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Published in:
Young Consumers

DOI:
[10.1108/YC-03-2017-00671](https://doi.org/10.1108/YC-03-2017-00671)

Publication date:
2017

Document Version
Peer reviewed version

[Link to publication](#)

Citation for pulished version (APA):
Fischer, D., Böhme, T., & Geiger, S. M. (2017). Measuring Young Consumers' Sustainable Consumption Behavior: Development and Validation of the YCSCB Scale. *Young Consumers*, 18(3), 312-326.
<https://doi.org/10.1108/YC-03-2017-00671>

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Published as:



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Accepted: 23.06.2017

Published online: 14.07.2017

DOI: 10.1108/YC-03-2017-00671

URL: <http://www.emeraldinsight.com/doi/full/10.1108/YC-03-2017-00671>

Measuring Young Consumers' Sustainable Consumption Behavior: Development and Validation of the YCSCB Scale

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Abstract

Purpose

Promoting sustainable consumption among young consumers has become a key priority on the research agenda in such different fields as education for sustainable development, environmental psychology, and consumer policy. Progress in this field has been hampered by a lack of sophisticated research instruments capable of measuring consumption behaviors that are relevant both in terms of their sustainability impacts and their suitability for teenagers. This study addresses this research gap and presents a scale for young consumers' sustainable consumption behaviors (YCSCB) in the areas of food and clothing.

Design/methodology/approach

The scale was developed in a two-step, mixed-methods approach. In an initial qualitative interview study, the actual behaviors of theoretically selected young consumers (n=8) were identified with regard to acquiring, using, and disposing of consumer goods in the areas of food and clothing. The YCSCB scale was constructed using the findings of this qualitative study and then validated in a subsequent quantitative study (n=155).

Findings

The YCSCB scale is a valid and reliable scale to measure young consumers' sustainable consumption behavior in the areas of food (n=14 items) and clothing (n=13 items).

Originality/value

The findings of this research provide a twofold contribution to advancing research on young consumers' sustainable consumption behaviors. Firstly, it presents a consolidated scale that is explicitly constructed for teenagers and their consumption contexts. Secondly, it proposes a heuristic for developing more sophisticated measurements of SCB among young consumers that would allow comparison between studies, is focused on behaviors (instead of confounding behaviors with intentions, attitudes or values), and is impact-oriented in terms of sustainability relevance.

Keywords:

sustainable consumption; food; clothing; consumer behavior; measure; teenagers

1. Introduction

Consumption is now recognized as a key driver of unsustainable development. The urgent need to promote more sustainable consumption behaviors has been prominently reaffirmed in the post-2015 agenda laid out by the United Nations (2015) in the Sustainable Development Goals (SDGs), where it features as a distinct goal (SDG 12). In response to the question how consumers can be motivated to reorient their consumption practices towards more sustainable ones (Jackson, 2005), sustainable consumption research has grown rapidly as a scholarly field (Liu et al., 2017; Reisch and Thøgersen, 2015). Young consumers are considered a key target group by researchers, policy-makers, and educators alike, as it is deemed crucial to intervene in the formation and routinization of mainstream unsustainable consumption practices and patterns (Fien et al., 2008; Heiss and Marras, 2009). There are several reasons discussed in the literature suggesting that this group is of particular relevance for sustainable consumption researchers. Teenagers are at a reflective stage of consumer socialization, where advanced decision-making strategies are evolving and a susceptibility to developing materialistic tendencies exists (Roedder John, 2008). Current findings suggest that the phase of adolescence (i.e. between 14 and 17) is clearly associated with a rapidly declining interest in environmental and sustainability issues, as compared to younger and older age groups (Olsson and Gericke, 2015). In addition to this, teenagers are approaching the critical period of leaving their family household and taking over an increased or even full responsibility for their own household. The importance of preparing adolescents for this transition is corroborated by recent research showing that young adult households tend to lag behind older generation households with regard to pro-environmental practices (Stanes et al., 2015). Not least, the spending power of this age group is rapidly expanding (Moses, 2000), which corresponds to an increased relevance in terms of the sustainability impacts resulting from their consumption choices.

Valid and reliable instruments are required to measure the complex sustainable consumption behavior (SCB) of this target group. Most existing empirical studies investigating sustainable consumption among teenagers [1] can be clustered in two groups. The first group focuses on pre-behavioral factors such as sustainability attitudes (Biasutti and Frate, 2017), concerns (Francis and Davis, 2015), or consciousness (Balderjahn et al., 2013). The second group expands on related concepts such as conspicuous consumption (Acikalin et al., 2009), ethical consumption (Bucic et al., 2012), or political consumer behavior, i.e. participation in boycotts and buycotts (Quintelier, 2014). Research in both groups has its merits. It has produced

