Reducing personal clothing consumption: A cross-cultural validation of the comprehensive action determination model

Tina Joanes[a,*], Wencke Gwozdz[a,b], Christian A. Klöckner[c]

[a] *Justus-Liebig-Universität Gießen, Institute of Household Science, Gießen, Germany*
[b] *Copenhagen Business School, Department of Management, Society & Communication, Frederiksberg, Denmark*
[c] *Norwegian University of Science and Technology, Department of Psychology, Trondheim, Norway*

ABSTRACT

Clothing production has high impacts on the environment, with a reduction in the consumption of clothes providing a contribution towards urgently needed sustainable production and consumption. The present study employs the comprehensive action determination model (CADM) to identify psychological determinants associated with reduced clothing consumption across five different countries. In two studies (n = 5,185) we sought to identify the constructs most strongly related to intentions to reduce clothing consumption and to reduction behavior. Results showed that normative constructs were most strongly related to intentions to reduce consumption. Intentions were only weakly negatively related to the number of items bought in a two-week period. As hypothesized, structural paths were equal across countries. Implications for intervention development are discussed.

1. Introduction

In 2016, a large part of the world community committed itself to limiting global temperature rise to less than 2 °C above pre-industrial levels by the end of the current century (United Nations, 2016). However, based on developments in the recent past warming of only 2 °C by 2100 is unlikely (Raftery, Zimmer, Frierson, Startz, & Liu, 2017). In order to reach this goal major transformative changes to current socioeconomic systems and consumption patterns are necessary, especially among consumers with high incomes and consumption levels (Steffen et al., 2018). The current paper focuses on one such action consumers can take immediately and without further technical development or extended investment – the reduction of consumption. In particular, we explore reducing personal consumption of clothing.

There are numerous reasons why clothing is bought, from functional aspects serving the biological need of protection from the weather, to psychological and symbolic functions of communicating status, belonging, identity or individuality (Cox & Dittmar, 1995; Entwistle & Wilson, 2001; Tiggemann & Lacey, 2009). Research that explores relevant criteria for textile purchase decisions often shows quality, comfort, price and skin friendliness or touch as most important characteristics, followed by other characteristics such as fashionability or brand (Holmlund, Hagman & Polsa, 2011; Hsu & Burns, 2002; Kamalha, Zeng, Mwasiagi, & Kyatuheire, 2013).

From an environmental impact perspective, such as land and water use in production, clothing and footwear have the second highest impact of all consumption categories per Euro spent (Ivanova et al., 2016). Additionally, the most rapid growth in environmental footprint can be found in the production of clothing, with material footprint increased by 100%, water footprint by 50% and carbon footprint by 20% since 1995 (Wood et al., 2018). Pesticides and chemicals used during the production process pollute local ecosystems in the producing countries (Choudhury, 2014). Equally, major social shortcomings characterize clothing production that include: long working hours and low payment, unsafe working conditions, child labor, and denial of labor rights (Dickson, Loker, & Eckman, 2009). It thereby contributes to globally unjust systems of production and consumption, but these are too broad concepts to be further discussed in this paper.

Clothing is a discretionary product that beyond that needed for physical protection, is not necessary for survival. Given the volume of clothing consumed today, especially in Western countries, it can be seen as a primary example of a material culture (Crane & Bovone, 2006) that has fueled overconsumption (McDonagh & Prothero, 2015). A reduction of the environmental impacts caused by clothing production is necessary and should be a shared effort across countries and markets.

So far, sustainable growth in general via technology that is more efficient or sustainable innovation has failed to deliver needed changes towards reducing environmental impacts (Martínez-Alier, Pascual,

Vivien, & Zaccai, 2010). Therefore, individual consumer decisions to reduce consumption through buying less, or deciding not to buy certain environmentally and ethically harmful products at all, have previously caught scholarly attention (Capstick, Lorenzoni, Corner, & Whitmarsh, 2014; Chatzidakis & Lee, 2013; García-de-Frutos, Ortega-Egea, & Martínez-del-Río, 2016). To date, none of these studies have focused on reduced clothing consumption.

For the development of strategies aiming at changing consumers' behavior towards reducing consumption, a systematic approach of 'assessing, understanding, and changing' (Steg & Vlek, 2009, p. 309) this specific behavior is necessary. According to Steg & Vlek, determinants of the desired behavior must be thoroughly analysed, and interventions aimed at changing current behavior developed with reference to those. The present two studies aim to identify such determinants. They contribute to the existing literature in the following three ways.

Firstly, we identify psychological determinants related to reducing clothing consumption and assess their role across five countries (Germany, Poland, Sweden, the United States and the United Kingdom; see section 1.3. for detailed discussion of country choice). We use Klöckner's (2013) comprehensive action determination model (CADM) as the theoretical framework. While the strength of the CADM lies with the inclusion of a comprehensive array of psychological determinants, some are more important than others in given specific contexts (Klöckner, 2013). The most relevant determinants for reducing clothing consumption are explored in this paper.

Secondly, we improve the measurement of behavior in comparison to studies that are based on self-reported measures across long retrospective periods. Through the more immediate measurement of purchase behavior daily across two weeks, we are able to minimize recall errors and gain a more accurate measure of behavior. Hence, in contrast to past research on goals and motivation, we are able to 'explicitly test the relationship between intention and behavior' (Sheeran & Webb, 2016, p. 504).

Thirdly, both analyses together provide valuable input in the design of targeted communication or intervention strategies to foster individual reduction behavior for clothing (Klöckner, 2015). The current findings are discussed against this practical backdrop and offer a solid foundation for the development of targeted intervention strategies to researchers and practitioners (e.g., NGOs or governmental agencies) across different countries.

