

Joanes, Tina

**Doctoral Thesis**

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SUFFICIENCY FOR SUSTAINABILITY - DETERMINANTS AND STRATEGIES FOR REDUCING CLOTHING CONSUMPTION

PhD Series 21-2019

Tina Joanes

# SUFFICIENCY FOR SUSTAINABILITY

DETERMINANTS AND STRATEGIES FOR  
REDUCING CLOTHING CONSUMPTION

Doctoral School of Organisation and Management Studies

PhD Series 21.2019

CBS COPENHAGEN BUSINESS SCHOOL  
HANDELSHØJSKOLEN

## **Sufficiency for sustainability**

Determinants and strategies for reducing clothing consumption

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## **Abstract (English)**

This dissertation examines the psychological determinants for reduced clothing consumption, which is understood as one example of urgently needed behavioural change to mitigate climate change. It investigates how these determinants can be addressed with an intervention strategy to achieve a reduction in clothing items purchased by consumers. The overarching theoretical framework for this thesis is the comprehensive action determination model (CADM), and the dissertation comprises three articles, which successively contribute to the overall aim of identifying successful strategies for behavioural change. Paper I explores the normative part of the CADM in more depth and extends it with the role that identification with all humanity (IWAH) plays for the development of personal norms in a globalised consumption context. Paper II examines the applicability of the full CADM across different countries and reveals the relationship between the intention to reduce consumption and the actual number of items purchased. Paper III reports on an intervention strategy, which was developed based on the insight from Papers I and II and is aimed at encouraging reduced clothing consumption.

The main findings of this thesis relate to insight about behavioural change and about intentions and personal norms, which in turn are hypothesised to influence behaviour. We find that it is possible to reduce the number of items purchased but that strategies aimed at increasing intention alone are not sufficient to induce such a behavioural change. In our study, goal setting, feedback, and commitment helped consumers reduce their clothing consumption. Moreover, personal norms were shown to be the strongest determinant for reduction intentions. Personal norms are strongly influenced by social norms (i.e. what relevant others are doing and expect one to do). They are related to problem awareness regarding environmental issues and the belief that one is able to alleviate these problems with one's behaviour.

In multiple ways, the thesis contributes to the existing literature and delivers valuable insight for practitioners. First, a theory-driven intervention is tested in practice to identify successful avenues for reducing the consumption of clothing. Second, behaviour is measured in addition to measuring the intention to reduce clothing consumption, elucidating the intention-behaviour relationship and underlining the importance of strategies that help consumers translate their intentions into actions. Third, the role that IWAH plays for personal norm formation is examined. The existing norm activation model (NAM) is extended, which improves the

understanding of personal norms in a context characterised by spatial and temporal psychological distance. Finally, previous cross-cultural studies are advanced by applying measurement invariance tests, and previous behaviour measurements are improved through the collection of diary data.



## **Abstract (Danish)**

Denne afhandling undersøger psykologiske determinanter for formindsket tøjforbrug, hvilket her forstås som ét eksempel på adfærdsændringer som er akut nødvendige for at mindske klimaforandringer. Afhandlingen undersøger endvidere, i hvor høj grad disse determinanter kan adresseres med en interventionsstrategi for at opnå en reduktion i mængden af tøjgenstande købt af forbrugere. Den overordnede teoretiske ramme for denne tese er comprehensive action determination modellen (CADM), og afhandlingen består af tre artikler som hver især bidrager til det overordnede sigte at identificere fungerende strategier for adfærdsændring. Artikel I går mere i dybden med den normative del af CADM, og udvider den ved at se på den rolleidentificering som hele menneskeheden (IWAH) spiller for udviklingen af personlige normer i en globaliseret forbrugskontekst. Artikel II undersøger anvendeligheden af hele CADM i forskellige lande, og kaster lys på forholdet mellem hensigter om at mindske forbrug og det antal genstande der faktisk købes. Artikel III rapporterer om en interventionsstrategi, som er udviklet på baggrund af indsigter fra artikel I og II, og retter sig mod at opfordre til formindsket tøjforbrug. De primære erkendelser i denne afhandling handler for det første om indsigt i adfærdsændringer, og for det andet om indsigt i hensigter og personlige normer, som antages at kunne påvirke adfærd. Vi finder, at det er muligt at reducere antallet af købte genstande, men at strategier der alene sigter mod at forstærke hensigter ikke er tilstrækkelige til at opnå en sådan adfærdsændring. I vores studie var det målsætning, feedback og forpligtelse som hjalp forbrugere med at reducere deres tøjforbrug. Derudover viste det sig, at personlige normer er den stærkeste determinant i forhold til hensigter om reduktion. Personlige normer er i sig selv stærkt påvirket af sociale normer, det vil sige hvad andre relevante personer gør og forventer af en at man gør. De er desuden relateret til problembevidsthed og troen på, at man kan afhjælpe disse problemer med sin adfærd. Tesen bidrager på adskillige måder til den eksisterende litteratur og giver værdifuld indsigt til folk som arbejder inden for dette felt. For det første tester den en teoribaseret intervention i praksis og identificerer dermed brugbare veje til formindsket forbrug af tøj. For det andet måler den adfærd, og ikke kun hensigter, om formindsket tøjforbrug. Derved kaster den lys over hensigt-/adfærdsforholdet samt vigtigheden af strategier der hjælper forbrugere med at handle på deres hensigter. For det tredje undersøger den, hvilken rolle IWAH spiller for dannelsen af personlige normer. Den udvider den eksisterende normaktiveringsmodel (NAM) og forbedrer forståelsen af personlige normer i en kontekst

defineret af rumlig og temporal psykologisk afstand. Endelig videreudvikler den forudgående tværkulturelle studier ved at anvende målings-invarianstests og forbedrer forudgående adfærdsmålinger gennem indsamling af dagbogsdata.

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## 1. Introduction

This thesis is researching a specific behaviour in depth: the reduction of the number of clothing items purchased. The attention to this particular behaviour stems from a genuine interest in identifying and fostering behaviours that will enable all humans, today and in the future, to meet their needs while living sustainably and in harmony with the environment. It is therefore deemed necessary to first discuss the wider context in which efforts to reduce overall consumption are situated in the following sections, before reviewing the particularities of reduced clothing consumption. Specifically, it is argued why incremental changes through technological improvements and more efficient products and services might not suffice to mitigate climate change and other environmental pressures, and why lifestyle changes and a decrease in the level of consumption are necessary, especially in developed countries. The thesis is therewith situated among general debates about pathways for sustainable development and sufficiency. The research informing this thesis was financed by the EU Horizon 2020 project Trash-2-Cash, and therefore clothing as the context for this study predetermined to some extent. We<sup>1</sup> acknowledge that changing clothing consumption is only one among many possible behaviour changes that are necessary to mitigate climate change. Nevertheless, especially for investigating sufficiency strategies, clothing as a discretionary consumer good is a particular suitable research context. Hence, the behaviour researched here in detail, reduced clothing consumption, is understood as one practical example of how sufficiency can be implemented at an individualistic and voluntary level.

The overall aim of this thesis is to empirically identify strategies that help consumers to reduce their clothing consumption. To this end, three papers are exploring determinants of reduced clothing consumption (Paper I and Paper II) and test the effectiveness of intervention strategies

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<sup>1</sup> I use the pronoun ‘We’ instead of ‘I’ throughout this thesis. While I authored the written work in this thesis, the research and insights that inform this thesis are a product of invaluable collaboration between me and my colleagues.

based on these determinants (Paper III). Throughout this thesis, we interchangeably make use of the terms clothing consumption or clothing purchase. While consumption comprises further life cycle phases, such as use or maintenance and discarding, we always refer to the purchase of clothing items only when using the term consumption. Again we acknowledge that reduction behaviours are also possible in the use-phase, e.g. through lower washing temperatures, or in the discarding phase, e.g. through reusing items and prolonging the use phase, however such behaviours are not the focus of this thesis.

The thesis is structured the following way. In this introduction, we first discuss the relevance of reducing consumption in general in the light of the current state of the environment, before outlining the application context of clothing consumption and concluding with the research questions guiding the inquiry of this thesis. We end the introductory chapter 1 with a short summary of each paper. In the next chapter 2 the different theoretical perspectives that build the framework of this thesis are introduced. Chapter 3 describes the methodology applied in more detail, and Chapter 4 offers a broad discussion embedding the research results across all studies in the context of the current literature. It furthermore shows implications of the results for practitioners, and provides reflections and avenues for future research. Chapter 5 is the conclusion and therewith the last chapter of this thesis. The three papers are included as Appendix A (Paper I), Appendix B (Paper II) and Appendix C (Paper III).

### 1.1. Status quo of the environment and background for reducing consumption

The context in which efforts to reduce the consumption of any consumer good need to be embedded is the rapidly changing conditions of the climate and other Earth ecosystems, which we already are experiencing and which will intensify in the future (Xu, Ramanathan, & Victor, 2018). Through the emission of greenhouse gases and other industrial by-products, especially since the Great Acceleration in the 1950s, humanity turned into the main driving force for these

changing conditions (Summerhayes & Zalasiewicz, 2018) thereby heralding the start of a period informally called the Anthropocene<sup>2</sup> (Steffen, Crutzen, & McNeill, 2007).