important insights into the conditions and factors affecting teenagers' consumption choices (Lee, 2016; Perera et al., 2016), revealed incongruences between attitudes towards sustainable consumption and respective practices (Hume, 2010; Hitchings et al. 2013; Francis and Davis, 2015) and allowed the analysis of distinct, often problematic tendencies like impulsive shopping (Brici et al., 2013) or compulsive consumption (Xu, 2008) among teenagers. However, research from both fields has largely failed to provide a sophisticated foundation of what should be analyzed as teenagers' sustainable consumption behaviors. Only few studies have explicitly attempted to provide a measurement of teenagers' sustainable consumption behavior (SCB). Lee et al. (2016) have recently proposed a measure for SCB, which focuses on undergraduate students in the US. The authors define SCB as "a consumer's wise balance of financial responsibility, environmental stewardship, social equity, and sustenance of personal health" (David Lee et al., 2016, p. 79) and operationalize sustainable and non-sustainable consumer behaviors with five variables each [2]. However, they overtly state that "these concepts are not meant to fully cover the construct of sustainable consumer behavior" (David Lee et al., 2016, p. 82). An alternative approach—in a non-Western context—is provided by Muralidharan and Xue (2016), who focus on millennials in India and China. Their measurement of green buying behavior uses a ten-item scale, including "I try to buy energy efficient products and appliances", "I have switched products/brands for ecological reasons" and "I try to buy products that can be recycled" (Muralidharan and Xue, 2016, p. 232), which have been selected and modified from a 30-item inventory of ecologically conscious consumer behavior (ECCB) (Straughan and Roberts, 1999).

Two general shortcomings of available approaches to the measurement of young consumers' SCB become apparent: firstly, the mostly inadequate consideration of the distinct conditions constraining young consumers' *autonomy* to consume and, secondly, the lack of criteria for selecting *relevant* consumption behaviors with regard to their sustainability impacts.

The first strand of criticism refers to the specific socio-economic status of teenagers. Adolescence is a transition phase between childhood and adulthood characterized by changing degrees of consumption autonomy, which may differ significantly between socio-economic groups and cultural contexts (Palan et al., 2010). Teenagers' consumption behaviors are embedded in structures characterized by different degrees of autonomy, ranging from living in family households to peer-related leisure activities (Larson and Verma, 1999). Although research shows that teenagers exert influence on consumption-related decision-making processes (Chavda et al., 2005; Palan et al., 2010; Watne et al., 2014; Collins, 2015), this

embeddedness poses constraints with regard to their autonomy as consumers. Bassett et al. (2008), for example, demonstrate for the case of eating practices how food choices emerge from processes of co-construction between teenagers and parents. Approaches to measuring the SCB of teenagers, in particular those used in the context of interventions geared to changing teenagers' consumption patterns towards more sustainable ones, should be responsive to youth consumption being situated between autonomy and dependence. In particular, they should focus on those consumption behaviors that teenagers have autonomy over, instead of those that are to a large extent decided on by others and beyond their control.

The second strand of criticism refers to the question of what behaviors should be selected for an assessment of SCB in general. Existing approaches to measuring SCB in the social sciences have received severe criticism in recent years (Steg and Vlek, 2009; Geiger et al., 2017). Critics argue that existing approaches often fail to provide sufficient explanations why the behaviors included in instruments measuring individual SCB are of relevance in terms of their sustainability impacts. Too often behaviors (e.g. turning lights off) are chosen on the basis that consumers may associate with sustainability or that are traditionally considered as green, pro-environmental, ethical, or sustainable. Such approaches, however, may lead to determining the sustainability of consumption behaviors based on an assessment of low-impact behaviors and a neglect of high-impact behaviors ("key points") (Bilharz and Schmitt, 2011). In order to remedy this shortcoming, approaches to the measurement of individual SCBs are needed that select those consumption behaviors with the greatest impacts on the ecological or socio-economic conditions that allow human beings to meet their needs today and in the future.

In light of this critique, we find that none of the measures for SCB proposed so far is able to meet the aforementioned requirements. The behaviors (if assessed at all) included in the different measures have neither been systematically designed to account for the specific consumption contexts of young consumers, nor systematically underpinned by considerations with regard to their impacts on sustainability thresholds. The present paper addresses this research gap and aims to contribute to the consolidation and advancement of research on the SCB of young consumers. It does so by describing the development and validation of a scale measuring the SCB of young consumers in the areas of food and clothing.

2. Rationale

This study addresses the lack of sophisticated measures by systematically developing and validating a scale for young consumers' sustainable consumption behavior (YCSCB), focusing on teenagers aged 14 to 17 as the target population. The YCSCB is constructed using an existing scale that measures sustainable consumption in adults based on the cube model of SCB (Geiger et al., 2017). The cube model provides an integrative conceptual framework comprising the three dimensions of SCB and extended by a fourth impact dimension. In this model, SCB occurs in different consumption *areas* (food, housing, mobility, clothing etc.), *phases* (acquisition, usage, and disposal of consumer goods) and impacts on different sustainability *dimensions* (ecological and socio-economic). The fourth cross-cutting dimension in the SCB cube refers to the necessity to identify and focus on the most *relevant behaviors* in the perspective of sustainability, i.e. those consumptions behaviors with the highest sustainability impacts. The SCB cube thus offers a comprehensive framework for the operationalization of SCB and the selection of high-impact behaviors.