The data for the present analysis is drawn from two sources. Firstly, Study 1 is based on an online consumer survey conducted in Germany, Poland, Sweden and the United States. An in-depth description of the purchase behavior of participants in this study, such as number of items purchased and money spent in a three month period, was previously reported in Gwozdz, Steensen & Müller (2017). Secondly, daily diary surveys of clothing consumption were conducted in the United Kingdom for Study 2. Both survey studies were conducted as part of two research projects (Trash-2-Cash und Mistra Future Fashion) and therefore contained further measures not reported in the present paper.

1.1. The comprehensive action determination model (CADM)

The CADM is used as a theoretical framework for this research. Its main strength is the integration of three well-established models of pro-environmental and consumer behavior, namely the theory of planned behavior (TPB) (Ajzen, 1991), the norm activation model (NAM) (Schwartz, 1977) and the value belief norm theory (VBN) (Stern, 2000), each of which has shortcomings. The TPB fails to account for personal norms, while the NAM and VBN neglect the influence of non-normative influences. The CADM integrates both normative and non-normative constructs (Klöckner, 2013; Klöckner & Blöbaum, 2010).

In line with the TPB, intentions are the main predictor of behavior in the CADM. Likewise, perceived behavior control is directly linked to behavior. Attitudes towards the specific behavior as well as social norms and perceived behavior control are in turn related to intentions.

Attitudes represent a general evaluation of the favorability of a behavioral alternative. Social norms comprise a person's perceptions about how others behave, so called descriptive norms, and which behavior others expect, so called injunctive norms. Perceived behavior control represents a person's perceptions regarding their ability to perform the behavioral alternative.

Furthermore, in the CADM it is postulated that personal norms can interfere with or support such non-moral motivational constructs like attitudes. Personal norms are felt moral obligations to perform a behavior, and are further direct predictors of intentions besides TPB constructs. In line with NAM and VBN theory, the theoretical assumption in the CADM is that personal norms need to be activated before they can influence intentions and hence environmentally friendly behavior. Activation can occur when a person becomes aware of the negative consequences of their own behavior for the environment and ascribes responsibility for these consequences on themself. Both awareness and responsibility, together with social norms, then activate felt moral obligations towards performing a specific behavior in question.

The CADM has been empirically tested with regards to purchase of fuel-efficient cars (Nayum & Klöckner, 2014), prediction of self-reported recycling behavior (Klöckner & Oppedal, 2011), installation of wood pallet stoves (Sopha & Klöckner, 2011), and choice of travel mode (Klöckner & Blöbaum, 2010). In altered form, it was applied in the area of sustainable seafood consumption (Richter & Klöckner, 2017) and recycling behavior at the workplace (Ofstad, Tobolova, Nayum, & Klöckner, 2017). A meta-analysis across various behaviors, e.g., energy conservation and car use, supports the model (Klöckner, 2013).

Outcome efficacy, the belief that one can help alleviate problems through one's actions, is another construct important in the production of personal norms (Schwartz, 1977). Even though outcome efficacy is not often included in studies applying the NAM or CADM, selected previous studies demonstrated its relevance (De Groot & Steg, 2009; Huijts, Molin, & van Wee, 2014; Steg & de Groot, 2010). We have included it in our model as relevant for the activation of personal norms.

An overview of our model can be seen in Fig. 1. For this research we applied an abridged form of the CADM, not including two theoretical assumptions stemming from the VBN theory. Firstly, we excluded values that are most distant to behavior from our analysis. Our ultimate goal is to identify psychological determinants that can potentially be targeted with an intervention strategy in order to foster reduced clothing consumption. Values are 'trans-situational goals, varying in importance, that serve as guiding principles in the life of a person or group' (Schwartz et al., 2012, p. 664). They are not easy to target with interventions, and therefore are less relevant for the final aim of the current research. Secondly, we disregard the postulated causal chain of constructs as previous research contradicts this assumption (Klöckner, 2013).

1.2. Overview of the current research

Two studies were conducted to test the relationships between constructs as proposed by the CADM across countries. For Study 1, the model was used to assess intentions to reduce clothing consumption. For Study 2, we included an improved measurement of behavior collected in a daily diary form. For two weeks participants reported whether they had bought an item or not on a daily basis. This allows us to test the relationship between intentions and behavior. Another important construct included in the CADM is habits as automated behavioral response patterns to cues in stable situations (Klöckner & Matthies, 2004; Verplanken & Aarts, 1999). They are an additional predictor for behavior and weaken the intention-behavior relationship, especially for frequent behaviors. Most studies examine habits in the context of water and energy use, recycling, food choice and transportation (Kurz, Gardner, Verplanken, & Abraham, 2015), as they are frequent behaviors. The average consumer purchases 5.9 items of
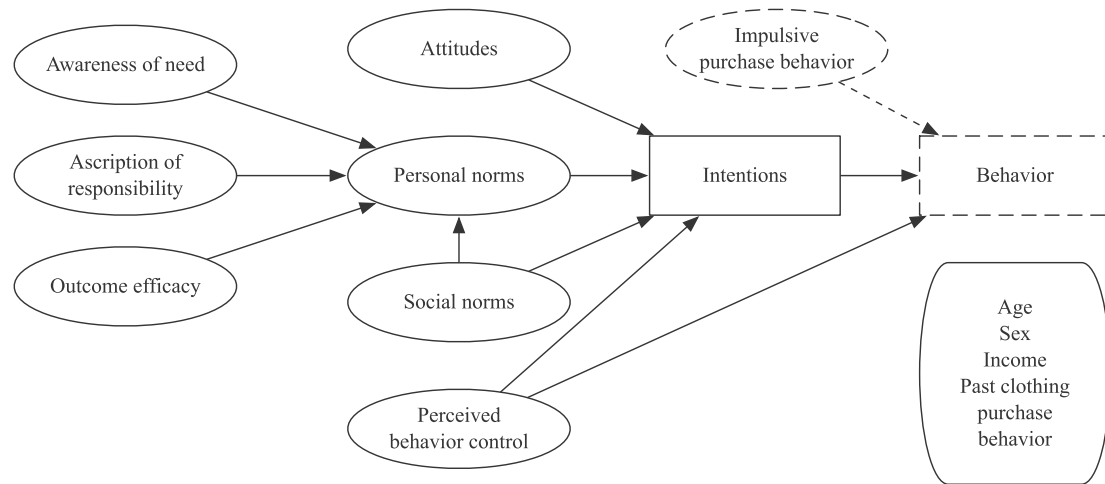
Fig. 1. Abridged CADM as used in this paper (based on Klöckner & Blöbaum, 2010). Every ellipse represents a latent variable that was measured by three or four indicators. For simplicity reasons the measurement model is not depicted but items are listed in Appendix A. Rectangles represent single item variables. Impulsive purchase behavior and behavior were only included in Study 2. Control variables are depicted in the box on the bottom right.