There is a consensus among the vast majority of scientists (Cook et al., 2016) that human activity threatens multiple planetary boundaries, some of them already reached, others to be hit in the foreseeable future (Rockström et al., 2009; Steffen et al., 2015). Apart from such boundaries like ocean acidification, genetic diversity and species loss, land system changes, and biogeochemical flows, the spectre of global climate change has caught the attention of academia, politicians, educators, companies, media and the like in the past (Allen & Craig, 2016; Carroll & Shabana, 2010; Dolsak & Prakash, 2018; Giddens, 2015; IPCC, 1990; Klein, 2015; Raworth, 2017; UNESCO, 2014). In 2016, a large part of the world community committed to limiting the global temperature rise at less than 2 degrees Celsius above pre-industrial levels for the current century, with efforts being made to reach a goal of limiting warming to 1.5 degrees Celsius (United Nations, 2015). A more recent IPCC report stresses the importance of the 1.5 degrees Celsius goal as well as the urgency of increased global efforts to respond to the threat of climate change and the heat, drought, floods and poverty it will eventually cause (IPCC, 2018).

In reality, however, the United States of America have withdrawn completely from the Paris Climate Agreement, and the vast majority of signatory countries have either set insufficient National Determined Contributions (NDCs) targets for reaching the Paris goals, policies not aligned to their targets, or both (IPCC, 2018; Rockström et al., 2017; United Nations Environment Programme, 2017). Based on developments of the recent past, a global warming of *only* 2 degrees Celsius by 2100 is unlikely at a chance of 5%. More likely is a range of temperature increase between 2–4.9% degrees Celsius with a median projection of 3.2 degrees Celsius (Raftery, Zimmer, Frierson, Startz, & Liu, 2017). In line with these forecasts,

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<sup>2</sup> The term was first used by Paul Crutzen (Zalasiewicz, Waters, Summerhayes, & Williams, 2018), who also dates the arrival of the Anthropocene potentially as early as the late eighteenth century (Crutzen, 2002).

preliminary analysis of global energy data indicates an increase in carbon emissions even in the advanced economies by 0.5% for 2018, which shows an inversion of their declining trend of the last five years (International Energy Agency, 2018). Without unprecedentedly rapid reductions in emissions, the current trajectory is far from reaching the Paris Climate Agreement of a 2 degrees Celsius threshold. Beyond this threshold, however, a cascade of feedback processes within the Earth system might cause the global temperature to increase outside the control of human actions, leading to unpredictable, massive and disruptive changes for human societies, a phenomenon called ‘Hothouse Earth’ (Steffen et al., 2018).

Considering the current state of the environment and the heavy influence human activity has on it (IPCC, 2018; Hoekstra & Wiedmann, 2014; Stern, Sovacool, & Dietz, 2016), it is urgently necessary to reflect on how to meet the Paris Climate Agreement and enable a prosperous life for everyone on the planet, in the present as well as in the future. Fundamental transformations are needed in order to keep earth’s climate stable and prosperous human societies possible (O’Brien, 2018; Steffen et al., 2018).

This includes major transformations in the *practical sphere*, i.e. specific actions like reduced meat consumption; in the *political sphere*, i. e. systems, structures and institutions like the energy system or economic system; and in the *personal sphere*, i.e. the set of values and worldviews that define individually and collectively what is imaginable and desirable, e.g. the understanding of what constitutes the good life (O’Brien, 2018). In other words, stabilizing the earth climate in the Anthropocene calls for profound changes in technologies, institutions, values, the current socioeconomic system, and—somewhat influenced by all of the former—consumption behaviour, especially among consumers with high per capita income and consumption (Steffen et al., 2018). This thesis thereby takes the ontological stance that the gap between large-scale structural changes and private decision-making might be smaller in practice than in theory, and seeks to verify this stance via an in-depth analysis of consumption behaviour. Individuals as consumers can take their share of responsibility for reducing carbon emissions and pressure on other parts of the Earth System through private lifestyle changes, and one specific way to enable such changes is researched here.



## 1.2. (Sustainable) Consumption in the Anthropocene

Understanding how exactly humans are exerting such pressure on the environment is as important as specifying clearly the environment's current state. Consumption behaviour, defined as the 'purchasing, using, evaluating and disposing of products and services' (Schiffmann, Kanuk & Hansen, 2007, p. 2) in order to fulfil needs and wants, can give a lead. Household consumption accounts for approximately 60 % of global greenhouse gas emissions and 50–80 % of total land, material, and water use (Ivanova et al., 2016). A significant portion of these emissions is linked to products imported through international trade, as a large volume of consumer goods consumed in Western countries is produced abroad. Hence, even the widely reported (albeit recently reversed) reductions of greenhouse gas emissions by developed countries has been achieved in part by placing the environmental burden of their consumption needs in developing countries (Hertwich & Peters, 2009; Tukker et al., 2016). But, when accounting for such consumption-based emissions, it becomes clear that the extent of pressure put on the global environment varies between countries, with more affluent countries putting consistently more pressure than less developed countries (Tukker et al., 2016, Reisch & Scherhorn, 1999). Income has been identified as the most important predictor of a region's carbon footprint (Diana et al., 2017) and individual's environmental impact, with a positive relationship between income and especially high-impact energy behaviours (Moser & Kleinhüchelkotten, 2017).

Moreover, previous research has demonstrated that technological advancement is a necessary (Duan, Zhang, Fan, & Wang, 2017) but not sufficient condition for emission reductions (Bjørn et al., 2018). All efficiency gains are in vain if actual consumption patterns and therefore energy demands are unchanged or actually increase – the so-called rebound effect (Gillingham, Rapson, & Wagner, 2016; Santarius, Walnum, & Aall, 2018). Rebound effects occur first and foremost when efficiency improvements lead to cost savings, which then in turn fuel an increase in consumption (Sorrell, 2015).

Rebound effects can occur at the micro-level, i.e. consumer reactions to energy efficiency improvements (e.g. increased consumption) and at the macro-level, i.e. the impact of energy efficiency improvements on a country's economic growth (e.g. rebound effects on overall energy demand) (Santarius & Soland, 2018). The latter is also expressed in the differentiation

between absolute and relative decoupling. Relative decoupling means that for every single unit of growth that is produced in an economy (e.g. indicated as an increase in GDP), the amount of resources needed for and emissions released through that growth is decreased. Absolute decoupling implies that the total amount of material throughput and carbon emissions of an economy is reduced, independently of the extent of growth (Andreoni & Galmarini, 2012). As long as world economies are growing, relative decoupling does not promise to lead automatically to absolute decoupling. On the contrary, research of five environmental pressures (greenhouse gas emissions, energy use, material use, water consumption and land use) shows that on a global scale decoupling only occurred in relative but not absolute terms in the period between 1995–2011 (Wood et al., 2018). Other authors doubt all together that growth in GDP can be decoupled from growth in material and energy use (Ward et al., 2016). At the micro-level, one example for rebound effects can be fuel-efficient cars, which make traveling cheaper and thereby potentially encourage travelling more or spending the saved money otherwise on consumer goods. In Denmark, for example, the per capita carbon footprint between 2000-2011 remained stable despite changes towards energy efficient light bulbs, less energy using appliances etc., mainly due to increased consumption (Bjørn et al., 2018).

In summary, it can be concluded that any sustainable development so far, which mostly has been focused on efficient technology (e.g. energy-efficient appliances) or sustainable innovations (e.g. bio-economy, digitalization) (Creutzig et al., 2016; Dietz, Gardner, Gilligan, Stern, & Vandenberg, 2009), has failed to set the right path. This is mainly due to increases in demand causing rebound effects and rising consumption classes worldwide (Jackson, 2016; Kharas, 2010; Martínez-Alier, Pascual, Vivien, & Zaccai, 2010). The extent to which both causes can be remedied solely by more efficient technology in the future is uncertain. From a consumption-based perspective, there is an urgent need to deliver further changes that enable a rapid carbon and material reduction.

#### *1.2.1. Sustainable consumption defined*

One research tradition trying to answer how to deliver this need is the research field of sustainable consumption (Reisch, Cohen, Thøgersen, & Tukker, 2016). Sustainable consumption, a comparatively young (Chappells & Trentmann, 2015; Liu, Qu, Lei, & Jia, 2017) and interdisciplinary research field, is informed by environmental sociology, behavioural

economics, political science, anthropology and more (Middlemiss, 2018), each contributing its own perspectives and questions about sustainable consumption. One defining aspect of sustainable consumption is the lack of consensus on a definition of the term (Geiger, Fischer, & Schrader, 2018), as it ‘more often is used as an umbrella term’ (Mont & Plepys, 2008, p. 532), e.g. for issues of human rights or consumer health and safety (Liu et al., 2017). Sustainable consumption research’s aim can be defined as to understand the effect consumption has on the environment or on other people now and in the future and how these effects can be avoided by promoting different ways of consuming (Middlemiss, 2018; Reisch et al., 2016). It has been suggested that such sustainable consumption can only take place in consumption corridors, both on individual and collective levels, whose borders are defined by a minimum standard for a good life and a maximum possibility given through planetary boundaries (Di Giulio & Fuchs, 2014; Leach, Raworth & Rockström, 2013). From a broader perspective, sustainable consumption also ‘encompasses the dynamics of consumption and production systems with respect to power relationships, political dimensions, and governance’ (Reisch et al., 2016, p. 235).

Within sustainable consumption, two main strategies are discussed: sufficiency and efficiency, or in other words ‘less and different’ (Reisch & Scherhorn, 1999). In their basic definitions, sufficiency targets at reflecting on consumption patterns in general, asking questions of how much is enough and advocating a general decrease in the level of consumption. Efficiency, or ‘green growth’ (Lorek & Spangenberg, 2014), on the contrary, aims at resource productivity and improving current products and production technologies in order to reduce the material throughput associated with them. Consistency can be named as one additional strategy, which aims at replacing environmentally harmful processes with processes compatible with nature (Huber, 2000).