The development of the YCSCB scale employed a mixed-methods approach comprised of two sub-studies. Study 1 used a qualitative approach to identify which actual behaviors young consumers enact with regard to acquiring, using, and disposing of consumer goods in the areas of food and clothing. Building on the findings of this inquiry, Study 2 sought to adjust the adults' scale for SCB in order to construct and validate a quantitative measure of YCSCB. In what follows, each study will be presented separately, including its methods, results, and a discussion.

3. Study 1: Qualitative Study

The overall objective of the explorative qualitative study was to gain a deeper understanding of young people's consumption behavior in the phases of acquisition, usage, and disposal, focusing on the areas of food and clothing. In addition to this, a particular interest was to determine the degrees of autonomy that frame the scope of action for teenagers' consumption behaviors. The 33 items of the adult scale for SCB (Geiger et al., 2017) served as a starting point for qualitative study and the process of developing the adjusted YCSCB scale.

3.1 Method

Participants

The sampling strategy employed in this study was designed to obtain a theoretically defined sample based on three criteria: income, socio-economic status of household, and gender. The first two criteria were informed by a recent representative study that for the first time assessed per-capita resource consumption in Germany (Kleinhückelkotten et al., 2016). The findings reveal that income plays a key role in carbon emissions and that the well-off population segments cause disproportionately more emissions due to lifestyle choices than less well-off population segments (Moser et al., 2016). Against this backdrop, the sampling strategy sought to distinguish between teenagers with high and low income (and thus purchasing power; Criterion 1) as well as teenagers from households with high and low socio-economic status (Criterion 2). Criterion 3 is based on prior research indicating sex differences both with regard to general sustainability consciousness (Hampel et al., 1996) and consumption behaviors in the area of food (Turner et al., 2013) and clothing (Chen-Yu and Seock, 2002). Thus, a sex-balanced sample was chosen comprising of four male and four female teenagers (n=8).

The participants were recruited by means of a written notice in a German middle school (grades 9 and 10) as well as by means of personal one-to-one approaches in a prominent shopping street in the city center of a mid-sized town in northern Germany. The participants had to indicate 1) their individual monetary budget including pocket money and earnings from side jobs, and 2) their self-rated socio-economic status of the household they were living in. One male and one female person each were then assigned to the dimensions high and low in both categories. The cut-off value for the personal monthly budget was 35 euros as the mean value of 24 teenagers initially sampled. This value corresponds closely to broader empirical investigations of discretionary money of teenagers in this age group (Tully and van Santen, 2012). Socioeconomic status was assessed by asking participants to rank the monetary situation of their household in comparison to other households in Germany on a five-point Likert scale [3]. Informants were split into two groups for the sampling (more than most others / the same as or less than most others).

Procedure

The interviews took place on the premises of Leuphana University of Lüneburg and lasted between 17 and 42 minutes each. Prior to the interview each teenager was informed that participation in the study was voluntary and anonymous and that the interviews would be

recorded. A payment of 10 euros was made to each participant after the interview. The semi-structured interviews were conducted following a guideline that covered a general introductory part and two parts focusing on the consumption areas of interest. The general part included questions on the participants' living circumstances and usual expenses. The food part started with a recall of what they had eaten and drunk the day before, whereas the clothing part began with a recall of the three pieces of clothing they had acquired most recently. Based on their answers, the participants were asked how they had obtained the pieces of food and clothing, which criteria had led them to obtain them, if they would do anything different if they could, and if this behavior was characteristic of their usual consumption patterns.

The design of the interview guideline sought to encourage respondents to speak freely by beginning each part with open questions. Following up on the informants' responses, more specific questions were asked concerning specific consumption activities for the three consumption phases (acquisition, usage, and disposal) of both areas (food and clothing). These specific questions were derived from the items of the adult scale of SCB (Geiger et al., 2017). For each item, i.e. consumption activity, additional questions were asked to obtain information about their decision-making processes and the influences on their consumption behavior, also in comparison to their peers. Through this combination of more open and explorative as well as more specific and deductive questions the interview guideline sought clarification concerning the young consumers' actions in different consumption areas and their autonomy and dependence in making these choices in order to provide a more holistic impression of the actual consumption behavior of teenagers in their everyday lives.