clothing in a three-month period (Gwozdz, Steensen, & Müller, 2017), hence clothing purchase is considerably less frequent than other behaviors such as water use or food choices. Moreover, clothing purchase choices are usually related to higher spending and therefore are associated with more deliberation. Habits, on the other hand, are related to a lack of awareness, difficulty to control, and mental efficiency (Verplanken, 2006). We therefore conclude that for most consumers habits do not exert as strong an influence on clothing purchase behavior as on other more frequent behaviors. At the same time, we cannot exclude that automatic or non-intentional processes, such as through situational cues, influence purchase behavior. In Study 2, we therefore included impulsive purchase behavior as a construct directly related to the number of items bought. Impulsive buyers engage in repetitive buying and purchase larger amounts of unplanned and unneeded items at more frequent intervals than average consumers (Ridgway, Kukar-Kinney, & Monroe, 2008).

In line with selected cross-cultural psychology scholars and biological perspectives, we assume that fundamental psychological processes are shared across humankind and that psychological functioning is invariant across cultures (Berry, Poortinga, Segall, & Dasen, 2002; Poortinga, 2013, 2015; Wang, 2016; Wang & Ware, 2013). We therefore hypothesize that the relationships between the CADM constructs are equal across countries.

1.3. Choice of countries for comparison

Funding-related considerations set the framework for country choice in this research, with the European funding partners expecting a majority of the countries selected to be European. We base the choice of countries on three main considerations. Firstly, reducing consumption can above all only be a goal for affluent Western societies. Of special interest are countries with a large clothing market and high per capita consumption of clothing items or a projected large growth in annual sales. Secondly, countries with similar cultures provide better comparisons as the probability for differences and of rival hypotheses explaining them are lower (Boehnke, Lietz, Schreier, & Wilhelm, 2011; Van de Vijver & Matsumoto, 2011). By identifying differences and similarities in what otherwise might be considered broadly similar countries, we offer inputs for aspects to emphasize in intervention strategies in given cultural contexts. Lastly, there is a certain advantage

in comparing more than two countries as differences can be more meaningfully interpreted in context if compared to at least one additional country, or to a cluster of similar countries (Boer, Hanke, & He, 2018).

Given these three considerations, we decided to focus on five of the largest clothing markets in Western, developed countries: Germany, Poland, Sweden, the United States and the United Kingdom (Statista, 2018). The main characteristics of the clothing market for each country are summarized in the Supplementary Material. The United States currently is the largest clothing market, both in gross and per capita terms. We therefore chose to include it as an additional non-European country. The United Kingdom is the largest clothing market in Europe with the highest average gross consumption per capita and a high projected growth rate. We have included Germany as a central European country and Europe's second-largest clothing market. To deepen our cross-cultural exploration of psychological determinants, we have also included the largest clothing markets of northern and eastern Europe: Sweden and Poland. Sweden's total market size by revenue is the smallest of all included countries, but its high average gross consumption per capita makes an understanding of its consumer behavior important. By contrast, Poland's consumption per capita is comparatively low. This is not surprising as Poland has by far the lowest median income of all countries compared. Clothing is still a discretionary product, and low levels of income go hand in hand with lower levels of spending and items bought. Nevertheless, Poland has a high expected annual growth rate as well as high revenues due to its large population and thus is a valuable target for intervention strategies fostering reduced consumption.

2. Method

We carried out two studies with a varying focus. Study 1 analysed data from $N = 4,591$ respondents to a survey that examined the CADM's relationships across Germany, Poland, Sweden and the United States (mean age M = 42.17 years, 56.65% females). Participants were recruited and the survey administered by Qualtrics in autumn/winter 2016/2017. Due to its length the survey was conducted in two parts with a two to four week interval between completion. Through quota sampling participants completing the first part of the survey were a representative sample by sex, age, education and region within each

country (*N* = 10,363). The participants decided themselves whether to take part in the second part and self-selection led to slight deviations from representativeness (for a more extensive description of the sample see Gwozdz, Nielsen, & Müller, 2017). This research includes all participants that took part in both survey parts. The questionnaire was developed in English and translated by ISO17100 certified translators. Study 1 aims to explain constructs related to intentions to reduce consumption, although intentions do not always translate into behavior (Sheeran & Webb, 2016). Study 2 therefore sheds more light on the intention–behavior relationship by collecting consumption behavior data through daily diaries over 14 days. Daily assessment of behavior enabled the measurement of clothing consumption behavior more precisely than in longer retrospectives. The research was conducted during winter 2017 with a British panel on the platform Prolific. All model constructs were measured with a pre-survey. The final sample consists of *N* = 594 participants with a mean age of 37.44 and a median monthly net income of £1000. Consequently the sample is younger than the UK population and has a lower median income (Office for National Statistics, 2019, 2016). Females, which constitute 71% of the participants, are overrepresented. A detailed display of the demographics for each country can be found in the Supplementary Material.