Both sufficiency and efficiency are part of sustainable consumption, but the latter has gained a primary role in politics and with industry and business in the past (Fuchs & Lorek, 2005; Huber, 2000). The former, however, has been coined a ‘difficult topic’ (Reisch et al., 2016, p. 238) and found to be ‘very unpopular within political discussion’ (Spengler, 2018, p. 17). As a result, the latter is understudied both conceptually and empirically.

### *1.2.2. Sufficiency and strong sustainable consumption*

In a world where consumption has moved beyond merely serving human needs (Shaw & Newholm, 2002), sustainable consumption with efficiency and green growth as its focus falls short of offering a path to the required broad-scale changes (Lorek & Spangenberg, 2014). Critiques increasingly note that meaningful changes in consumption behaviour cannot be reached by so-called ‘green consumerism’ or single green consumption decisions, which build on similar materialistic values as traditional consumption (Akenji, 2014; O’Brien, 2015). Instead, broader systemic shifts away from continuous consumption, consumers culture and consumption lifestyles are necessary, i.e. sufficiency strategies (Jackson, 2016; Brown & Vergragt, 2016; Capstick, Lorenzoni, Corner, & Whitmarsh, 2014; Chatzidakis, Larsen, & Bishop, 2014). Such an understanding of sustainable consumption would be less prone to rebound effects and instead create a vision of the good life that is less dependent on material throughput. Conceptually, the idea is in line with so called strong sustainable consumption, which postulates that overall consumption levels need to decrease (Lorek & Fuchs, 2013). This approach furthermore connects questions of sustainable consumption with the good life and human well-being in such a way that it acknowledges the role basic consumer goods, such as food or housing, can have for fulfilling human needs. Above and beyond a certain level of economic prosperity, however, more economic growth and material possessions do not necessarily lead to higher well-being (Jackson, 2016; Oishi & Kesebir, 2015; Roberts & Clement, 2007; Roster, Ferrari, & Peter Jurkat, 2016). Based on this consideration, the aim should be to reduce resource use in those areas that fail to contribute substantially to well-being, e.g. the consumption of discretionary products in wealthy countries, and use existing resources for consumer segments with the highest marginal utility, e.g. through raising living standards in developing countries.

This thesis proposes that reducing clothing consumption constitutes one example of such strong sustainable consumption or sufficiency. Reduced consumption constitutes an environmentally friendly behaviour, and paves a promising avenue towards the development of sustainable societies (Capstick et al., 2014; Clayton, Devine-Wright, Stern, et al., 2015; García-de-Frutos, Ortega-Egea, & Martínez-del-Río, 2016). Different research traditions have dealt with the topics closely related to sufficiency and strong sustainability, and selected main concepts are named briefly in the following. Reduced consumption has been studied using multiple terms by various

scholars, some of them referring to at least overlapping phenomena (Chatzidakis & Lee, 2013). Prominent examples are e.g. consumer resistance (Cherrier, Black, & Lee, 2011; Nepomuceno, Rohani, & Gre, 2017), anti-consumption (Chatzidakis & Lee, 2013; Iyer & Muncy, 2009), voluntary simplicity (Shaw & Newholm, 2002; Zamwel, Sasson-Levy, & Ben-Porat, 2014) or de-growth (Asara, Otero, Demaria, & Corbera, 2015).

### 1.3. Empirical context: clothing as a particular consumer good

Clothing is the selected research context for this thesis due to two reasons. Firstly, the focus of the project funding the research for this PhD is on clothing; hence a direction was preset. Above and beyond this reason, secondly, clothing is an internationally traded consumer good with high relevance for environmental and social issues (Wiedmann & Lenzen, 2018). Moreover, it is a discretionary product and paramount example of overconsumption (McDonagh & Prothero, 2015) and the material culture that has fuelled it (Crane & Bovone, 2006).

Clothing, or the more complex act of dressing ‘in fashion’, is an inherent part of our culture and everyday life. On a daily basis, consciously or not, we make clothing decisions not only to protect our body from rain and cold, but also to express individuality, communicate meaning and meet social and situational requirements in all different kinds of contexts (Crane, 2000; Van Der Laan & Velthuis, 2016). Clothing items are consumed in vast amounts: 46 % of young female consumers buy clothes at least monthly (Farsang et al., 2015). Research across Germany, Poland, Sweden and the United States found that consumers buy on average 5.9 pieces of clothing in a three-month period (Gwozdz, Nielsen, & Müller, 2017). A steady increase in clothing items produced and consumed along with the establishment of fast fashion as a widespread and successful business model was observed over the past few decades (Kim, Jung Choo, & Yoon, 2013; Lueg, Pedersen, & Clemmensen, 2015). Fast fashion is characterized by a large number of items available in stores for low prices. These items change frequently to go with fast-changing fashions, stimulating demand and motivating consumers to buy more (Gupta & Gentry, 2018). More recently, e-commerce (Blázquez, 2014), social media platforms like Instagram or Facebook (Hyseni, Brown, & Gannon, 2015). and phenomena like so-called ‘influencers’ (Wiedmann, Hennigs, & Langner, 2010) and ‘ultra-fast fashion’ with even shorter times from design to the customer are trends further fuelling increased sales in the clothing sector. This trend is reinforced as markets respond to the demands of a middle class that is

growing around the world. A worldwide increasing middle-class with disposable income and as a consequence thereof expanding markets outside the West (Kharas, 2010; Robison & Goodman, 1996) as well as growing online access and smartphone ownership are reinforcing the trends in fashion (Chaudhuri & Kumar, 2015).

While being one of the most culturally significant consumer goods and one of the most important economic sectors in many developing countries (Dicken, 2015), fashion and its related clothing industry is also one of today's most polluting and socially unjust industries. Food, housing and mobility are generally identified as the three consumption areas with the greatest environmental impact (Hertwich & Peters, 2009; Ivanova et al., 2016; Reisch, Eberle, & Lorek, 2013), but their relevance varies across different types of environmental impact indicators, and other consumption categories can have higher impacts for certain footprint indicators. For land and water use, for example, clothing and footwear have the second highest impact directly after food (Ivanova et al., 2016). Additionally, the most rapid growth in footprints can be found in clothing, with the material footprint doubled, water footprint increased by 50% and carbon footprint increased by 20% since 1995 (Wood et al., 2018). Cotton requires large amounts of water to grow, and the production of synthetic fibres like polyester requires large amounts of energy (Roos, Sandin, Zamani, Peters, & Svanström, 2017). Further, pesticides and chemicals used during the production process pollute local ecosystems in the producing countries (Holmquist et al., 2016; Choudhury, 2014).

The clothing industry is growing rapidly, especially in developing countries. To a large extent, this industry employs unskilled or semi-skilled women, ethnic minorities and other vulnerable members of the society under what can be described as sweatshop conditions (Dicken, 2015). Issues of long working hours, unsafe working conditions, child labour, payment well below the minimum wage and denial of labour rights are among the most pressing issues (Dickson, Loker, & Eckman, 2009). Radical reform of this industry is thus important both as a component of a coordinated global response to the threat of climate change and, more directly, in order to create globally just systems of production and consumption. A reduction of the environmental and social impacts caused by clothing production is urgently needed and has to be a shared effort across countries and markets.

It can be concluded that two main characteristics of clothing make it an interesting subject for the study of reducing consumption. Firstly, clothing consumption is related both to environmental pressures that should be reduced, and to social issues that should be contested. Secondly, clothing is a discretionary product and, above and beyond a certain amount of clothing for physical protection, not necessary for survival. In this light, the volume of clothing consumed today, especially in Western countries, can be characterized as overconsumption (McDonagh & Prothero, 2015). Both the negative byproducts of clothing production and its discretionary status make it a suitable candidate for the ‘difficult’ (Reisch et al., 2016) approach of reducing consumption, as within clothing it might be considered an easier option than e.g. for food, mobility or housing. Not tested within the scope of this thesis, but potentially relevant, could be a spillover effect from reduced clothing to reduced consumption in other areas that have even higher environmental impacts than clothing.

#### 1.4. Theoretical approach

Since environmental damage is caused by the behaviour of society, organisations and ultimately individuals, it is reasonable to consider ways of addressing the issue at the level of the individual (Clayton, Devine-Wright, Swim, et al., 2015). For this reason, the contributions of environmental psychology to sustainable consumption research form the main basis of analyses in this thesis. The focus in the environmental psychology tradition lies with what can be described as intent-oriented approaches, i.e. the analysis of intentions to behave in more sustainable ways (Geiger et al., 2018). A second focus of environmental psychology is the individual (Steg, van den Berg, & De Groot, 2013). Approaches based on psychological insights can help to describe and predict environmentally friendly behaviours by identifying cognitive, emotional and social factors, which are often in focus, as well as contextual, economic or cultural characteristics that lead to or hinder individual engagement in such behaviours. A third focus of environmental psychology emphasises the design of communication strategies, e.g. for changing public perception of climate change or motivating individuals towards the adaption of sustainable behaviours (Klöckner, 2015). Traditionally to a lesser extent, it can focus on the provision of infrastructure and other structural changes (Steg & Vlek, 2009).

