
PH 6	-.005	<b>.870</b>	.130	.084	1.27	.746
PH 7	-.020	<b>.844</b>	.133	-.011	1.23	.713
PH 8	.286	<b>.536</b>	.022	.243	1.37	.757
PH 9	.107	<b>.571</b>	.372	.287	2.09	1.05
PH 10	<b>.595</b>	.188	-.024	.240	3.16	1.08
PH 11	<b>.841</b>	.108	.193	.026	3.34	.941
PH 12	.190	.246	<b>.579</b>	.397	2.52	1.27
PH 13	.034	.241	<b>.721</b>	.131	1.86	1.20
PH 14	-.139	<b>.436</b>	.286	.330	2.06	1.34
PH 15	.078	.289	.439	<b>.614</b>	1.94	1.19
PH 16	.167	.021	<b>.782</b>	.112	2.87	1.50
PH 17	.116	.197	<b>.726</b>	.121	2.43	1.22
<i>M<sup>b</sup></i>	3.39	1.70	2.41	2.27		
<i>SD</i>	.750	.690	1.00	.883		
% <i>Var<sup>c</sup></i>	18.47	16.53	13.76	11.71		

Note. <sup>a</sup> Wordings of the PH items are given in Appendix B.

<sup>b</sup> PH items were measured on a five-point rating scale ranging from 1 'rarely' to 5 'usually'.

<sup>c</sup> % Var: Percent of total variance explained by the factor (after rotation).

to be chosen less frequently (about half of the time). Certified ecological and fair-trade products are reported to be chosen least frequently (about thirty percent of the time).

#### 5.4 Relationship Between Self-efficacy Beliefs and Purchase Habits

We investigated the relationship between purchase habits and both GSE and SDSE

beliefs by means of regression analyses. We performed a sequence of multiple regression analyses in which one of the PH indices served as criterion and both the SDSE factor indices and the GSE index entered as predictors. These analyses address research question 2 (Do self-efficacy beliefs predict behavior?) and research question 3 (What is the relative contribution of SDSE and GSE beliefs in explaining behavior?). The results are given in Table 4.

**Table 4: Regressions of Purchase Habits on SDSE Factor Indices and GSE Index**

Criterion Variable	Predictor Variables													F
	Constant		SDSE Factor 1 'Influence on others'		SDSE Factor 2 'Influence on the environment'		SDSE Factor 3 'Influence of consumption on socially fair distribution and economic welfare'		SDSE Factor 4 'Influence of actions in general on socially fair distribution and economic welfare'		GSE			
	B	t	$\beta$	t	$\beta$	t	$\beta$	t	$\beta$	t	$\beta$	t		
PH Factor 1 'Domestic-seasonal'	2.46	6.80**	.046	.713	.068	1.14	.030	.407	.071	.987	.038	.752	.021	(5, N = 395) = 2.68*
PH Factor 2 'Eco-fair-trade'	.756	2.36*	.158	2.57*	.103	1.79	.142	2.03*	-.011	-.154	-.040	-.822	.092	(5, N = 394) = 9.10**
PH Factor 3 'Animals-cosmetic'	1.30	2.79*	.289	4.66**	.069	1.19	.013	.190	-.059	-.847	-.031	-.635	.079	(5, N = 395) = 7.85**
PH Factor 4 'Packing-energy'	.624	1.54	.228	3.75**	.088	1.56	.114	1.65	-.022	-.318	.016	.333	.111	(5, N = 395) = 10.95**

Note. \*  $p < .05$

\*\*  $p < .001$



**The results of the regression analyses indicate that SDSE and sustainable purchase habits are positively related and that SDSE beliefs have higher predictive power for the purchase of sustainable products than GSE beliefs**