2.1. Measurements

With the exception of impulsive purchase behavior, we developed our own measurements based on item formulations in existing literature for other consumption contexts (De Groot & Steg, 2009; Nayum, Klöckner, & Mehmetoglu, 2016). Participants indicated their answers on a seven-point Likert scale ranging from "strongly disagree" to "strongly agree" if not indicated otherwise. Apart from the behavior and intention items, the same measurements were used in both studies. All items are listed in Appendix A.

2.1.1. Behavior and intentions

Behavior was reported only in Study 2, in which participants were asked to indicate the number of clothing items purchased via daily diary entries, and clothing purchase behavior was defined as the sum of items purchased over the two-week period.

The intention to reduce personal clothing consumption was operationalized in two different ways. In Study 1, intention was assessed in study part two by response to the statement: *In the following, please indicate what applies to you. In the next three months, when buying clothing items, I intend to… Refrain from buying clothing about which I have environmental concerns*. In Study 2, the intention was operationalized as the importance of the goal *to reduce my clothing consumption*, with answer categories ranging from 0 ('I do not have this goal') to 7 ('very important').

2.1.2. Awareness of need, ascription of responsibility, outcome efficacy and personal norms

Three items measured personal norms, e.g., *I feel a strong personal obligation to reduce my personal clothing consumption*. Awareness of need, ascription of responsibility and outcome efficacy were measured with three items each and referred to issues of environmental concern. Example items for awareness of need are: *Please indicate the extent to which you think each of the following issues is a problem. Clothing production uses vast amounts of hazardous chemicals*; for ascription of responsibility: *Please indicate your agreement with each of the following statements. Through my personal clothing consumption, I am contributing to the harm done to the environment*; for outcome efficacy: *Please indicate your agreement with each of the following statements. Through my personal clothing consumption, I can reduce the environmental impact*. In Study 1, all of these items were placed in study part one.

2.1.3. Social norms, attitudes and perceived behavior control

Social norms were measured with two items each for descriptive

norms (e.g., *People who are important to me… – Reduce their personal clothing consumption*) and injunctive norms (e.g., *People who are important to me… – Suggest that I should reduce my personal clothing consumption*). Attitudes were measured using a seven-point semantic differential scale with four polar adjectives in answer to the question *In general, I think reducing my personal clothing consumption is …*, e.g., *unimportant-important* or *foolish-wise*. Perceived behavior control was measured with three items, one example being *It is mostly up to me whether or not to reduce my personal clothing consumption in the next three months*. In Study 1, all three constructs were assessed in study part two.

2.1.4. Impulsive purchase behavior

Impulsive purchase behavior is theorized to have a direct impact on behavior, equally to habits, above and beyond other motivational constructs in the CADM. Study 2 contained three measures of impulsive purchase behavior from Ridgway et al., (2008) compulsive buying measure: *I consider myself an impulse purchaser*; *I buy things I don't need*; and *I buy things I did not plan to buy*.

2.2. Analysis strategy

Descriptive analyses were conducted in Stata (Version 15.1), and all other analyses were realized in Mplus (Version 8). In a first step, for Study 1, we applied a confirmatory factor analysis to test the measurement model for the combined sample of all four countries. Next, we tested for invariance of the measurement model across countries (Cheung & Rensvold, 1999; Fischer & Poortinga, 2018) before estimating a structural equation model across all countries. Lastly, for Study 2, we conducted a confirmatory factor analysis to test the measurement model and equally estimated a structural equation model for this sample. While both structural models are based on the same measurement model, the difference is the endogenous variable, which is behavioral intention in Study 1 and behavior in a two-week period in Study 2. Furthermore, the model in Study 2 included impulsive purchase behavior as an additional latent factor. The structural models were estimated with maximum likelihood estimation and bootstrapping (N = 1,000) in order to obtain robust standard errors and 95% confidence intervals for each estimate. Age, gender, income and past clothing consumption behavior[1] were included to control for their influence on intention and in Study 2 also behavior.

3. Results

3.1. Study 1

Reported intentions to reduce clothing consumption were moderate with *M* (*SD*) = 3.80 (1.84), range 1–7. Social norms had the lowest reported mean, *M* (*SD*) = 3.20 (1.42), range 1–7, and perceived behavior control the highest with *M* (*SD*) = 5.74 (1.21), range 1–7. Cronbach's alpha was good (α > 0.70) for all constructs. It can be noted that the means of the constructs vary across countries. See Supplementary Material for an overview of all constructs, including means, standard deviations, range, internal consistency and correlations.

3.1.1. Confirmatory factor analysis and measurement invariance

The measurement model comprised the latent factors of awareness of needs, ascription of responsibility, outcome efficacy, personal norms, attitudes, social norms and perceived behavior control. Latent factors were allowed to correlate. For the social norm factor, we allowed the error terms of the two items measuring descriptive norms and the two items measuring injunctive norms to correlate. The measurement model

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[1] Past clothing consumption behavior was operationalized by the number of items bought in the previous three months.

Table 1
Baseline measurement models for individual countries.

Country	N	X^2	df	χ^2/df	P	RMSEA	CFI	TLI	SRMR
All countries	4591	1219	207	5.89	.000	.033	.987	.984	.029
Germany	1170	430	207	2.08	.000	.030	.989	.987	.029
Poland	1105	666	207	3.22	.000	.045	.973	.967	.056
Sweden	1176	521	207	2.52	.000	.036	.985	.982	.031
US	1140	501	207	2.42	.000	.035	.984	.981	.031

Note: RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; SRMR = Standardized Root Mean Square Residual; all countries – unconstrained model.

Table 2
Measurement invariance testing.