At the same time, however, this thesis acknowledges that many environmental challenges and social injustices can only be tackled by cooperation, e.g. across certain consumer segments,

communities, nations and even across borders (Micheletti & Stolle, 2012). Communities can play a role in fostering sustainable behaviours (McKenzie-Mohr, 2000) and questions of sustainable consumption require a broad-reaching approach, whereby responsibilities are not ‘confined to relationships of responsibilities within one’s own country or community’ (Micheletti, Stolle, & Berlin, 2012). Recent research in environmental psychology has started to acknowledge this collective component of environmental action (Bamberg, Rees, & Schulte, 2018; Fritsche, Barth, Jugert, Masson, & Reese, 2018). Within the scope of this thesis, these topics are discussed on the one hand as a matter of extended identities (McFarland, Brown, & Webb, 2013) and on the other hand from the perspective of group efficiency (Abrahamse, Steg, Vlek, & Rothengatter, 2007).

### 1.5. Research question

The current thesis is guided by one overarching aim, namely to encourage consumers to purchase less clothing items. From this aim, two research questions are derived:

1. Which psychological determinants are related to reduced clothing consumption and are these determinants relevant across different cultural contexts?
2. What are effective strategies to influence these determinants to such a degree that a behaviour change towards reduced clothing consumption happens?

Both research questions are considered in the three empirical papers that are included in the thesis, and each is now described briefly.



## 1.6. Overview of the three research articles

An overview over all studies, their content and the relating papers can be found in Figure 1.

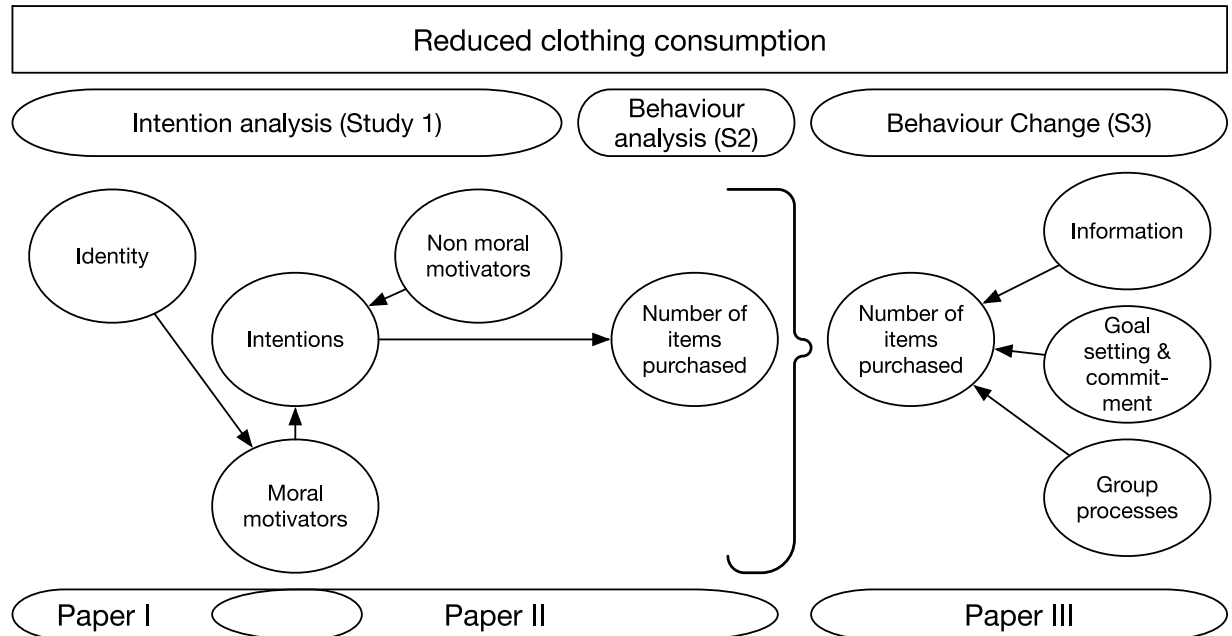


Figure 1 Overview graph depicting the studies and papers of this thesis

### 1.6.1. *Paper I: Personal norms in a globalized world: Norm-activation processes and reduced clothing consumption*

Status: Published in the Journal of Cleaner Production (2019, 212, p.941-949)

Paper one analyzes what leads consumers to reduce their clothing consumption. Building on the norm activation model (NAM), the paper explores the expression of personal norms as well as intentions to reduce clothing consumption. The environmental and social impact of clothing production often takes place far away from the point of consumption and the consumer. This results in the particular condition of psychological distance, i. e. the spatial, temporal and social distances between object and subject of the personal norm. Paper I extends the NAM with the concept of identification with humanity (IWAH), which is the categorization of oneself as part of, as well as a concern for all humanity, above and beyond one's community and nation. It analyzes IWAH's role for generating awareness of environmental and social issues related to clothing production and ascribing responsibility for these issues to one's own clothing

consumption behaviour. The proposed model is tested with a large, diverse sample of 4,123 consumers from four countries – Germany, Poland, Sweden and the United States. These countries were selected because they are the biggest clothing markets in their regions and a high number of items is purchased per capita. By employing structural equation modelling, we found evidence for positive relationships between IWAH and NAM variables. IWAH was found to consist of two components: self-definition and self-investment. The self-investment component is most clearly related to NAM variables. Possible explanations are discussed in the paper. Moreover, the results show that outcome efficacy has the strongest positive relationship with personal norms, which in turn relate to intentions for reducing consumption.

*1.6.2. Paper II: Reducing personal clothing consumption: A cross-cultural validation of the comprehensive action determination model*

Status: under review with the Journal of Environmental Psychology, special issue on cross-cultural environmental psychology (major revision submitted March 2019)

Paper 2 applies a reduced version of the CADM to a) identify psychological variables related to intentions to reduce clothing consumption across four culturally different countries; and b) explore the relevance of these psychological variables for the actual number of items purchased in a two-week period. For these purposes, it uses data from the same large cross-country survey as paper 1, supplemented with data from a 14-day daily diary survey in order to improve the measurement of purchasing behaviour. Participants for the 14-day diary study were recruited from Prolific's British participant pool. Our research design assumes that the underlying psychological processes, which are expressed in relationships between psychological variables included in the CADM, are of basic nature and therefore equal across countries. Based on this assumption, we hypothesize that the relationships between CADM variables, e.g. between personal norms and intentions, are equally strong across countries. However, based on cultural differences between the selected countries, we furthermore hypothesize that the level of each variable differs across the countries. Hypotheses about the qualitative nature of these differences are formulated based on characteristics of the countries' cultures, e.g. value of autonomy and harmony (Schwartz, 2004, 2014) or environmental concern (Inglehart et al., 2014, World Value Survey Wave 5). Generally speaking, we find Germany and Sweden more similar to each other and different from Poland and the US, which also share similarities. Results confirm equally

strong relationships between model variables across countries. In all countries studied, personal norms and social norms are found positively related to individuals' intentions for reducing consumption in the future. The levels of all variables vary across countries, and potential consequences for intervention strategies are discussed. Moreover, the data shows that reduced intentions are related to the actual number of items purchased, in such a direction that higher intentions lead to a lesser number of items bought in the 14-day diary period. But, they only influence the actual number of items purchased to a weak extent.

*1.6.3. Paper III: Think twice – an intervention strategy to reduce personal clothing consumption*

Status: Submission to Global Environmental Change planned for ultimo March 2019

Paper 3 reports the results of an intervention strategy based on the results of papers 1 and 2. In summary, papers 1 and 2 pointed towards the importance of awareness of need, outcome efficacy, personal norms and social norms for the development of intentions to reduce consumption. Paper 2 furthermore pointed towards the potential gap between intentions and actual behaviour and therefore highlighted the need to employ additional strategies in order to induce actual behaviour change. These were implemented in a manner consistent with the recommendations from previous research on stage models of behaviour change and goal-setting theory. Participants in the study were members of the Prolific platform who lived in the United Kingdom and had purchased at least three items of clothing in the previous three months. Out of 525 qualified participants, 397 completed the whole study. In the pre-post-control design of the study, participants were randomly assigned to one of four groups or conditions. One group served as a control condition and three groups as intervention conditions that received different forms of intervention material. Members of intervention condition two received only informational material. Members of intervention condition three also were encouraged to set a personal goal for reduction of clothing. Additionally, they received feedback about the water and carbon savings potential of their goal and were asked to commit to their goal. Members of intervention condition four received the same information and requests as members of group three, but at a group level. They established a group reduction goal and received feedback about the group goal, before committing to meet their personal goal in order to contribute to the group goal. Additionally, the later two groups received advice how to reach their goal based on coping

planning. The intervention input material was provided each Thursday for three consecutive weeks. The number of clothing items purchased and the impact of the intervention input on psychological variables (e.g. social norms, personal norms) were measured in the one-month period before the first intervention input, the one-month period after the third intervention input, and during a three-month follow-up. The main results show a significant reduction in the number of items purchased for both goal conditions (group three and four), but not for the control and information only condition (group one and two), at the one-month follow-up. At the three-month follow-up there was no difference between the conditions anymore, as all groups had reduced their clothing consumption significantly.