Analyses

The audio recordings of the interviews were transcribed following transcription rules developed by Kuckartz et al. (2008). The resulting textual data material was analyzed using a content analysis approach (Mayring, 2004). A deductive coding system was developed in order to structure the coding process. The categories of the coding system were closely linked to the deductive set of questions concerning the consumption behaviors in each area and phase and also reflected the specific behaviors included in the inventory of the adult version of the scale. Moreover, open categories were added to the coding system for any other consumption behavior mentioned in each area and phase or for those mentioned but not in the pre-defined areas and phases. Additionally, three categories structured the data on decisional range (consumption behavior autonomously decided on, decided by others but complied with,

and decided by others but not complied with). The transcripts were coded in a division of labor between two coders. Coder rules included allowance for double-coding. The coded data material was analyzed for each combination of sampling criteria separately.

3.2 Results

Interestingly, no specific patterns were found between the variation of consumption behaviors of the teenagers in our sample and their self-rated personal budgets and/or the socio-economic statuses of their households. Moreover, the intention to change any of their consumption patterns if they had more money and/or more opportunities to decide for themselves did not depend on how much money they or their parents had at their disposal.

General consumption behaviors

The majority of the participants indicated that they used large parts of their budget to pay for contracts for mobile phone, music and video streaming services, video games, and electronic equipment (e.g., mobile phone, laptop, and camera). Moreover, all stated that they bought lunch and/or snacks during the day, often with extra money from their parents (ranging between 3 - 5 euros daily). Concerning their expenses on clothing, the teenagers reported that their parents paid for their clothes only if they really needed them. Any additional piece of clothing the participants wanted but, according to their parents, did not need they had to pay out of their personal budget. Other typical expenses of the teenagers were for parties, cinema, and trips to a bigger city close to their hometown.

Specific consumption behaviors in the area of food

In the present sample, all of the participants and their families consumed meat and dairy products on a regular basis. Only one participant stated that her father was a vegetarian and that consequently her family ate very little meat. All of the teenagers reported that they bought lunch at school and/or snacks like bread, fruit, chocolates, cookies, and other sweets at bakery stores or supermarkets (also discounters) during school breaks or after school. As a result, our informants consumed many take-away products (which produce more waste). In general, the main criteria for their purchases were low price and tastiness. Only a few stated that they sometimes ensured the product they wanted to buy was organically produced or fair trade. As expected, the parents were generally responsible for the family's grocery shopping, only occasionally accompanied by their children. Only half of the participants indicated that they prepared meals for themselves. In most of these cases, the parents supplied frozen food

or leftovers the teenagers only had to heat in the oven or microwave. A few of our informants, however, noted that they knew how to cook easy dishes with pasta, potatoes, or meat for example. In more than half of the cases, the families grew food in their gardens or held chickens, although the teenagers did not seem to exert any actual influence on these systems of self-provisioning. In response to the question if they would do anything differently if they had more money and/or the opportunity to decide freely for themselves, more than half of the participants said they would not change anything in general. Three participants stated they would buy more organically produced or fair trade products.

Specific consumption behaviors in the area of clothing

All except for one of the participants reported that they decided for themselves what pieces of clothing they would obtain. Their main criteria were low price, fashionable design, the fabric, and functionality. Criteria like ecological or socially fair production did not play a role for the teenagers and only one person clearly stated that she would consider these sustainability aspects more carefully if she had more money. Half of the teenagers indicated that they would not change any of their consumption criteria if they had more money and/or could decide freely, whereas roughly a third stated they would buy more clothes if they could afford to do so. Generally, the parents paid for new clothes as long as they considered the new clothes necessary, e.g. because their child had grown out of the old clothes. The teenagers only had to pay for clothes from their personal budget if their parents considered these items unnecessary. In some cases, the parents accompanied their children to the shops. Sorting out clothes because they did were no longer in fashion was very common among the informants. Which pieces of clothing were thrown away, given to charity or repaired was not decided by the participants themselves, but rather jointly agreed upon with or decided by the parents. Only a few participants occasionally borrowed from or swapped clothes with friends or others. None of the participants did their own laundry or produced clothes themselves (e.g. knitting or sewing).

3.3 Discussion

In summary, the teenagers of different backgrounds interviewed in this study spent most of their money on products or services related to their mobile phones and computers as well as on snacks and clothes that they buy in addition to the basic provision of food and clothes from their parents. They are highly dependent on their parents concerning their consumption behaviors in the areas of food and clothing, with parents buying the majority of the food the

teenagers consume and paying for the clothes the teenagers select. Interestingly, the teenagers in our sample mainly agreed with their parents' decisions and stated that they would not change much if they had more money or more opportunities to decide freely for themselves. Only some indicated they would pay more attention to criteria identified as relevant for sustainable consumption.