Invariance type	χ^2	df	P	RMSEA	CFI	TLI
Configural Invariance	2117.87	828	.000	.037	.983	.980
Full Metric Invariance	2387.05	876	.000	.039	.980	.977
Full Scalar Invariance	3634.00	924	.000	.051	.965	.962
Partial Scalar Invariance	3267.99	923	.000	.047	.970	.967

Note: RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; NFI = Normed Fit Index.

fitted the data well across all countries (χ2 (207, N = 4591) = 1218.61, p < .001, χ^2/df = 5.89, CFI = 0.99, TLI = 0.98, RMSEA = 0.03 (90% CI [0.03, 0.03], SRMR = 0.03)) (Iacobucci, 2010). Standardized loadings of all indicators on their respective latent factor were satisfactory (all > 0.70 with the exception of two items). The model equally fitted the data well in each country (see Table 1), confirming *configural invariance*. Chi-square statistics were significant, but chi-square tests often result in significant p-values due to large sample size effects (French & Finch, 2006). We therefore report χ^2/df as additional goodness of fit indicator. All other goodness of fit indicators including χ^2/df showed an acceptable model fit (Hu & Bentler, 1999).

Metric and scalar invariance were established in the following steps. Table 2 contains information on the goodness of fit indicators for each invariance model, while Table 3 depicts changes in model fit. Metric invariance was met, but the change in model fit for the full scalar invariant model was above the most commonly accepted threshold of −0.01 for the CFI and TLI (Putnick & Bornstein, 2016). Hence, for reaching partial scalar invariance, the item intercept of the item *I will have control over reducing my personal clothing consumption within the next three months* was allowed to be freely estimated for the group of Polish respondents. The fit of the partial scalar invariant measurement model was overall adequate with χ2 (923, N = 4591) = 3267.99, p < .001, χ^2/df = 3.54, CFI = 0.97, TLI = 0.97, RMSEA = 0.05 (90% CI [0.05, 0.05]) and SRMR = 0.05 (Iacobucci, 2010). All indicators showed satisfactory loadings on their respective latent factor across all countries (all > 0.7 except for the freely estimated item named above).

3.1.2. Structural model and direct effects

We tested the relationships between the CADM constructs and the intention to not buy clothing items due to environmental concerns in

Table 3
Changes in model fit.

Invariance type	$\Delta \chi^2$	Δdf	P	ΔRMSEA	ΔCFI	ΔTLI
Configural Invariance						
Full Metric Invariance	269.18	48	0	.002	-.003	-.003
Full Scalar Invariance	1516.13	96	0	.014	-.018	-.018
Partial Scalar Invariance	1150.12	95	0	.010	-.013	-.013

Note: RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; NFI = Normed Fit Index.

Germany, Poland, Sweden and the United States in a structural equation model. At the same time, we tested for the applicability of the model across all countries. The fit of the structural model across all countries was adequate, with χ2 (1399, N = 4591) = 5843.94, χ^2/df = 4.18, p < .001, CFI = 0.94, TLI = 0.94, RMSEA = 0.05 (90% CI [0.05, 0.05]), SRMR = 0.07 (Iacobucci, 2010). This model with structural path coefficients restricted to be equal across countries fitted the data only marginally worse than the model with structural path coefficients estimated freely for each country (χ2 (1363, N = 4591) = 5644.03, χ^2/df = 4.14, p < .001, CFI = 0.95, TLI = 0.94, RMSEA = 0.05 (90% CI [0.05, 0.05]), SRMR = 0.07). A χ2-difference test between the constrained and unconstrained model was significant with $\Delta\chi$2 (36, N = 4) = 199.91, p < .001. Equal to the χ2 fit statistic the χ2-difference test is sensitive to large sample sizes (Cheung & Rensvold, 1999; French & Finch, 2006). We therefore quantified the magnitude of the χ2 difference by calculating Cohen's effect size measure w = 0.035, which is a small effect. Moreover, all other goodness of fit indicators except the CFI were the same across both models. Together these confirmed our hypothesis of equal paths across countries. Unstandardized path coefficients were equal across all countries and are depicted in Fig. 2. Awareness of need (β = 0.31, p < .001), outcome efficacy (β = 0.36, p < .001) and social norms (β = 0.35, p < .001) had similarly strong, significant, positive relationships with personal norms. Ascription of responsibility had a significantly positive, but smaller link with personal norm (β = 0.06, p < .001). Personal norm had the strongest significantly positive direct relationship with intention to reduce clothing consumption (β = .38, p < .001). Attitudes and social norms were equally, if also less strongly, significantly positively linked to intention (β = 0.24, p < .001 & β = 0.29, p < .001, respectively). Perceived behavior control was not significantly related to intentions. Standardized path coefficients and explained variance values for each country are listed in the Supplementary Material.

3.1.3. Indirect effects and control variables

In addition to direct effects, unstandardized indirect effects mediated through other model constructs were of interest. Social norms had a significant, positive, indirect relationship with intention (β = 0.13, 95% CI [0.11, 0.15]). The total unstandardized effect of social norms on intentions was β = 0.42, 95% CI [0.38, 0.47]. Furthermore, awareness of need (β = 0.12, 95% CI [0.10, 0.14]), ascription of responsibility (β = 0.02, 95% CI [0.01, 0.03]) and outcome efficacy (β = 0.13, 95% CI [0.12, 0.15]) were all indirectly positively linked with intentions. Of the control variables, income was significantly negatively related to intentions to reduce consumption (β = −0.02, p < .05).

3.2. Study 2

We found that respondents bought on average *M* (*SD*) = 2.11 (2.86) items (range 0–25) in the two-week period (see Supplementary Material for the distribution of number of items bought). 147 participants (24.75%) reported not to have an intention to reduce clothing consumption. Eliminating them before calculating the mean intention showed a moderate intention with *M* (*SD*) = 3.54 (1.73), range 1–7. Cronbach's alpha was good for all constructs (α > 0.70). Similar to Study 1, social norms were reported the lowest, *M* (*SD*) = 2.88 (1.45), range 1–7, and perceived behavior control the highest with *M* (*SD*) = 5.87 (1.11), range 1–7. A descriptive overview of all constructs is provided in the Supplementary Material.