## 2. Theoretical framework

The main aim of this research is to evaluate potential pathways towards pro-environmental behaviour, in particular the reduction of personal clothing consumption. To fulfil this aim, this thesis follows a systematic approach of ‘assessing, understanding, and changing environmental behaviour’ (Steg & Vlek, 2009). According to Steg & Vlek, successful and effective behaviour change interventions include four main elements. Firstly, the sought behaviour change must be significantly less harmful to the environment or actually improve environmental conditions (Abrahamse & Matthies, 2013). Secondly, determinants of the desired behaviour must be thoroughly analysed. Thirdly, interventions aimed at changing current behaviour shall be developed with reference to those determinants. Fourthly, the effects of the intervention on both the behaviour and the determinants have to be evaluated. The rationale for our selection of clothing consumption as the specific behaviour to be changed (step one) was discussed in the introduction (see Chapter 1, section 1.3.). The fourth step, how we assessed the intervention effects, is discussed in chapter 3 (section 3.1.3.). Hence, the current chapter mainly provides the theoretical basis for steps two and three.

For step two, the identification of behavioural determinants, a theory-driven approach is essential (Abrahamse & Matthies, 2013). We can refer to a rich tradition of mostly environmental psychology studies that have assessed psychological, social and contextual variables reliably related to pro-environmental behaviour. These studies identify severally potentially relevant variables and theoretical approaches, both as related to environmentally friendly behaviours in general (Bamberg & Möser, 2007; Gifford & Nilsson, 2014; Swim et al., 2009) and as related specifically to sustainable consumption (Jackson, 2005; Wolske & Stern, 2018).

In the first section of this chapter, we introduce the overarching theoretical framework for this research, which is based on the comprehensive action determination model (CADM) (Klöckner, 2013a; Klöckner & Blöbaum, 2010). CADM’s main strength is its integration of previously well-established models of pro-environmental and consumer behaviour, namely the theory of planned behaviour (TPB) (Ajzen, 1991), the norm activation model (NAM) (Schwartz, 1977) and the value belief norm theory (VBN) (Stern, 2000). Following a brief discussion of these

three theories on their own terms, the version of the CADM that served as the theoretical framework for the current work is derived from the single theories' strengths and weaknesses.

In the following section, we explain how we integrate the fundamental collective dimension of environmentally friendly behaviours like sustainable consumption (Fritzsche et al., 2018) in our research. This is realised through two perspectives: collective importance and collective action. The first perspective, collective importance, is described in section 2.2. By adding identification with humanity to our model in Paper I we acknowledge that environmental concerns usually regard socially, spatially and temporally extended collectives (e.g. humanity or future generations).

In the last section (section 2.3.), the potential of the CADM to explain behaviour and induce behaviour change is critically reflected and the stage model of self-regulated behaviour change (Bamberg, 2013b) as well as further strategies for behaviour change are introduced. One of these strategies comprises the second perspective of the collective dimension of environmentally friendly behaviours, collective action. By adding a group treatment condition we acknowledge that environmental problems only can be solved as work of collectives (e.g. neighbourhoods, national goals or supranational collaborations).

## 2.1. The comprehensive action determination model

In the following, the CADM as main theoretical framework for the current thesis is introduced. Firstly, the three theories that are the building blocks for the CADM are presented briefly. Thereby, a special focus lies with the explanation of the single variables included in each model, as the meaning of each variable is identical in the single models and the CADM. A general overview over all constructs included in the theoretical framework of this thesis can be found in Table 1. Afterwards, empirical results from previous research applying the CADM are reviewed and its application in the context of this thesis is explained. The proposed theoretical framework for this thesis is depicted in Figure 2.

### *2.1.1. Theory of Planned Behaviour*

The theory of planned behaviour (TPB; Ajzen, 1991) seeks to predict human intentions and volitional behaviour across different situations. It has proven to be applicable in different

environmentally friendly consumption contexts in different countries, e.g. purchase of green products (Yadav & Pathak, 2016), adoption of hybrid electric vehicles (Wang, Fan, Zhao, Yang, & Fu, 2016), food consumption (Tanner & Kast, 2003; Robinson & Smith, 2002) or recycling (Pakpour et al., 2014; Ramayah, Lee & Lim, 2012). According to the theory the intention to perform (or not to perform) a specific behaviour is a direct predictor of performance (or not) of the behaviour (Ajzen, 1985): the performance of a behaviour is more likely when intentions to perform it are stronger (Ajzen, 1991).

Intentions are individual decisions to perform a certain behaviour (Sheeran, 2002) and are based on rational weighing of three underlying motivational factors: favourable or unfavourable attitudes towards the behaviour; perceived social pressure to perform the behaviour (which are referred to as subjective norms); and perceived control over the behaviour (Ajzen, 1991; Klöckner, 2015). Among these, only the latter also has a direct influence on performing a specific behaviour. Perceived behaviour control is a proxy for actual volitional control and can relate to external factors, yet it is important to note that some authors disagree that perceived behaviour control reflects actual control (Carrington, Neville, & Whitwell, 2010). It differs conceptually from self-efficacy, which relates to individuals' beliefs in their own capabilities, e.g. in regard to managing certain events. Self-efficacy can take the form of general beliefs of one's capabilities or beliefs of personal efficacy with regard to certain contexts or behaviours (Armitage & Conner, 2001; Bandura, 1992). Subjective norms can be divided in two components. These are injunctive norms, i.e. expectation of others, and descriptive norms, i.e. behaviour of others (Ajzen, 2011; Robert B. Cialdini, Reno, & Kallgren, 1990; Fishbein & Ajzen, 2010). The TPB assumes that the more one's personal attitudes and relevant other persons are in favour of a specific behaviour, and the higher perceived control over the behaviour is, the stronger is the intention to perform the behaviour. The relative influence of attitudes, subjective norms and perceived behaviour control thereby differs from behaviour to behaviour and situation to situation.

Table 1 Overview over variables and determinants as proposed by the CADM

Construct	Explanation
• Behaviour	A specific behaviour in question, e.g. reducing clothing consumption
• Intentions	Plan or personal instruction to perform the specific behaviour, measured e.g. with 'I intend to do X'
• Attitudes	Positive or negative beliefs about the behaviour; not all beliefs a person holds about a behaviour are activated in every situation
• Social Norms	Social pressure towards the behaviour, i.e. descriptive norms (what other people do) and injunctive norms (what other people expect one to do); similar to subjective norms in the theory of planned behaviour
• Perceived behaviour control	Perceived abilities, opportunities and resources to enact the behaviour often reflect the perceived difficulty or simplicity of the behaviour; theorised as a proxy for actual control that, when low, weakens the intention-behaviour link
• Personal norms	A feeling of moral obligation, which needs to be activated in a given moral situation in order to determine behaviour
• Awareness of need	Awareness that there is an e.g. environmental or social problem related to a current behaviour
• Ascription of responsibility	Includes both concepts, awareness of consequences and ascription of responsibility, acknowledgement that one's current behaviour contributes to the problem and acceptance of one's responsibility for the negative outcomes of one's behaviour
• Outcome efficacy	Perceived efficacy of the new behaviour to mitigate and reduce negative outcomes of the current behaviour
• Habits	Automatized behaviours, developed over time through repetition of behaviour in specific contexts; more relevant for frequent than infrequent behaviours; definitions of 'frequent' and 'infrequent' are contested

The TPB makes an important contribution to identifying variables relevant for explanations of intentions and behaviours, but it has been criticized for failing to include other relevant variables. Multiple studies have shown the benefit of including additional variables in explanations of variance in intentions and behaviour, especially in the environmental domain (Han & Stoel, 2017). Such additional variables are e.g. environmental concern or environmental knowledge (Wang et al., 2016; Yadav & Pathak, 2016) and personal norms or felt moral obligation (Chen, 2016; Harland, Staats, & Wilke, 1999; Roos & Hahn, 2017), whereby



especially the latter have proven to be a valuable addition to existing TPB variables. Variables explaining the emergence of personal norms are incorporated in the norm activation model (NAM) (Schwartz, 1977) and will be introduced below.

### *2.1.2. Norm Activation Model*

The NAM was originally developed in the context of pro-social behaviour with an explicit focus on the role of personal norms. According to the NAM, activated personal norms, expressed in feelings of moral obligation, are the driving force for pro-social behaviour. Important for the activation of personal norms in a given situation are four situational factors and two personality trait factors (Harland, Staats, & Wilke, 2007). These are awareness of need, awareness of consequences, situational responsibility, efficacy, ability and denial of responsibility. Most empirical works within the environmental domain focus on only two factors – awareness of need and ascription of responsibility. Awareness of consequences in the original sense often overlaps with ascription of responsibility and the two labels often are used interchangeably (Klößner, 2015), which is the case also in this research. The logic is that a person a) has to be aware of a person in need or an existing problem (awareness of need); b) has to be aware of the potential consequences of his or her behaviour related to the need or problem (awareness of consequences); and c) accepts a certain responsibility for these consequences (ascription of responsibility<sup>3</sup>).

The NAM was explicitly developed to explain pro-social behaviour, but repeatedly has been applied within the environmental behaviour domain. Environmentally friendly purchase behaviour can be understood as a form of pro-social behaviour, because it benefits others and often creates individual costs rather than direct individual benefits for the consumer (De Groot & Steg, 2009; Eisenberg & Miller, 1987). Prior studies beginning with this assumption provide evidence that the NAM is a valuable theoretical framework for the prediction of a range of pro-

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<sup>3</sup> The term ascription of responsibility in this context is to be understood as personally accepting responsibility, rather than ascribing it to someone or something else.

environmental behaviours. If individuals are aware of the consequences of their behaviour, those who accept personal responsibility e.g. are less likely to burn waste in their yard (Van Liere & Dunlap, 1978), less likely to litter (Heberlein, 1972), and more likely to accept energy-saving measures or a car-disadvantaging transport pricing policy (De Groot & Steg, 2009). Both factors contribute to an individual's realisation of a situation as normative. Furthermore, the NAM proved to provide robust explanations for e.g. adoption of electric vehicles (He & Zhan, 2018) and a range of different energy behaviours (Van der Werff & Steg, 2015). Awareness of need and ascription of responsibility increase personal norms as feelings of moral obligation to act, which in turn influence behaviour.