In the last step of this study, the 33 items of the SCB scale for adults (Geiger et al., 2017) were reviewed in light of the interview findings. Items on behaviors that turned out to be irrelevant for the target group of young consumers were omitted. In the consumption area of food, two items were deleted from the adult scale ("*I eat self-grown food*" and "*I buy animal-based products from animals in ethical husbandry*"). Another adaptation was the inclusion of two control items to account for the differing degrees of autonomy and dependence among teenagers in their food consumption practices ("*How often do you buy food items for yourself?*" and "*How often do you prepare meals for yourself?*"). The remaining 15 items (see Table 3) were structured into three parts: firstly, general food behavior (4 items), secondly, choices when buying food items (7 items), and, thirdly, choices when preparing food (4 items). In the consumption area of clothing, two items on the usage of a washing machine and a tumble dryer were deleted for the YCSCB since none of the informants in the qualitative study had reported doing their own laundry. The remaining 14 items were structured into two parts: firstly, general clothing consumption behaviors (8 items), and, secondly, choices when selecting clothing items (6 items). Again, two items ("*I buy my clothes myself.*" and "*I get clothes as presents.*") were included to control for the teenagers' autonomy in choices concerning consumption of textiles.

4. Study 2: Quantitative Study

The quantitative study aimed to test the psychometric properties and internal scale structure of the 15 amended items for sustainable food consumption and the 14 items on sustainable clothing consumption resulting from the qualitative study. Three different models based on theoretical considerations were tested separately for each consumption area (in order of decreasing parsimony):

1. A unidimensional model, reflecting a general sustainable consumption behavior factor (in the area of food and clothes, respectively)
2. A two-dimensional (hierarchical) model, reflecting the ecological and socio-economic sustainability dimensions as first order factors

3. A three dimensional (hierarchical) model, reflecting the three consumption phases as sub-dimensions: acquisition, usage and disposal

4.1 Method

Participants and Procedure

A convenience sample was recruited via social media and personal contacts in the school sector. The study was online from November 2016 until January 2017. No payments were made to participants, but 20 online vouchers worth 10 euros were raffled. After indicating socio-demographic information about their person, respondents answered questions on mindfulness, connectedness to nature, enjoyment of nature, the new ecological paradigm followed by the questions on sustainable consumption in the order of food and then clothing. The whole questionnaire took approximately 20 minutes to complete. Results on the other variables will be reported elsewhere.

Of the 186 complete data sets, 7 were excluded because the completion time was extremely low (under 10 minutes). Another 12 data sets were excluded because respondents were not between 14-17 years old, which was our intended target population. Lastly, 12 further data sets from non-native Germans were excluded, yielding a final sample of $n=155$. Of this final sample, 77 (49.7%) were female and 78 (50.3%) were male; the mean age was 15.5 years (ranging from 14 to 17). The highest percentage (72.3%) was attending a *Gymnasium* secondary school (leading to the general higher education entrance qualification), while 4.5% were attending a *Realschule* (providing lower secondary education), and 1.9% at a *Hauptschule* (providing a basic general secondary school education). The remaining 16.1% attended a *Gesamtschule* (combining the three forms in one educational institution) (KMK, 2015). The sampling criteria of gender and educational background were assessed as socio-demographic variables. The original version of the Subjective Socio-Economic Status Scale was used (Adler et al., 2000). On a scale from 0-10 the students self-estimated their socio-economic status at 6.6 on average ($SD= 1.7$). Regarding Criterion 2, data showed that most students disposed of 6-10 euros of pocket money weekly, with a range of less than 5 to over 60 euros.

Measures

Sustainable food consumption

To assess sustainable food consumption, 17 items concerning the acquisition, usage, and disposal of food were administered. The two control items (“*How often do you buy food items for yourself?*” and “*How often do you prepare meals for yourself?*”) assessing to what extent students were autonomous in their food choices were excluded from the factor analysis. Of the remaining 15 items, 10 items were aimed at the ecological and 5 items at the socio-economic impacts of sustainable consumption (according to the SCB-cube model, see Section 2). The scale analysis comprised these 15 content items. For the complete list of items, please see Table 1.

Table 1: Items of the young consumers’ sustainable consumption behavior food scale (YCSCB_{FOOD}) (factor loadings from the 2-factor hierarchical model 4) [items translated; original German scale is available from the authors]

5. Control question: How often do you buy food for yourself?	-
13. Control question: How often do you prepare meals for yourself?	-
Factor: Nutrition choices (original item numbering)	Standardized factor loadings
1. I eat meat (steak, ham, etc.).	.58
14. I use frozen foods for meal preparations.	.50
17. I use fresh ingredients for meal preparations.	.47
16. I reuse leftovers for the next meal.	.46
6. I buy snacks and beverages in disposable packaging (take away, fast food, coffee to go, etc.).	.46
4. It happens that I discard food products.	.36
3. I keep a healthy diet.	.35
2. I eat dairy products (butter, cheese, yoghurt, etc.).	.30
Factor: Purchase choices	
8. I avoid food products in excessive packaging.	.80
7. I buy organic food products.	.76
9. I buy fair trade food products (e.g. with a fair trade label).	.71
11. I buy locally grown food products.	.63
15. I cook/prepare my meals energy-efficiently.	.46
10. I buy food products even just before the best before date expires.	.35
12. I buy fresh fruits and vegetables from overseas (e.g. mangos, avocados).	deleted