When regressing choice of domestic and seasonal products (PH Factor 1) on the SDSE indices and the GSE index ( $n = 401$  after listwise deletion), the model was significant,  $F(5, 395) = 2.68, p < .05$ , but none of the predictors turned out to be significant. For choice of certified ecological and fair-trade products (PH Factor 2) as the dependent variable ( $n = 400$ ), the model was significant,  $F(5, 394) = 9.10, p < .001$ , and SDSE indices for Factor 1 ('Influence on others') and Factor 3 ('Influence of consumption on socially fair distribution and economic welfare') emerged as significant predictors. With choice of products that guarantee a humane treatment of animals and the choice of environmentally sustainable cosmetics (PH Factor 3) as dependent variable ( $n = 401$ ), the model was significant,  $F(5, 395) = 7.85, p < .001$ , with the index for SDSE Factor 1 ('Influence on others') as the only significant predictor. Finally, we analyzed choice of products with environmentally sustainable packing and choice of products that have been shipped with little energy use (PH Factor 4) as the criterion variable ( $n = 401$ ). The regression model was significant,  $F(5, 395) = 10.95, p < .001$ , and once more the index of the SDSE Factor 1 was the only significant predictor among the self-efficacy indices.

The results of these regression analyses indicate (a) that SDSE and sustainable purchase habits are positively related and (b) that SDSE beliefs have higher predictive power for the purchase of sustainable products than GSE beliefs. Moreover, the regression analyses highlight the role of the social facet of

SDSE beliefs. In three out of four regression analyses, SDSE Factor 1 ('Influence on others') predicted sustainable purchase habits. This suggests that consumers are more likely to purchase sustainable groceries if they believe that their behavior motivates others to also act sustainably. Beliefs in one's ability to contribute to social fairness and economic welfare seem to play an important role in the purchase of certified ecological and fair-trade groceries.

### 5.5 Relationship Between Self-efficacy Beliefs and Incentive Choice

With respect to the choice between the sustainable and the unsustainable incentive, we found that almost two thirds of our sample ( $n = 249$  participants, i.e., 62 %) chose a package with conventional produce, the remaining participants ( $n = 153$ , i.e., 38 %) chose a package with ecological produce.

With respect to the relationship of self-efficacy to incentive choice, we computed a logistic regression with the GSE index and the four SDSE factor indices as covariates and incentive choice as the dependent variable (cf. Table 5). Interestingly, incentive choice was predicted only by SDSE Factor 2 ('Impact on the environment'),  $\chi^2(5, N = 402) = 31.66, p < .001$ . SDSE Factor 1 that measures self-efficacy with regard to encouraging others to act sustainably, which was an important predictor of purchase habits, was non-significant for incentive choice. Likewise, SDSE Factors 3 and 4, measuring self-efficacy with respect to a socially fair distribution of resources and economic welfare, were non-significant as predictors of incentive choice.

The findings suggest that in situations in which consumers can choose between ecological and conventional produce confi-

**Table 5: Regression of Incentive Choice on SDSE Factor Indices and GSE Index**

Constant	SDSE Factor 1 'Influence on others'		SDSE Factor 2 'Influence on the environment'		SDSE Factor 3 'Influence of consumption on socially fair distribution and economic welfare'		SDSE Factor 4 'Influence of actions in general on socially fair distribution and economic welfare'		GSE										
	B	Wald Exp(B)	B	Wald Exp(B)	B	Wald Exp(B)	B	Wald Exp(B)	B	Wald Exp(B)									
Choice of sustainable incentive	-3.99	13.16**	.018	.006	1.02	.885	13.32**	2.42	-0.09	.001	.991	.308	1.67	1.36	-0.51	.034	.950	.103	$\chi^2_a$ (5, N = 402) = 31.66**

Note. <sup>a</sup> The  $\chi^2$  test for the logistic regression tests if the deviance (-2 LL) of the complete regression model differs significantly from the deviance of the null-model.

\*  $p < .05$

\*\*  $p < .001$

dence in one's ability to contribute to environmental protection can be a decisive factor. We find further support for this assumption if we regress the PH item 9 (purchase of ecological produce) on the four SDSE factors [adj.  $R^2 = .073$ ,  $F(4, N=389) = 8.69$   $p < .001$ ]: SDSE Factor 1 'influence on others' and SDSE Factor 2 'influence on the environment' are significant predictors, with  $\beta = .155$ ,  $t = 2.48$ ,  $p = .014$ , and  $\beta = .128$ ,  $t = 2.19$ ,  $p = .029$ , respectively. SDSE Factors 3 and 4 are non-significant as predictors, with  $\beta = .097$ ,  $t = 1.36$ ,  $p = .174$  and  $\beta = -.039$ ,  $t = -.557$ ,  $p = .578$ , respectively.