#### *2.1.3. Value belief norm theory*

A third model that informs the CADM is the VBN (Stern, 2000; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). The VBN theorizes variables similar to the NAM as relevant for pro-environmental behaviour, but proposes a causal chain: values lead to the formation of an ecological worldview, which precedes awareness of consequences and a perceived responsibility and ability to e.g. reduce environmental threats. This ability influences personal norms, which in their activated form are the basis for pro-environmental behaviours. The VBN model moves from more unspecific, trans-situational and stable values, which are a central part of personality and belief structures (Stern, 2000), to a felt moral obligation and behaviour in a specific situation. It claims that each variable has an impact on the next variable in the causal chain, as well as possibly on other variables further along the chain. This thesis did not adopt this central assumption of the VBN in our theoretical framework. Therefore, the VBN is not further discussed in detail. A more in-depth reasoning for this decision and the version of the CADM used in this research are provided in the next section.

#### *2.1.4. Integrating TPB, NAM and VBN*

For this research, an adapted version of the CADM serves as a theoretical framework. It is depicted in Figure 2. To our knowledge, Klöckner & Blöbaum (2010) were the first to integrate normative and non-normative determinants from TPB, NAM and VBN theory into the 'comprehensive action determination model' (CADM), which has since been published in a new adapted and extended version (Klöckner, 2013a). The CADM takes into consideration the

proposition that normative motivations – as felt moral obligations to perform a behaviour – can interfere, compete with or support non-moral motivational factors, e.g. personal cost-benefit comparisons. It furthermore explains how distal values and normative judgements relate to intention and actual environmentally friendly behaviour in a complex way, mediated through various influencing factors. Above and beyond the TPB variables, personal norms as felt moral obligations to perform a specific behaviour are integrated as direct predictors of intention. Intentions, together with perceived behaviour control, become direct predictors of environmentally friendly behaviour. In line with the TPB, attitudes towards the specific behaviour as well as social norms (which are comparable to subjective norms within the TPB), are further predictors of intention. Learning from the NAM, we understand that personal norms have to become activated in order to have an influence on intention and subsequent specific environmentally friendly behaviour. In line with VBN, these personal norms are predicted by basic values, which first find reflection within more environmentally specific values and an environmental worldview. ‘Values’ do not refer to specific situations and behaviours, but rather to trans-situational personality traits. They do not directly or necessarily lead to a feeling of moral obligation to perform a specific environmentally friendly behaviour in a given situation, but have an influence on the likelihood of becoming aware of the consequences of one’s own behaviour and the ascription of responsibility in a specific context. An awareness of consequences and ascription of responsibility, together with social norms, then activate felt moral obligations towards performing a specific behaviour in question. Mediated through intentions they have an influence on environmentally friendly behaviour. One further characteristic of the CADM is its inclusion of habits as automated behavioural response patterns to cues in stable situations (Klöckner & Matthies, 2004; Verplanken & Aarts, 1999). Habits, together with intentions and perceived behaviour control, have been identified as relevant determinants for environmentally friendly behaviour (Klöckner, 2013a). In the context of this thesis, habits were not applied as determinant of behaviour. Only for Paper II impulsive buying behaviour were conceptualised in a way similar to how Klöckner (2013a) conceptualises habits.

In a theoretical discussion of the CADM the causal chain of variables is postulated like in the VBN theory (Klöckner, 2013b), however in empirical works it is dismissed (Klöckner, 2013a; Klöckner & Blöbaum, 2010). Equally, values as distal determinants for behaviours are sometimes included (Klöckner, 2013a) and other times not (Klöckner & Blöbaum, 2010; Ofstad,

Tobolova, Nayum, & Klöckner, 2017). For this thesis, it was decided to exclude both theoretical components from the theoretical framework. The reason for not including values as distal determinants for behaviour lies within the main aim of the thesis to change behaviour. In order to reach this aim, as explained previously, relevant determinants of the behaviour need to be identified and subsequently targeted. Values, however, are ‘trans-situational goals, varying in importance, that serve as guiding principles in the life of a person or group’ (Schwartz et al., 2012). They are as such not easy to target with an intervention, and therefore not relevant for the final aim of the current thesis. With regard to the causal chain, previous research contradicts this theoretical assumption (Klöckner, 2013a) and it is therefore disregarded in this thesis.

One additional variable that we added to the CADM needs special mention, namely outcome efficacy. It is the degree to which individuals believe they can contribute to a specific outcome, e.g. environmental protection, through their behaviour, e.g. reducing clothing consumption, and as such should be an important determinant for behaviour (Hanss & Böhm, 2010). It is different from self-efficacy, which is the belief that one is capable of showing a certain behaviour (Bandura, 2006) and locus of control, which are individuals’ beliefs about the extent to which events in their lives are caused by themselves or by external powers and circumstances outside their control (Ajzen, 2002). A concept similar to outcome efficacy is perceived consumer effectiveness, i.e. the level to which consumers believe to have an impact on environmental outcomes (Gilg, Barr, & Ford, 2005). Outcome-efficacy was already theorized by Schwartz (1977) to be important for the development of personal norms. With a few exceptions (De Groot & Steg, 2008; Hanss, Böhm, Doran, & Homburg, 2016; Harland et al., 2007), it was however successively removed from the majority of empirical studies applying the NAM. We add outcome efficacy in our theoretical framework as studies including it repeatedly find it to be an important determinant of e.g. personal norms (De Groot & Steg, 2009; He & Zhan, 2018; Steg & De Groot, 2010).

CADM versions similar to our theoretical framework have been empirically tested in the contexts of purchases of fuel-efficient cars (Nayum & Klöckner, 2014), prediction of self-reported recycling behaviour (Klöckner & Oppedal, 2011), installation of wood pallet stoves (Sopha & Klöckner, 2011), and the 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 behaviour at the workplace (Ofstad et al., 2017). A meta-analysis across

various behaviours, e.g. energy use and conservation, car use and willingness to pay for green energy or intention to purchase green products, supports the suggested model (Klößner, 2013a). Based on mostly correlational studies, it is confirmed that intentions are related to behaviour and that intentions are predicted by attitudes, perceived behaviour control, personal norms and social norms. Personal norms are significantly related to social norms, awareness of consequences, ascription of responsibility, values and an environmental worldview.

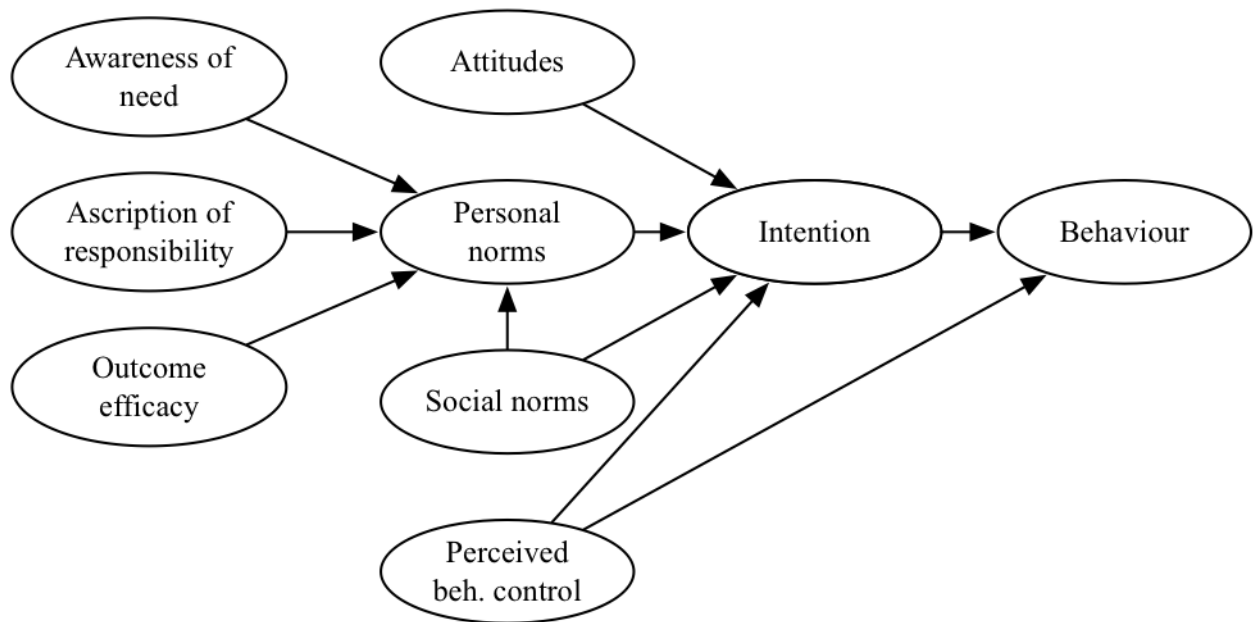


Figure 2 Abridged CDM as proposed for the PhD project

## 2.2. Linking global shared problems and local individual actions: a global perspective on sustainable consumption

Clothing production is a particular example of the global scale of environmental and social<sup>4</sup> problems, as the clothing industry witnessed a huge global shift of production to developing