3.2.1. Confirmatory factor analysis

The fit of the measurement model was good overall with χ2 (269, n = 594) = 558.07, p < .001, χ^2/df = 2.07, CFI = 0.98, TLI = 0.97, RMSEA = 0.04 (90% CI [0.04, 0.05]) and SRMR = 0.04 (Iacobucci, 2010). Standardized loadings of all indicators on their respective latent factor were satisfactory (all > 0.75 except for two items).
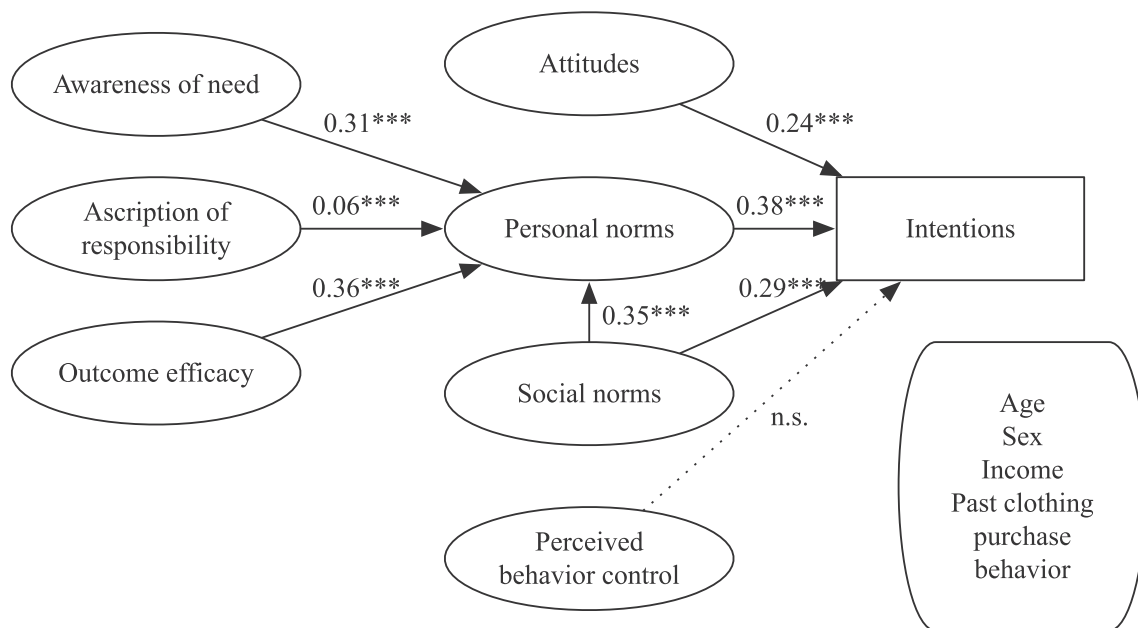
Fig. 2. Results of the structural equation model (Study 1), unstandardized structural coefficients (*p ≤ .05; **p ≤ .01; ***p ≤ .001).

3.2.2. Structural model and direct effects

Our research tested the relationships between the same[2] model constructs like in Study 1, but included a measure of purchase behavior in a two-week period as well as impulsive buying. The fit of the structural model was adequate, with $\chi2$ (418, N = 594) = 1042.36, CMIN/ DF = 2.50, p < .001, CFI = 0.95, TLI = 0.94, RMSEA = 0.05 (90% confidence interval = [0.05, 0.05]), SRMR = 0.06 (Iacobucci, 2010). Standardized coefficients are provided in the Supplementary Material, and unstandardized path coefficients are reported in the following. Awareness of need and social norms had the strongest significant positive relationship with personal norms by point estimate (β = 0.36, p < .001 & β = 0.31, p < .001, respectively). Ascription of responsibility and outcome efficacy showed a weaker relationship (β = 0.19, p < .01 & β = 0.22, p < .01, respectively). However, the 95% confidence intervals of all four factors overlapped, indicating a potentially similar relevance of all four for personal norms. In line with Study 1, the strongest significant positive direct relationship existed between personal norms and the goal to reduce clothing consumption (β = .55, p < .001). Social norms were significantly positively linked to the goal of reducing, but the magnitude was smaller (β = 0.24, p < .01). Attitudes were marginally significantly linked (β = 0.14, p = .055) and perceived behavior control again was not significantly related to intentions. However, perceived behavior control was significantly negatively related to purchase behavior in a two-week period, indicating that the more participants believed they were able to reduce their consumption the less they bought in that period (β = −0.30, p < .05). Impulsive purchasing was significantly positively connected to purchase behavior (β = 0.29, p < .01). The goal to reduce consumption showed a significant, yet weaker, negative relationship with items purchased (β = −0.10, p = .05).

3.2.3. Indirect effects and control variables

Unstandardized indirect effects are reported in the following. Personal norms (β = −0.06, 95% CI [-0.11, −0.01]) and social norms (β = −0.04, 95% CI [-0.08, −0.01]) were indirectly linked to purchase via intentions. Notably, the upper limit of the 95% confidence interval is close to zero for each. Furthermore, indirect effects on the intention

to reduce consumption via personal norms were significant. Awareness of need (β = 0.20, 95% CI [0.11, 0.28]), ascription of responsibility (β = 0.10, 95% CI [0.04, 0.16]), outcome efficacy (β = 0.12, 95% CI [0.05, 0.21]), and social norms (β = 0.17, 95% CI [0.10, 0.23]) were all significantly indirectly related to intentions. None of them were significantly indirectly linked to purchase behavior.

Past clothing consumption behavior was negatively linked to intentions to reduce consumption (β = −0.16, p < .05) and positively to purchases (β = 0.60, p < .01). Sex was positively related to the number of items purchased (β = 0.96, p < .001), indicating that women had bought significantly more items.