In sum, with respect to research question 2, the results show that SDSE beliefs have predictive power for both measures of sustainable consumption. The different facets of SDSE differ in their importance for different types of behavior. For sustainable purchase habits, the most important predictor is self-efficacy with respect to influencing others. This predictor is, across all types of purchase habit, more important than self-efficacy with respect to direct behaviors. Only in predicting the purchase of ecological and fair trade products (PH Factor 2) emerges self-efficacy with respect to fostering a socially fair distribution of resources and economic welfare by consumption (SDSE Factor 3) as an additional predictor. The pattern is different for incentive choice which is predicted by self-efficacy concerning directly influencing the environment (SDSE Factor 2).

**The different facets of SDSE differ in their importance for different types of behavior**

With respect to research question 3, GSE beliefs seem not to be important in sustainable consumption decisions. GSE contributed neither to predicting sustainable purchase habits nor to predicting choice of a sustainable incentive.

### 5.6 Relationship Between General and Domain-specific Sustainable Development Self-efficacy

In order to address research question 4, we correlated the GSE index with the SDSE factor indices. The correlations were significant, albeit weak, for two of the indices: SDSE Factor 1 ('Influence on others') and SDSE Factor 3 ('Influence of consumption on socially fair distribution and economic welfare'), both with  $r = .117, p = .019$ . For the indices of SDSE Factor 2 ('Influence on the environment') and SDSE Factor 4 ('Influence of actions in general on socially fair distribution and economic welfare') the correlations were non-significant, with  $r = .022, p = .662$ , and  $r = .096, p = .054$ , respectively.

## 6 Discussion

The general aim of the presented study was to explore consumers' self-efficacy beliefs in the domain of sustainable development (SDSE) and to investigate how these domain-specific self-efficacy beliefs are related to general self-efficacy (GSE) and to sustainable consumption behavior. We found four separable facets of SDSE. One of them, SDSE concerning motivating others, turned out to be a stronger predictor of sustainable consumption habits than the other three facets. A second facet, SDSE concerning directly preserving the environment, was a significant predictor only for choice of ecological produce. GSE did not contribute to predicting sustainable

consumption, but was weakly related to SDSE. We will now discuss these findings in relation to the four research questions that we have addressed in our study.

Research question 1 asked which facets comprise self-efficacy beliefs in the domain of sustainable development. Our conceptualization of SDSE is more comprehensive than earlier approaches in that we incorporated at least two aspects that had not been studied before as parts of self-efficacy beliefs: On part of the outcome variable, we included three dimensions of sustainable development, that is, not only environmental preservation, but also social fairness and economic welfare. On part of the behavior, we included self-efficacy regarding behaviors with indirect influence (i.e., social influence) in addition to behaviors with direct influence on sustainable development. Four separable facets of SDSE emerged from this conceptualization as the result of a factor analysis: (a) the perceived ability to influence others to act sustainably, (b) the perceived ability to promote environmental preservation by one's own actions and consumption behavior, (c) the perceived ability to promote social fairness and economic welfare through one's consumption, and (d) the perceived ability to promote social fairness and economic welfare through one's actions in general. Interestingly, consumers' perceived ability to foster sustainable development on a national versus on a global level did not show up as separate facets; and self-efficacy concerning the mitigation of climate change was not distinguished from that of preserving natural resources.

It should be noted that, due to restrictions in questionnaire space, our SDSE measure did not include all possible combinations of facets. For example, national versus global scope was varied for social fairness and eco-

**We found four separable facets of SDSE. One of them, SDSE concerning motivating others, turned out to be a stronger predictor of sustainable consumption habits than the other three facets**

conomic welfare, but not for preservation of natural resources. Regional scope might have shown up as an independent facet had we included more items on it. It is one of the desirable extensions in future studies to use a more extensive measure that allows for a systematic variation of all facet elements. Still, from the current factor analysis, we conclude that the three dimensions of sustainable development (nature preservation, economic welfare, social fairness) and type of behavior (direct vs. indirect, consumption vs. actions in general) provide more dominant distinctions in self-efficacy beliefs than regional scope.