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<sup>4</sup> Social problems, e. g. unsafe working conditions, payment below minimum wage and violation of workers rights, are not further discussed here. They are, however, equally relevant specifically for the theoretical argument in this chapter, but also in characterising the

countries in the recent past (Dicken, 2015). Heavily environmentally burdensome production has been outsourced to developing countries, where insufficient environmental standards lead to local environmental degradation in the present. Equally, the needs of today's clothing industry in terms of energy, water, land and chemical usage will affect future generations and the environments they will be able to inhabit. But environmental degradation in developing countries, both today and in the future, are distant to consumers in Western countries nowadays. They see advertisement for a vast array of products, yet do not experience and can barely imagine the negative impacts that stem from the production of these products. The resulting distances can be described in terms of space, time, society and uncertainty (Lieberman & Yaacov, 2008). Spatial distance means that the effects of clothing production are physically far away; temporal distance refers to the time between clothing production and appearance of environmental damage; social distance relates to interpersonal dissimilarity or that effects of clothing production are experienced by individuals who are perceived as less similar; and uncertainty refers to a low level of certainty as to whether and, if so, which environmental problems actually are occurring or will arise in the future. Environmental problems in general, and more specifically environmental problems in clothing production, are perceptually distant on all four categories (Spence, Poortinga, & Pidgeon, 2012). Anything that is distant in such ways cannot be directly experienced by an individual and therefore needs mental representation or construal (Trope & Liberman, 2010). In other words, in order to comprehend the potentially negative impacts of clothing consumption behaviour, and to care about acting in line with collective interests, individuals need to have a basic awareness of them acting in a global collective production and consumption network and that their consumption decisions have an influence on others (von Borgstede, Johansson & Nilsson, 2013). This represents the two

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problematic nature of clothing production and consumption in general. It is therefore only for reasons of consistency across this thesis, which is researching ways to limit the environmental burden of clothing, that social problems are not a focus point and the theoretical argumentation build around environmental problems. It needs further thought in how far reduced consumption can help alleviating social problems; see discussion (section 4.5.).

components of the NAM: awareness of need and ascription of responsibility. However, it remains open how some individuals are more aware than others are, or why some individuals seek information and ascribe responsibility for negative outcomes to their own behaviour, while others fail to do so. Two perspectives inform how such a ‘mental connection to those who are or will be threatened’ (Fritsche et al., 2018) is related to felt moral obligations to act and environmentally friendly behaviour, and both will now be discussed.

First is the approach of reducing psychological distance and ‘proximizing’ environmental problems, which previously was found to increase climate change engagement (Scannell & Gifford, 2013) and to be connected to higher levels of environmental concern as well as preparedness to act on climate change (Spence, Poortinga, Butler, & Pidgeon, 2011; Spence et al., 2012). However, while Spence et al. (2012) acknowledge the need to focus equally on the global and local impacts of climate change, Scannell & Gifford (2013) solely focus on ‘localising’ climate change and on impacts for participants’ local areas. A question emerges as to how to reduce psychological distance in circumstances that are inherently spatially distant, e.g. global production. One potential pathway lies within reducing social distance through altered understandings of identity. Identity refers to how individuals see and label themselves (Gatersleben & Steg, 2013). It is formed through processes of self-categorisation and identification, whereby the self is defined in relation to different levels of inclusion: as individuals (personal identity); as members of particular groups (social identity); or, at the highest level of inclusion, as members of the human race (Brewer, 1991). Defining oneself as a member of a specific group leads to ‘in-group’ behavior in favour of the group’s interests (see social identity theory, Tajfel & Turner, 2004 & self-categorization theory, Turner, Oakes, Haslam, & McGarty, 1994). Hence, identification with the most inclusive ‘in-group’ of all humans may contribute to behaviours that serve all humans, such as behaviours that tackle global environmental and social problems.

One psychological concept associated with the notion of a superordinate group of all humans is Identification with All Humanity (IWAH) as the categorization of oneself as part of and with a concern for all humanity (McFarland, Webb, & Brown, 2012). Recent research has refined the concept of IWAH and identified a two-factor structure with the two dimensions self-definition and self-investment (Reese, Proch, & Finn, 2015; Reysen & Hackett, 2016). Self-definition relates to defining oneself as part of the most inclusive group of all humans and group

similarities, and self-investment stands for solidarity and loyalty with and proactive concern for humans all over the world.

People high in IWAH tend to have an increased interest in events and situations that affect humanity as a whole as well as humans in distant places, which should translate into greater knowledge about such events and situations as well as a wish to learn about them. Previous research has found IWAH to be related to such desires as well as to increased actual knowledge of global concerns (McFarland, 2017). The Psychological Sense of Global Community (Malsch & Omoto, 2007), a measure highly correlated with IWAH (McFarland & Hornsby, 2015), was found strongly correlated to a measure of global social responsibility. Devine-Wright, Price & Leviston (2015) found that relatively strong attachment at the global scale (defined as a strong sense of belonging to the area ‘whole world’) relates to an increased belief that climate change is happening and induced by humans. Reysen & Katzarska-Miller, 2013 found global citizenship to be connected to a felt responsibility to take action for a better world. Equally, global belonging was predictor for sustainable behaviours (Der-Karabetian, Cao, & Alfaro, 2014). Together, this research points towards the significance of IWAH for behavioural intentions to act in support of environmental and social issues. At the same time, it shows links between IWAH and the concepts of awareness of need and ascription of responsibility from the NAM. Figure 3 depicts the proposed model, which was the base for Paper I.

Secondly, and somewhat contrary to the ‘proximizing’ strategy, a set of studies failed to consistently show benefits from reducing psychological distance (Brügger, Dessai, Devine-Wright, Morton, & Pidgeon, 2015). Construal Level Theory (Liberman & Yaacov, 2008; Trope & Liberman, 2010) can offer one possible explanation. CLT theorizes that psychological distance determines the level at which mental construal of situations or objects takes place, which in turn influences the type of information that is used to evaluate them. Increased psychological distance is connected to an increase in higher-level construal, which leads to an evaluation of situations and objects in favour of more abstract and generalized principles as compared to low-level construal, which is connected to contextual information. Moral principles are an example of generalized and decontextualized high-level principles. Under circumstances of greater psychological distance, persons are more inclined to base their judgments and decisions on generalized values and moral principles (Eyal, Liberman, & Trope, 2008). This line of research highlights the possible benefits of a higher-level, abstract construal of humanity for



the activation of moral principles. It is important to note, however, that other authors have found a reverse pattern, with moral judgments being more pronounced for low-level construals (Gong & Medin, 2012).

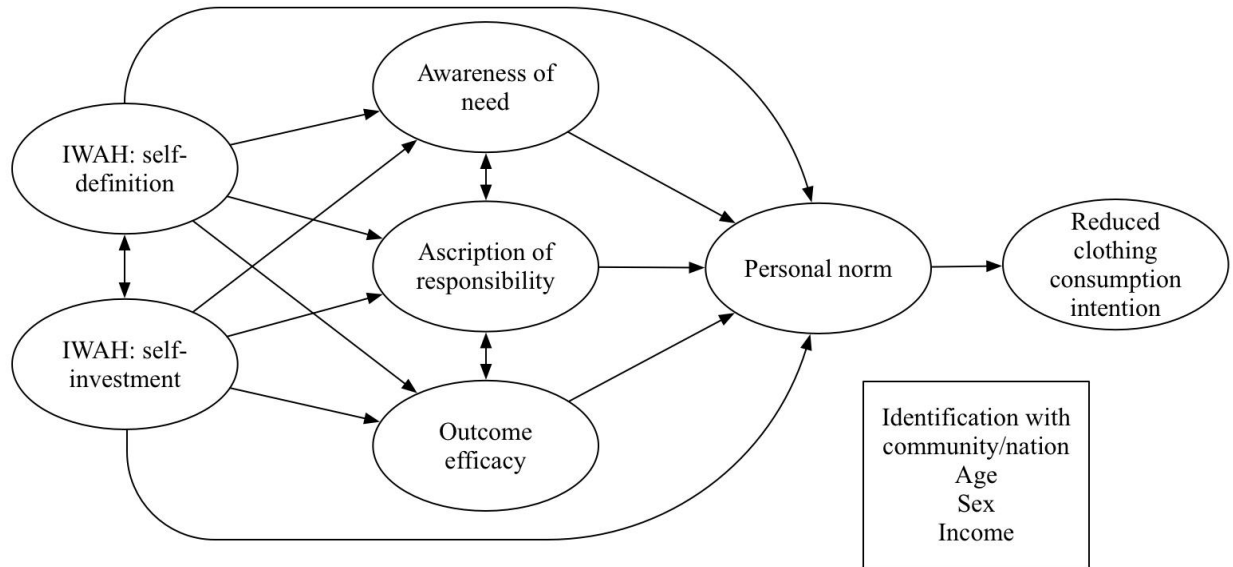


Figure 3 Proposed model including IWAH (see Appendix A, paper I)

## 2.3. From intention to behaviour: theories and strategies of behaviour change

### 2.3.1. *Intention-behaviour gap*

The relationship between intentions and behaviour, or intentions as immediate predictor of behaviour, is one of the core assumptions of the models introduced so far. While the CADM acknowledges that further variables have a direct influence on behaviour (i.e. perceived behaviour control and habits), it still hypothesizes intentions as a central predictor for behaviour. In empirical praxis, however, results have been more mixed and a gap has been identified between intentions and the attainment of goals. Multiple lines of research have referred to this phenomenon as the ‘attitude-behaviour gap’ or the ‘intention-behaviour gap’ (Carrington, Neville, & Whitwell, 2014; Gollwitzer & Sheeran, 2006; Sheeran & Webb, 2016). It should be noted that the CADM to some extent already acknowledges an ‘attitude-behaviour gap’, as it includes a variety of other variables in addition to attitudes as predictors of behaviour. Therefore, ‘intention-behaviour gap’ is the more precise term in the current research context.