Sustainable clothing consumption

Accordingly, to assess sustainable clothing consumption, 16 items concerning the acquisition, usage, and disposal of clothes were administered. Again, the two control items (“*I buy my clothes myself.*” and “*I don’t have to pay for my clothes.*”) estimating the autonomy of

teenagers in their clothing consumption were excluded from the factor analysis. Ten items referred to the ecological dimension, and 4 items to the socio-economic dimension of sustainability (according to the SCB-cube model, see Section 2). Additionally, we asked for the overall quantity of clothes acquired over the course of the past year in two different categories (*trousers, skirts, or dresses* and *shirts, pullovers, or blouses*). For the complete list of items, please refer to Table 2.

Table 2: Items of the young consumers' sustainable consumption behavior clothing scale (YCSCB_{CLOTHING}) (factor loadings from the 2-factor hierarchical model 4) [items translated; original German scale is available from the authors]

1. Control item: I buy my clothes myself.	-
2. Control item: I get clothes as presents.	-
Factor: Sufficient and frugal consumption	Standardized factor loadings
13. I buy second hand clothing.	.75
9. I wear patched and mended clothing.	.58
3. I give away or swap unwanted clothing items that I no longer wear.	.54
6. Instead of buying a new piece of clothing for a special occasion, I borrow something.	.54
10. I look for other possible uses of unwanted clothing items (e.g. as a cleaning cloth or recycling projects).	.47
5. I air my clothing items properly before deciding whether they need washing.	.45
7. I make clothing items myself (e.g. sewing, knitting).	.38
4. I throw away clothing items that I no longer wear.	.29
Factor: Purchase choices	
14. I avoid buying clothing items that originate in countries with poor working conditions.	.80
11. I choose clothing items from fair trade production.	.72
12. I choose clothing items from organic production (e.g. made from organic cotton).	.72
15. I choose clothing items with labels that guarantee absence of chemical pollutants (e.g. OEKO-TEX® confidence in textiles).	.65
16. I choose high quality and long lasting clothing items.	.50
8. I sort out clothing items that are no longer fashionable or do not match my taste anymore.	Deleted

4.2 Results

Descriptive results

Of the 155 respondents, few said they never bought (3.9%) or prepared (5.2%) a meal for themselves. Roughly a third (35.5%) of the respondents stated they often or always bought food for themselves and even more (47.1%) said they prepared meals for themselves often or always. A similar pattern emerged for clothing consumption. Only 3.9% of the respondents never bought clothes for themselves, whereas more than half (54.9%) said they mostly (often

or more) bought clothes for themselves. Comparing the mean frequency between buying food and clothes for themselves, teenagers significantly more frequently bought clothes than food for themselves ($t(154) = 3.18, p < 0.01$).

For the quantity of purchased clothes items two extremely unlikely values (1000 and 4787) were excluded from analysis. On average the teenagers bought 7.7 trousers, skirts, or dresses during the previous year with a high variation (range from 1-88, $SD = 9.3$ items). The same was true for upper parts as shirts, pullovers, or blouses: here teenagers bought a mean of 15.1 pieces (ranging from 2-100, $SD = 12.4$).

Item characteristics and internal structure of the scale

Sustainable food consumption

We computed the confirmatory factor analyses with RStudio (Version 0.99) using the lavaan package (Rosseel, 2012). The models were evaluated against cutoff criteria for acceptable fit of $CFI \geq .90$ and $RMSEA < .08$ according to Bentler (1990). Testing the models in the order of decreasing parsimony, we first fitted a unidimensional model for all 15 items, yielding an unsatisfactory model fit ($\chi^2(88) = 171.3, p = .00, RMSEA = .078$, and $CFI = .832$). Item number 12 showed a 0-loading, and the model fit increased significantly when the item was omitted (see Table 1). Modification indices indicated a covariation of measurement error between items number 1 and 2 (indicating that consuming meat and dairy products are stochastically dependent, as the latter indicates a more restrictive dietary choice – veganism – than the former), items number 7 and 9 (referring to organically produced and fair trade products, also partially dependent), and items number 3 and 17 (eating healthily and with fresh ingredients). All further models (Models 2 to 4, for comparative indices see Table 1) were calculated without item 12 and allowed for error correlations between items 1 and 2, 7 and 9, as well as 3 and 17 respectively.