Research question 2 referred to the question of whether SDSE predicts sustainable consumption and whether the different facets of SDSE differ in their relation to behavior. For sustainable purchase habits (PH), the perceived ability to influence others was the strongest predictor, yielding a significant regression weight for three of the four PH types, and being the only significant predictor for two of the PH types. It is quite noteworthy that, overall, the perceived capability to influence others was more important in predicting sustainable purchase habits than the perceived ability to directly influence sustainable development.

The importance of the social facet may stem from the fact that fostering sustainability is a collective challenge. The positive effects of sustainable consumption on the environment, on social fairness, and on economic welfare only manifest themselves if sustainable consumption practices are adopted on a collective, societal level. The direct contribution that an individual consumer can make to sustainable development is quite limited. Consumers are most likely aware of this fact. For global environmental problems, which generally are col-

lective, it has been shown that many people feel that they cannot contribute much as individuals to tackling such problems (Böhm, 2003, 2008; Lorenzoni & Pidgeon, 2006). Thus, it may be more promising to strengthen people's perceived ability to influence others in order to promote sustainable consumption than to emphasize the direct effect of individual consumption behaviors on sustainability.

Apart from the prominent role of social influence as a predictor across all but one PH types, for one of the PH types another predictor was significant: The SDSE facet representing perceived impact of consumption on social fairness and economic welfare predicted the purchase of certified ecological and fair-trade groceries. This may be due to a strong association of fair-trade with the challenge of achieving a socially fair distribution of resources: Consumers who believe that their purchase decisions can contribute to a socially fair distribution of resources might perceive the choice of fair-trade products as an important means to make a difference.

The facet of SDSE which refers to the impact of one's actions (in general) on social fairness and economic welfare did not predict the purchase of ecological and fair-trade products. This finding is plausible considering the broader behavior scope of the factor. Consumers may feel capable of fostering social fairness and economic welfare through other behaviors (e.g., political activism or charitable donation) than everyday consumption.

The purchase of domestic and seasonal products was not predicted by any of the

**The importance of the social facet may stem from the fact that fostering sustainability is a collective challenge**

SDSE facets. One possible explanation of this finding is that the purchase of domestic and seasonal products may originate from other motivations than to foster sustainable development. For example, consumers may consider local and seasonal products to be healthier and of superior quality.

The SDSE facet that reflects consumers' perceived impact on the environment did not predict sustainable purchase habits. This facet did, however, turn out to be the only significant predictor for choice of sustainable produce in the incentive choice task. The difference may lie in the special focus of the incentive choice. The incentive choice was one between ecologically and conventionally produced fruits and vegetables; the

**It is conceivable that consumers perceive agriculture differently from other fields of production. Agriculture is vivid and tangible so that the consequences of agricultural practices on the environment may seem more immediate and understandable**

salient aspect of this choice is probably the impact of different agricultural practices on the environment. It is conceivable that consumers perceive agriculture differently from other fields of production. Agriculture is vivid and tangible (some people may even have hands-on experience) so that the consequences of agricultural practices on

the environment may seem more immediate and understandable than those of other production techniques that are more remote or elusive. Thus, the purchase of fruits and vegetables may represent a field where consumers feel particularly capable of contributing to environmental preservation by choosing ecological products. This might explain why the SDSE facet 'influence on the environment' was related to the choice of ecological produce in the incentive choice task.