4. Discussion and conclusion

The aim of this research is to identify the most relevant psychological determinants for reduced clothing consumption across different countries. Two normative constructs are strongly related to intentions to reduce consumption, personal norms and social norms. These results were robust in a large nearly representative sample as well as in a smaller non-representative sample. As hypothesized, the relationships between model constructs thereby are the same (Study 1) or similar (Study 2) across countries.

We also aimed to test the often only assumed role intentions play for behavior (Sheeran & Webb, 2016), and therefore included an improved measure for number of clothing items bought and examined the relationship with reduction intentions. Possible explanations for the high average number of items bought in Study 2 can be the higher number of women in this sample. As seen in Study 1, women buy significantly more clothing than men. An alternative explanation is that perhaps clothing purchases reported retrospectively are often an underestimation of the number of items bought, and the daily reporting in the current study made it easier to report all items.

The results reveal that intentions were only weakly related to purchase behavior. We find a significant and negative, yet small relationship between intentions to reduce clothing consumption and the number of items bought in the two-week period. Moreover, intentions are not significantly linked to past behavior in Study 1. This reflects the so-called 'intention-behavior-gap' (Sheeran & Webb, 2016; Sniehotta, Presseau, & Araújo-Soares, 2014) and our research aligns with previous work e.g., in the area of recycling (Davies, Foxall, & Pallister, 2002). Intentions can be of great importance to reach long-term goals, but

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[2] We treat the goal to reduce consumption as conceptually equal to the intention of not buying a clothing item due to environmental concern (Gollwitzer, Fujita, & Oettingen, 2008).

people who intend to change their behavior in the future do not necessarily act upon their intentions. Such intention-behavior inconsistencies can be caused by, for example, characteristics of the intention itself or challenges people encounter during implementation. Intention quality and strength, environmental conditions and self-regulatory capacities can all play a role. Therefore, to foster behavior change additional strategies beyond intention formation need to be considered.

Our research included past purchase behavior to reflect average level of clothing consumption and control for its influence on intentions to reduce consumption and number of items bought. Past behavior was found to have the strongest positive relationship with purchase, which is in line with previous findings that past behavior is a good predictor of future behavior (Sheeran, 2002). This is especially the case in stable contexts (Ajzen, 2002). The relationship between past and future behavior sometimes is interpreted as a sign of habitual processes, yet this interpretation is also criticized (Verplanken, 2006; Verplanken & Aarts, 1999). Likewise, we find impulsive purchase behavior linked to both past and future purchase behavior. Together, it points towards one potential interpretation that buying clothing can be to some extent an automatic or at least non-intentional process.

Personal norms were found to have the strongest direct positive relationship to behavioral intentions, which highlights the moral nature of motivations to reduce clothing consumption. The results were confirmed for both the intention to reduce due to environmental concerns, as well as a general intention to reduce clothing consumption. This aligns with previous research that found personal norms related to, for example, buying environmentally friendly products or organic food (Aertsens, Verbeke, Mondelaers, & Huylenbroeck, 2009; Onwezen, Antonides, & Bartels, 2013) and purchase of hybrid or electric vehicles (Nordlund & Garvill, 2002). Personal norms are strongly related to social norms and awareness of need in both studies and to outcome efficacy particularly in Study 1.

The total effect of social norms on intentions, including mediated effects through personal norms, is positive and of comparable magnitude to the relationship between personal norms and intentions in Study 1. In Study 2, social norms showed the second strongest relationship with intentions. The role of social norms for intentions differed in previous studies, with some studies reporting only an indirect relationship between social norms and intentions, for example in the use of renewable energy sources (Fornara, Pattitoni, Mura, & Strazzera, 2016), or recycling (Klöckner & Oppedal, 2011). Others report a direct relationship with intentions, for example in the use of public transport (Donald, Cooper, & Conchie, 2014; Klöckner & Blöbaum, 2010). One possible explanation can lie with the assumption that social norms exert a stronger influence on behaviors that are more easily observed by others (Vesely & Klöckner, 2018). While a reduction in the number of clothing articles bought cannot be directly visible to others, clothing itself is a highly visible behavior and therefore perhaps under more influence among social norms. At the same time participants indicated to a limited extent that they perceive descriptive or injunctive norms to reduce clothing consumption. This is possibly caused by prevalent marketing techniques and advertisements that suggest it is the norm to buy new clothing items and go with changing trends.

Perceived behavior control was not related to intentions, but to purchase behavior in a two-week period. The missing relationship between perceived behavior control and intentions is in contrast to previous studies, which found perceived behavior control important in, for example intentions to visit a green hotel (Han, 2015; Han, Hsu, & Sheu, 2010) or buy green products (Paul, Modi, & Patel, 2016), willingness to pay for park conservation (López-Mosquera & Sánchez, 2012), or environmentally friendly travel mode choice (Klöckner & Blöbaum, 2010). Moreover, means of the perceived behavior control latent factor were high across all countries. This points towards one benefit of reducing clothing consumption we already mentioned in the introduction; it is an easy behavior that most consumers theoretically can implement immediately without further resources such as knowledge,

time or money. The finding is also in line with Ajzen (1991) who argued that in situations where normative influences are strong, perceived behavior control might be less related to intentions.

4.1. Practical implications

Across all countries, the current research identified personal and social norms as two important determinants to be addressed in intervention strategies. Results show that an increase in perceived personal norms potentially could be reached with focused messages, such as on the environmental impact of clothing (awareness of need) as well as on possibilities to alleviate such impacts through own reduced consumption (outcome efficacy). Awareness of need can be raised through information provision, e.g., in large-scale advertisement campaigns. To communicate outcome efficacy it is better to be content specific. Tailored information on, for example, how much water and energy can be saved through the reduction of one's personal clothing consumption can enhance the perception of outcome efficacy and is therefore valuable in potential intervention strategies. There is a difference in possibilities for communicating social norms. Results show that there might not be a strong social norm for consuming less in a given country or consumers' immediate context, and hence it is difficult to make consumers perceive such a social norm.