Next we tested a two-dimensional, hierarchical model based on the conceptual distinction of sustainability dimensions, followed by a three-dimensional hierarchical model taking into account consumption phases. Neither model showed a satisfactory model fit (for comparative fit indices see Table 3), so we proceeded to amend items according to modification indices from model 3. The resulting two-factorial hierarchical model with a *nutrition choices* and a *purchase choices* factor showed best improvement compared to the unidimensional model. Both factors loaded strongly on a higher order “sustainable food consumption” factor

(nutrition choices: $\gamma = 0.90$ and purchase choices: $\gamma = 0.77$). Factor loadings for the items of this model are presented in Table 3.

Table 3: Comparison of different models for the young consumers' sustainable consumption behavior food scale (YCSCB_{FOOD})

#	Model Type	χ^2 -Model Test	RMSEA	CFI	χ^2 -Difference Test compared to 1
1	Unidimensional (- item 12)*	$\chi^2(74) = 131.2, p < .000$	.071	.883	
2	Hierarchical Two factors: sustainability dimension	$\chi^2(73) = 129.4, p < .000$	.071	.884	$\chi^2(1) = 1.8, p = .18$
3	Hierarchical Three factors: Consumption phase	$\chi^2(71) = 128.6, p < .000$	.072	.882	$\chi^2(3) = 2.6, p = .45$
4	Hierarchical Two factors: purchase/ food choices	$\chi^2(73) = 116.3, p = .001$	.062	.911	$\chi^2(1) = 14.9, p < .000$

Sustainable clothing consumption

For the clothing consumption items we proceeded as with the food items. A unidimensional model yielded an unsatisfactory fit ($\chi^2(88) = 171.3, p = .00$, RMSEA = .078, and CFI = .832). Item 8 showed a non-significant loading and was subsequently omitted from further models. Similar to the food scale, items 11 and 12 (referring to organically produced and fair trade clothes) had correlated error terms which was allowed in all subsequent models. A two-factorial model based on sustainability dimensions did not yield satisfactory fits. Next we tested the three-factorial model based on consumption phases which had a significantly better fit than the unidimensional one, but still just failed to reach satisfactory fit indices (see Table 4). This model was outperformed by an amended two-factorial hierarchical model based on modification indices, yielding a *sufficiency/frugality consumption* and a *purchase choices* factor. Both factors loaded strongly on a higher order *sustainable clothing consumption* factor (sufficiency/frugality consumption: $\gamma = 0.85$ and purchase choices: $\gamma = 0.80$). Factor loadings for all items based on Model 4 are presented in Table 4.

Table 4: Comparison of different models for the young consumers' sustainable consumption behavior clothing scale (YCSCB_{CLOTHING})

#	Model	χ^2 -Model Test	RMSEA	CFI	χ^2 -Difference Test compared to 1
1	Unidimensional (- item 8)	$\chi^2(64) = 146.9, p < .000$	.091	.818	
2	Hierarchical Two factors: sustainability dimension	$\chi^2(63) = 151.7, p < .000$	.095	.806	no improvement
3	Hierarchical Three factors: Consumption phase	$\chi^2(61) = 107.3, p < .000$	.070	.899	$\chi^2(3) = 39.6, p < .000$
4	Hierarchical Two factors: sufficiency / purchase	$\chi^2(63) = 97.0, p < .000$	.060	.922	$\chi^2(1) = 49.9, p < .000$

As item 8 refers to a quantitative aspect of clothing consumption (the reason items are replaced) we correlated this item with the overall number of clothes acquired during the previous year. The bivariate Pearson's correlation, however, revealed no relation between the two variables ($r = 0.09, p = .25$). We also computed the correlation between the number of clothes acquired and the mean of the new *purchase choices* scale, which was weakly negatively correlated ($r = -0.15, p = 0.55$).

4.3 Discussion

In this paper we present a valid and reliable measurement scale to assess young consumers' sustainable consumption behavior in the area of food (YCSCB_{FOOD}, $n=14$ items) and clothing (YCSCB_{CLOTHING}, $n=13$ items). The development of the items was based on the SCB-cube model (see Section 2, Geiger et al., 2017) spanning the three consumption phases of acquisition, usage, and disposal as well as the impacts of consumption behaviors on socio-economic and ecological sustainability dimensions. The measurement models did not provide a satisfactory fit for either consumption phases or sustainability dimensions. Instead, a hierarchical model with two well interpretable sub-factors and a strong general factor emerged as the best fit for both consumption areas. For the area of food, the first factor comprises *food choices* (vegetarian, vegan, and eat healthily). The second factor comprises *purchase behaviors* of sustainably sound products (e.g., fair trade, organically and regionally

produced products) and energy saving behaviors. Being conscious of imported foods had no diagnostic value for the sustainable behavior of young consumers, so we deleted the item from the scale. As both factors loaded highly on a general order factor we consider our scale to reflect an overall sustainable food consumption style and encourage the use of an overall scale mean. For further development of the scale, combined items for the correlated item pairs should be considered (e.g. fair trade/eco-label purchases) because in practice these two behaviors often coincide (i.e. fair trade products imply ecological standards).