It may be seen as a limitation of the PH questionnaire that it focuses on behaviors aiming at environmental preservation, and that the other two dimensions of sustainable development, which are included in the SDSE scale (economic welfare and social fairness), are less accounted for in the PH questionnaire. Social fairness is covered by only one item (Item 14: fair trade). Economic welfare is not mentioned explicitly, but items addressing local products (Items 1, 3, and 8: domestic products, little shipping energy, farmers) may be perceived as being related to support for the local economy. This overrepresentation of environmental preservation, however, seems to be implied in the content domain. There are many product characteristics that relate to the environmental impact of the products. The social impact is much less discernible to the consumer and requires knowledge about corporate social responsibility policies (the Demeter label stands for all three, ecological, economic, and social responsibility; to what extent this is known to consumers is another question). With respect to economic welfare, it seems even more difficult to identify specific product characteristics – particularly because any consumption behavior might have beneficial effects for some economic actors.

If domain-specific SDSE beliefs motivate sustainable consumer decisions, as our results suggest, we can draw some conclusions concerning the design of interventions. Our study indicates that pointing out how setting a good example can encourage others (friends, family, colleagues, etc.) to consume sustainably is a particularly effective intervention strategy. One possibility may be to have respondents work with a simulation that illustrates not only the consequences of their own consumption on, for example, carbon and ecological footprints, but also

the accumulated benefits that would occur if they encouraged some of their friends, colleagues, or relatives to also consume sustainably.

In research question 3, we asked whether domain-specific SDSE as well as GSE beliefs contribute to predicting sustainable consumption. Our results give a clear answer to this question: None of our analyses yielded GSE as a significant predictor of behavior. These findings resemble the results of research on the attitude-behavior discrepancy in that we find a closer relationship between self-efficacy and behavior if both are measured on a similar level of generality (Bohner & Wänke, 2002). SDSE is more concrete than GSE and thus closer to the concrete behaviors that were measured.

In contrast to the independence of GSE to behavior which we found, GSE was shown to be related to various health risk behaviors (e.g., Luszczynska, Sarkar, and Knoll, 2007; Matthew, 2000; Oei, Hasking & Phillips, 2007). A possible explanation for these diverging results may be that health is a personal outcome whereas sustainability is a collective outcome which requires collective actions. Consumers' perceived capability to influence others, which was the most important facet of SDSE, may facilitate collective action. The GSE scale lacks such a social component. This might be a reason why the GSE scale did not correlate with sustainable behavior, but was previously found to correlate with health behavior – health behavior refers to individual behavior affecting a personal outcome; the social component may not be needed in this case. Another reason for the non-significant relationship between GSE and sustainable consumption concerns the measurement of GSE: the low variance of the GSE index ( $s^2 = .152$ ) suggests that the measure may not be sensitive enough to

assess inter-individual differences in GSE among Norwegian consumers.

Research question 4 concerned the relationship between GSE and domain-specific SDSE. Two of the four SDSE facets correlated with GSE: Perceived influence on others (SDSE factor 1) and perceived ability to foster social fairness and economic welfare by one's consumption behavior (SDSE Factor 3). It should, however, be pointed out that in both cases the correlation coefficients were small (both  $r = .117$ ). Taking into account the rather large sample size of our study ( $N = 402$ ), our findings suggest, at most, a weak relationship between GSE and SDSE.

Our results are ambiguous as to whether there is a relationship between SDSE and GSE or not. Apparently, GSE is weakly related to some facets of SDSE but not to others. We expected a relationship between SDSE and GSE, because it is plausible that general and domain-specific self-efficacy depend on each other in both ways. Specific self-efficacy beliefs can be derived from more general ones (top-down inference), as is assumed, for example, in Fishbein and Capella's (2006) integrated behavior model; conversely, GSE beliefs may be derived from self-efficacy beliefs in specific behavior and outcome domains (bottom-up inference). Maybe there are commonalities between GSE and SDSE Factors 1 and 3 which GSE does not share with the other two SDSE factors.