While the above discussed relationships were found to be equal across countries, means of all constructs varied across countries (see Supplementary Material). Such mean differences are explorative in nature and not further discussed in this paper. However, they are point of departure for programs aiming at changing behavior and therefore potentially relevant for the choice of communication strategies. A more detailed analysis of these differences and their implications can be a promising avenue for future research.

One more possibility in reducing consumption may lie in contemplating past purchases, and in how far these are perceived as necessary and valuable now. Instructing reflections about impulsive purchases might enable consumers to become aware of unnecessary purchases and reduce consumption in the future.

Lastly, designers of all policy or intervention strategies following these pathways towards increasing intentions must remember that the effect of intentions on behavior might be limited. Further strategies facilitating a translation from intentions into behavior need to be applied, e.g., goal setting, implementation intentions and if-then plans, as well as strategies derived from self-regulation theory (Bamberg, 2013; Nielsen, 2017; Sheeran & Webb, 2016).

4.2. Limitations and future studies

While discussing the merits of the current research, we need to also note some weaknesses and avenues for future research. Firstly, the measurement of reduced consumption can be further improved. We used a generally improved measurement of behavior in Study 2. However, diary data across only a two-week period might be prone to noise and not reflect consumers' real purchase behavior, as many days can pass without a single purchase, and multiple pieces can be purchased at the same time. Future studies could follow consumers for a longer period and with weekly or bi-weekly (rather than daily) reports on the number of items purchased, as most customers can recall purchases made in the previous week or two.

Secondly, the variance explained in purchase behavior across the two-week period is rather low. This points towards the importance of other variables that influence purchase behavior and are not assessed in the current study. Such can be many and varied e.g., personality variables like materialism or fashion involvement. Future studies could further investigate the role purchasing clothing plays above and beyond the mere acquiring of a new garment, e.g., novelty seeking or rewarding oneself, and explore the extent to which less carbon-intense pastimes might fulfill these needs. Moreover, future studies could put a focus on contextual factors that

might have an influence on the number of items purchased. Examples are contact with fashion advertisements (on social media, public spaces etc.) or proximity of clothing stores to home and on daily commutes.

Thirdly, while focusing on culturally similar countries has its advantages as described above, a look at emerging countries would be of merit in the future. Two large clothing markets come to mind as potential subjects for future comparisons: China and India. China's market for clothing consumption is comparable to the United States (US$311,527m for 2018), even though the current average consumption per capita is far lower than in the countries we chose (22 pieces). India similarly has a large market (US$86,178m for 2018) with again a comparatively low average per capita of 18 pieces. For both countries, prognoses are that the market will grow and per capita consumption increase. While these emerging countries are completely within their rights to aim for more material wealth, this aspiration is in tension with the 2 °C goal. Studies exploring this conflicting issue, how it is perceived among consumers in emerging countries and what possible alternative pathways for development are imaginable and acceptable, add valuable insights for how to reach the 2 °C goal through working together globally.

CRediT authorship contribution statement

Tina Joanes: Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft, Writing - review & editing. **Wencke Gwozdz:** Conceptualization, Methodology, Investigation, Writing - review & editing, Supervision. **Christian A. Klöckner:** Conceptualization, Writing - review & editing, Supervision.

Declaration of competing interest

None.

APPENDIX A

Single item measures

Behavior: daily clothing purchase question (*Study 2*)
How many items did you purchase? (If you purchased a multipack of a given product (e.g., a three-pack of socks) that counts as one purchase)
Intention
- (*Study 1*) In the following, please indicate what applies to you. In the next three months, when buying clothing items, I intend to … – Refrain from buying clothing about which I have environmental concerns (Strongly disagree (1) – Strongly agree (7))
- (*Study 2*) Please indicate how important the following goals are to you in relation to your clothing consumption. – To reduce my clothing consumption (I don't have this goal (0) – Not very important (1) – Very important (7))

Seven-point Likert scales from strongly disagree to strongly agree

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Personal norm
- No matter what other people think or do, my principles tell me that it is right to reduce my personal clothing consumption
- Reducing my personal clothing consumption is the right thing to do
- I feel a strong personal obligation to reduce my personal clothing consumption
Awareness of need (Clothing production …)
- Uses vast amounts of energy and water
- Causes tremendous harm to the environment
- Uses vast amounts of hazardous chemicals
Ascription of responsibility (Through my personal clothing consumption, I …)
- Am contributing to the harm done to the environment
- Am contributing to the amount of energy and water used in clothing production
- Am contributing to the use of hazardous chemicals in clothing production
Outcome efficacy (Through my personal clothing consumption, I can …)
- reduce the environmental impact
- have an impact on water and energy savings
- have an impact on reducing the use of hazardous chemicals
Social Norms
- Reduce their personal clothing consumption
- Are considering reducing their personal clothing consumption
- Expect me to reduce my personal clothing consumption
- Suggest that I should reduce my personal clothing consumption
Perceived behavior control
- If I want to, I will be able to reduce my personal clothing consumption in the next three months
- It is mostly up to me whether or not to reduce my personal clothing consumption in the next three months
- I will have control over reducing my personal clothing consumption within the next three months
Impulsive purchase behavior
- I buy things I don't need
- I buy things I don't plan to buy
- I consider myself an impulse purchaser

Seven-point semantic differential scale with four polar adjectives

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Attitudes
- Unimportant – Important
- Foolish – Wise
- Harmful – Beneficial
- Worthless – Valuable

Note: Items were the same across Study 1 and Study 2 if not stated otherwise.

Appendix B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jenvp.2020.101396.

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