The same applies for the clothing consumption scale, which comprises a subscale of *frugal behaviors* such as swapping and borrowing clothes, using second-hand clothing, and repairing clothes. The other subscale reflects *purchase behaviors* of buying ecologically and socially responsible or high quality products, similar to the food area. The second order factor also suggests using an overall scale mean for diagnostic usage of an overall sustainable clothing consumption style. It has to be noted though that this style exclusively refers to a qualitative aspect of purchased clothes and their respective usage, whereas the quantitative aspect was captured in additional questions. Item 8, which was intended to assess the frequency in which clothes are discarded for new fashions, did not correlate with the overall number of acquired pieces. We conclude that the item did not capture the behavior we intended it to and as it did not contribute to the overall scale, we deleted it from the scale. Our scale correlates very weakly with the quantity of clothing purchases. As this constitutes a key point of sustainable behavior in the area of clothing, we explicitly encourage future research to investigate the overall volume of clothing purchases. This seems particularly advisable as teenagers are more autonomous in the consumption area of clothing than food.

5. Limitations and Future Research

The target group of this study is young consumers of a specific age group (14-17 years) in Germany in a specific household economic structure (with parents at home) in a specific time period. These contextual factors allow the development and validation of a SCB scale that is tailored closely to the lifeworlds of young consumers. This narrow focus makes it necessary to carefully consider the limitations involved in transferring the scale to other population groups and contexts.

For a rigorous assessment of SCB, context-sensitive measures are needed that are also able to reflect high-impact consumption behaviors from a sustainability perspective in the target group's lifeworld. Thus, the selection of behaviors for study is dependent on both the

lifeworlds of young consumers and sustainability priorities. The present scale was developed for the German context. In other parts of the world, different behaviors may be selected to account for different high-priority areas of action, different household compositions in the age group, and different sustainability priorities. We would, however, argue that given overall similarities with regard to different contextual factors such as available income of teenagers (for pocket money, see e.g. ING, 2014) the YCSCB scale presented in this study may well be a feasible and robust measure in cultural contexts outside of Germany. This remains to be corroborated or corrected by further research.

A more general restriction arises from the overall dynamics of youth consumption. The ways in which teenagers consume is constantly changing, both in the geographical (urban vs. rural, Global North vs. Global South) and in the social realms (e.g. milieus, lifestyles, youth cultures) (Kjeldgaard and Askegaard, 2006; Larson and Verma, 1999). As a result, even for the context for which this scale was developed, it will need constant revision and updating for researchers interested in measuring and understanding young consumers' SCB to have reliable and valid instruments. This is a task for future research in the field.

For other contexts, the method used and presented in this study gives a guideline on how to approach the adjustment of the YCSCB scale for specific population groups and contexts. This approach builds on a conceptualization of a threefold perspective on SCB: in consumption areas (food, clothing, etc.), phases (acquisition, usage, and disposal), and sustainability impacts (ecological and socio-economic). In our view, a benefit of such a conceptual meta-perspective is that it encourages a more valid (in terms of content or construct validity) measurement of SCB. The use of such a conceptual framework in developing SCB scales for different subpopulations and contexts would allow for greater comparison of different measures and a better differentiation among instruments with regard to the aspects of SCB they are measuring.

This paper provides a twofold contribution to the field of measuring SCB among young consumers: by presenting a consolidated scale and by paving the way towards a more sophisticated measurement of SBC among young consumers that is both more comparable, focused on behaviors (instead of confounding behaviors with intentions, attitudes, or values), and impact-oriented in terms of sustainability relevance.

Notes

[1] While we acknowledge that the terms teenagers, young adults, adolescents, and youths are used with different meanings in different contexts (Furlong, 2013), we have chosen to use the term “teenager” to refer to our target group of 14 to 17-year-olds.

[2] Compassionate self-concept, health consciousness, self-esteem, volunteerism, and self-sufficiency as variables for sustainable consumer behavior, and negative behavior, risk-taking, materialism, compulsive buying, and negative attitude toward business ethics as variables for non-sustainable consumer behavior (David Lee et al., 2016).

[3] The five poles were labelled: significantly more than most others, slightly more than most others, no more or less than most others, slightly less than most others, and significantly less than most others.

Acknowledgements

The authors would like to thank Jana Koltzau and Hannah Auerochs for their support in the collection and analysis of data, Carolin Kameke in the preparation of tables and Theresa Horbach for background research, Paul Lauer for proofreading and editing, as well as two anonymous reviewers for their valuable feedback on an earlier version of this manuscript.

The work was part of the project BiNKA (Education for Sustainable Consumption through Mindfulness Training [project funding reference number: 01UT1416], funded by the German Federal Ministry of Education and Research in the Socio-Ecological Research Programme on Sustainable Economy between 2015 and 2018).

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