A central finding of our study is that consumers' perceived indirect, social influence on sustainable development comprises a distinct facet of SDSE that plays a role in motivating the purchase of sustainable groceries. Furthermore, our findings suggest that this social facet of SDSE may be even more im-

portant for sustainable consumption than the perceived direct influence on sustainable development. The importance of the social facet of SDSE might stem from the fact that sustainable behavior needs to be collective in order to be effective. This implies an additional component of efficacy which may be included in future studies: the perceived collective efficacy (e.g., Bandura, 2000). Collective efficacy refers to a group's shared beliefs in the ability to bring about desired outcomes through collective efforts. This may go beyond a mere aggregation of the self-efficacy beliefs of the individuals in a group, because collective efficacy includes beliefs about group dynamics, for example, how well the group is believed to communicate and operate as a whole, and how much other group mem-

bers are trusted to cooperate. It remains for future research to show whether collective efficacy provides a contribution to explaining sustainable consumption. A study by Homburg and Stolberg (2006) suggests that collective efficacy may even be more closely related to environmental behavior than self-efficacy. A challenge in devising measures for collective efficacy is to define the reference group for collective action. Presumably – assuming that large groups tend to be more anonymous, less cohesive, and facilitate diffusion of responsibility – people have higher faith in being able to achieve collective outcomes in smaller than in larger groups. Studies investigating collective efficacy in the domain of sustainable consumption need to specify which reference groups are relevant to consumers. Presumably, consumers will experience high collective efficacy only if they

identify with the group. Note that the impact of effective groups on individual action may also be negative, because effective groups invite free rides (Lubell, 2002). That is, members of effective groups may be tempted to take advantage of the collective outcome without contributing their share to producing it.

An additional aspect of collective efficacy regarding sustainable consumption that may provide a valuable path for future research is the perceived responsiveness of external environments and forces such as governments (Lubell, 2002) to consumer demands. This seems particularly relevant when consumers see their purchases as a means to exert power in order to shape markets or policies, for example by boycotting certain products, which stand for an unwanted (e.g., unsustainable) policy. Such behaviors promise to be successful only when the industry is seen as responsive to consumer demands (e.g., by offering green products and implementing socially responsible and pro-environmental production procedures) as well as the government (e.g., by issuing regulations, for example with respect to the required labeling of products).

A necessary step for future research is to experimentally manipulate efficacy beliefs and measure the effects on consumers' choices between sustainable and unsustainable products. This will allow for a better understanding of the mechanisms that translate efficacy into purchase decisions for sustainable products. Furthermore, longitudinal studies may be fruitful in order to explore the possibility that the relationship between efficacy and consumption is reciprocal so that they reinforce each other. It might well be that past beliefs about efficacy affect current sustainable consumption, whereas past sustainable consumption in-

**A central finding of our study is that consumers' perceived indirect, social influence on sustainable development comprises a distinct facet of SDSE that plays a role in motivating the purchase of sustainable groceries**

creases current efficacy beliefs (Lubell, 2002).

We want to conclude with speculating as to whether any of our results are specific to our Norwegian sample and whether Norwegian consumers may differ from other nationalities. We see only one aspect of our results which may have a culture-specific component. It has to do with the factor structure of SDSE beliefs. We were surprised to see that social fairness and economic welfare were not distinguished in respondents' self-efficacy beliefs. One might think that these two aspects have divergent connotations, with social fairness being associated with a warm, caring, and moral attitude, whereas economy may elicit images of profit-seeking and competitive agents. This contrast between a social and an economic orientation may be less pronounced in the Norwegian belief systems. Norway is an egalitarian society and has a strong social welfare system, which is primarily based on the prosperity of the state-owned oil industry. Consequently, the integration of economic viability with social fairness and environmental protection may be part of the Norwegian common thinking and culture, possibly more so than in other countries. Alternatively, it could also be a more universal, culture-unspecific, belief that social fairness and economic welfare are closely related: For example, consumers might assume that by purchasing fair trade products (contribution to a socially fair distribution of resources) they support local producers and thus contribute to improving the living and working conditions in the respective country (contribution to economic welfare).

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## Notes

- 1) We also performed an oblique rotation (Promax), which yielded the same pattern of factor loadings as the orthogonal Varimax rotation.
- 2) A reviewer suggested that we remove the items concerning climate change (i.e., SDSE 1, 9, and 15) and those addressing human responsibility (i.e., SDSE 7 and 8) from the scale and, consequently, from the analyses. We eliminated these items and replicated the analyses. The results yielded no differences regarding the dimensionality of SDSE. That is, the factor analysis still yielded four factors and the pattern of loadings for the remaining items was the same as in Table 2. Regarding the relationship between SDSE and sustainable consumption, reported below, only minor differences occurred (i.e., the effect sizes were slightly different but all significant relationships remained). We decided to keep these items in the analyses, because we consider the results worth reporting. First, global warming is one of the most important environmental issues today. The emergence of anthropogenic global changes has marked a shift in the scope and urgency of environmental problems; it has also raised the question whether psychological instruments (e.g., instruments to measure environmental attitudes such as The New Environmental Paradigm, cf. Dunlap, 2008) have to be adapted to problems of global scope. That self-efficacy beliefs concerning climate change are not distinguished from those concerning the preservation of natural resources in general could not be expected, and provides valuable information for future studies on SDSE.

Concerning responsibility, it is true that Bandura's concept of self-efficacy is more specific, referring to one's own ability to bring about an outcome. Perceived responsibility of humans, then, may be seen as a precondition rather than as an integral part of self-efficacy. However, different authors approach the problem quite differently, and some operationalize self-efficacy as human responsibility (e.g., Kellstedt et al., 2008). Again, we believe that our result that human responsibility and more specific self-efficacy beliefs form the same facet will inform future research.

- 3) A reviewer pointed out that not all of the items of the PH measure are mutually exclusive and that the items vary in their level of abstraction. Some of the product characteristics and product labels overlap (e.g., dairy products or coffee are also food products, some products may carry more than one eco-label). This may lead to inconsistencies when computing averages across items in that a consumer with sustainable purchase habits who buys only a narrow range of products may receive a lower score than a less devoted consumer who occasionally buys sustainable products from a variety of categories. It seems, however, almost impossible to avoid such overlaps in the area of sustainable products. They are found in other measures of green consumer behavior (e.g., Kaiser, Oerke, Bogner, 2007; Tanner & Wölfling Kast, 2003), simply because the domain is quite unstructured. Product categories overlap (e.g., dairy and produce), sustainable characteristics apply to only subsets of product categories (e.g., not all categories of groceries contain fair-trade

products; both produce and dairy products can be certified), many but not all sustainable products are certified by a label (e.g., not all organic produce is certified), and so on. It is not desirable to have such overlapping scopes of items. But then, it is also obvious that such a measure captures behavioral propensities rather than a logical partitioning of all purchase occasions. Even if we could formulate a questionnaire that seemed non-overlapping to the researcher, we do not know whether consumers categorize products and sustainable characteristics the same way the researcher intends. For example, is milk considered as produce? Do consumers think of fair-trade labels when they are asked for sustainable products? It would be quite worthwhile to investigate the subjective categorizing of consumers, the results might be surprising (Walsh & Mitchell, 2010).

# Appendix A

## Sustainable Development Self-efficacy (SDSE) Questionnaire

The following statements are about different societal issues. Please indicate if you strongly agree, agree, disagree, or strongly disagree with each of the statements (one cross for each statement). Cross "Strongly disagree" if you fully disagree with the statement. Cross "Strongly agree" if you fully agree with the statement. And, of course cross "Disagree" or "Agree" if you neither fully disagree nor fully agree with the statement. Please answer each statement.

	SDSE Item
I believe my actions have ... [Influence on the environment]	
... an influence on global warming and climate change. <sup>a</sup>	SDSE 1
... an influence on the preservation of natural resources.	SDSE 2
I believe that with my actions I can ... [Influence actions in general on socially fair distribution/ economic welfare]	
... contribute to a socially fair distribution of resources <u>in this country</u> .	SDSE 3
... contribute to a socially fair distribution of resources <u>around the world</u> .	SDSE 4
... foster economic welfare <u>in this country</u> .	SDSE 5
... foster economic welfare <u>around the world</u> .	SDSE 6
Human beings are responsible for ... [Influence on the environment]	
... global warming and climate change. <sup>a</sup>	SDSE 7
... the preservation of natural resources.	SDSE 8
My everyday consumption and buying behavior ... [Influence on the environment]	
... has an influence on global warming and climate change.	SDSE 9
... has an influence on the preservation of natural resources.	SDSE 10
With my everyday consumption and buying behavior I can ... [Influence consumption on socially fair distribution/ economic welfare]	
... contribute to a socially fair distribution of resources <u>in this country</u> .	SDSE 11
... contribute to a socially fair distribution of resources <u>around the world</u> .	SDSE 12
... foster economic welfare <u>in this country</u> .	SDSE 13
... foster economic welfare <u>around the world</u> .	SDSE 14
My actions ... [Influence on others]	
... to reduce the effects of global warming and climate change in my community will encourage others to do the same. <sup>b</sup>	SDSE 15
... to contribute to the preservation of natural resources will encourage others to do the same.	SDSE 16
My actions to contribute to a socially fair distribution of resources ... [Influence on others]	
... in this country will encourage others to do the same.	SDSE 17
... around the world will encourage others to do the same.	SDSE 18
My actions to foster economic welfare ... [Influence on others]	
... in this country will encourage others to do the same.	SDSE 19
... around the world will encourage others to do the same.	SDSE 20

Note. The response scale ranged from 1 to 4; labelled 'Strongly disagree' (1), 'Disagree' (2), 'Agree' (3), and 'Strongly agree' (4). Allocation of the items to the SDSE factors which resulted from the factor analysis is given in brackets.

<sup>a</sup> Items adopted from "Personal Efficacy, the Information Environment, and Attitudes Toward Global Warming and Climate Change in the United States," by P. M. Kellstedt, S. Zahran, and A. Vedlitz, 2008, *Risk Analysis*, 28, p. 118.

<sup>b</sup> Original item from "Personal Efficacy, the Information Environment, and Attitudes Toward Global Warming and Climate Change in the United States," by P. M. Kellstedt, S. Zahran, and A. Vedlitz, 2008, *Risk Analysis*, 28, p. 118. Item slightly adapted for SDSE questionnaire.

## Appendix B Purchase Habit Questionnaire

In the following, we will present you with statements that describe different shopping situations. Please read each statement. Where there is a blank, insert what your normal or usual shopping behavior would be:

- A = Rarely (less than 10 % of the time)
- B = Occasionally (about 30 % of the time)
- C = Sometimes (about half the time)
- D = Frequently (about 70 % of the time)
- E = Usually (more than 90 % of the time)

Of course, there are always unusual situations in which this would not be the case, but think of what you would do in most normal situations. Insert the letter that describes your usual shopping behavior in the *space provided on the response sheet below*. Only if you never buy the product categories mentioned in the item (for example if you never buy any food products), tick the boxes on the right side of the items.

		PH Item
When shopping groceries and there is a choice of Norwegian and imported products I ____ choose Norwegian products.		1
When shopping groceries I ____ choose products with little wrapping.	<input type="checkbox"/>	2
When shopping groceries I ____ choose products that have been shipped with little energy use.		3
When shopping wrapped food products I ____ make sure that the wrapping is recyclable.		4
When shopping food products I ____ buy products that are certified with the 'Debio Økologisk' label.	<input type="checkbox"/>	5
When shopping food products I ____ buy products that are certified with the 'Demeter' label.		6
When shopping food products I ____ buy products that are certified with the 'Soil Association' label.		7
When shopping produce I ____ go a farmers' market or a similar place where I can buy directly from the farmer.	<input type="checkbox"/>	8
When shopping produce I ____ decide for ecological products.		9
When shopping produce I ____ buy seasonal products.		10
When shopping produce I ____ choose domestically grown products.		11
When shopping dairy products I ____ decide for an environmentally approved brand.	<input type="checkbox"/>	12
When shopping animal products I ____ make sure that the product has a certificate that guarantees a humane treatment of the animals.	<input type="checkbox"/>	13
When shopping coffee I ____ decide for a fair-trade product.	<input type="checkbox"/>	14
When shopping beverages I ____ choose products with containers that require little energy for manufacturing.	<input type="checkbox"/>	15
When shopping cosmetics I ____ choose products that have not been tested on animals.	<input type="checkbox"/>	16
When shopping cosmetics I ____ choose products that are certified with the 'Svanemerket' eco-label.		17