Previous meta-analyses have found intentions to explain  $R^2=.22$  (Armitage & Conner, 2001),  $R^2=.27$  (Bamberg & Möser, 2007) or  $R^2=.28$  (Sheeran, 2002) in behaviour across different contexts, whereby the explained variance is lower for objective or observed behaviour as compared to self-reported behaviour. A meta-analysis in the health context confirmed this finding, and further revealed that type of behaviour, age of the sample and other factors influence the predictive power of the TPB (McEachan, Conner, Taylor, & Lawton, 2011). Moreover, Sheeran (2002) shows that a considerable amount of individuals with similar levels of intentions and perceived behaviour control differ in their behaviour. Other studies e.g. in the context of ethical consumption found larger discrepancies between intention and behaviour (Carrington et al., 2010, 2014). Hassan, Shiu and Shaw (2016) found a large variation in explained variance ranging from  $R^2=0.0036$ – $0.84$ , again confirming the difference between self-reported and observed behaviour. A meta-analysis focused on behaviour change and confirmed that medium-to-large changes in intentions and intention strength lead to small-to-medium changes in behaviour (Webb & Sheeran, 2006), further supporting the notion that changes in intentions do not necessarily lead to behaviour change (Sheeran & Webb, 2016).

From a large-scale perspective, between 2007–2017, a vast majority of Europeans indicate that protecting the environment is very or fairly important to them and eight out of ten state that they believe they can play a role in protecting the environment (European Commission, 2017). At the same time, consumption-based emissions have increased between 1995–2008, after which a large drop occurred in parallel to the global financial crisis. Final data reports for after 2011 are not available yet, but preliminary data suggests that the weaker EU economy is a major factor for emission reductions since 2008 and a reversed trend of higher economic growth since 2014 can contribute to emissions increasing again (International Energy Agency, 2018; Karstensen, Peters, & Andrew, 2018). Globally, no decrease in environmental pressure through carbon, material and water footprints can be observed, with ‘the most rapid growth in environmental footprints in clothing and footwear’ (Wood et al., 2018). Therefore, it can be argued that the same gap can be observed in a macro perspective.

Potential reasons for this gap at the individual level are manifold, with problems associated with the measurement of attitudinal variables, intentions and behaviour being one of them. Especially when indicating concern about social and ethical problems related to the production of consumer goods, social acceptability could play a role (Auger & Devinney, 2007), leading to measures of

attitudes and intentions being inflated. Equally, the measurements of intention and behaviour have to match, i.e. have to be at the same level of specificity for the action, target time and context (Ajzen & Fishbein, 1974). E.g., a general intention to behave in more environmentally friendly ways might not correlate with public transport usage. Moreover, rating scales of the importance of single product attributes, e.g. cost or environmental friendliness, have little in common with the complexity of real-life decision contexts, where such attributes often are a trade-off. Decision making as theorized in models like the CADM is isolated from situational factors, which might influence actual behaviour (Carrington et al., 2010). Such factors could include a lack of monetary means or advertising leading to temptations in a given situation. Lastly, multiple studies fail to measure prospective behaviour at a second measurement time point. Often, they only explain the development of intentions (Carrington et al., 2014; Hassan, Shiu, & Shaw, 2016).

In summary, it becomes clear that intentions are an important first step, but do not guarantee behaviour change. Firstly, it is important to measure actual behaviour in a preferably objective way, e.g. via diary logging (Hassan et al., 2016). This methodological solution is further discussed in Chapter 3. Secondly, it is necessary to better understand how the translation of intentions into actions can be explained or even improved. The CADM can be described as a decision or prediction model (Klößner, 2015; Nielsen, 2017). It aims to describe or predict individuals' decisions regarding whether and how to engage in environmentally friendly behaviour. Consequently, it does not describe how behaviour changes. To fill this theoretical gap towards the aim of the current research, to change behaviour towards reduced clothing consumption, the stage model of self-regulated behavioural change as 'the most comprehensive stage model that environmental psychology has to offer at the moment' (Klößner, 2015) is introduced in the next section.

### 2.3.2. *Stage models of behaviour change*

In response to the intention-behaviour gap, Bamberg (2013b) developed the stage model of self-regulated behavioural change (see Figure 4). Based on Gollwitzer's model of action phases (Gollwitzer, 1990), the model predicts that a person needs to pass successfully through four 'time-ordered, qualitatively different stages' (Bamberg, 2013b). In the pre-decisional stage, a *goal intention* is formed. An individual sets a goal, e.g. '*I have the goal of reducing my clothing*

*consumption*'. This goal is conceptually similar to intentions in the CADM. Upon goal formation, the preactional stage is entered, in which a *behavioural intention* is developed. A behaviour intention can be e.g. '*I will not purchase any new items of clothing in the next month*', and its formation marks the transition in the actional stage. In the actional stage, individuals translate their goal into action. This is supported by the formation of implementation intentions, i.e. plans about the when and how of action. This implementation intention is somewhat different in the case of reducing clothing consumption, as it is about proactively avoiding behaviour. Therefore, coping planning is more appropriate, i.e. the prediction of obstacles and plans how to shield goals from such (Sniehotta, Schwarzer, Scholz, & Schuz, 2005). An example for a coping plan would be '*Next time when my friend invites me to a shopping trip I remind myself of my goal and say no*'. Conceptually, there is a close relationship between the concept of implementation intentions and self-regulation strategies for goal attainment (Nielsen, 2017). Finally, the postactional stage is connected to recovery self-efficacy for the case of relapsing back to old behaviours. The stage model of self-regulated behaviour change builds the theoretical foundation for applying further strategies for behaviour change, beyond encouraging intentions, in this thesis. The strategies chosen are discussed in the following section. It is important to note that the intervention in the current research contains three blocks each referring to the different stages. However, in contrast to theoretical assumptions of stage models of behaviour change, the information was not provided tailored to participants' current stage, but the three blocks consecutively provided to participants (see Appendix C, paper III).

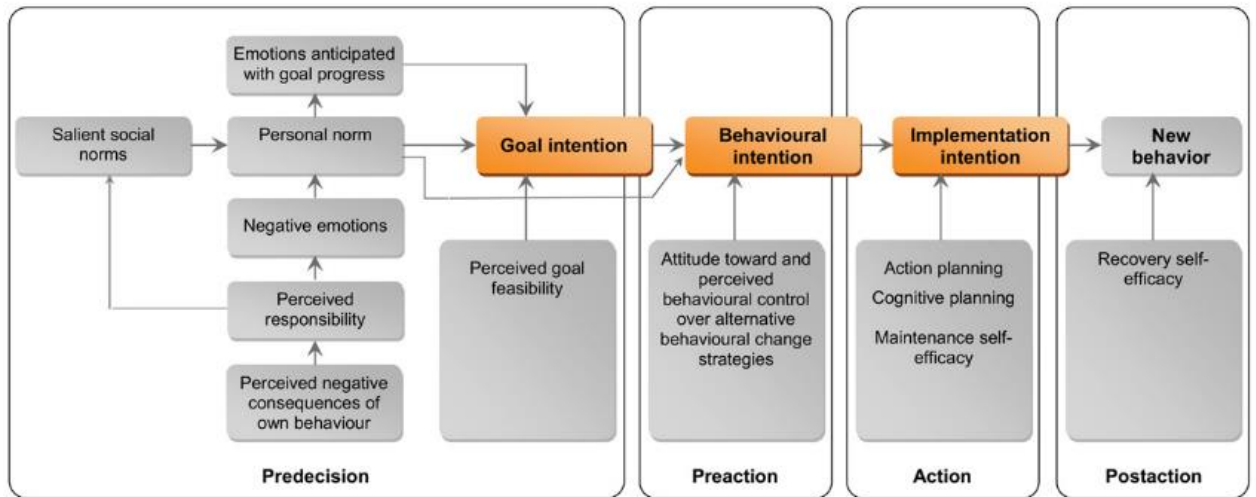


Figure 4 Stage model of self-regulated behavioural change. Reprinted from “Changing environmentally harmful behaviors: A stage model of self-regulated behavioral change,” by S. Bamberg, 2013, *Journal of Environmental Psychology*, 34, p. 153

### 2.3.3. Communication-based strategies for behaviour change

Communication-based strategies matching the predecisional, preactional and actional stage of behaviour change were applied in the current research, each explained in the next sub-sections. Multiple suggestions exist for the classification of strategies for behaviour change, e.g. in antecedent and consequence strategies (Geller et al., 1990), in informational or communication and structural strategies (Klöckner, 2015; Steg & Vlek, 2009) or in convenience, information, monitoring and social-psychological processes (Osbaldiston & Schott, 2012). Antecedent strategies are trying to exert influence prior to the behaviour, e.g. via providing information, while consequence strategies target post-behaviour determinants, e.g. feedback, including rewards and penalties. Both type of strategies are examples for communication strategies, which aim for change at the individual level e.g. by changing attitudes or norms. On the contrary, structural strategies are concerned about changing the context and circumstances in which decisions are made, thereby changing the costs and benefits associated with behaviour through e.g. nudges or increased availability of alternatives. Situational strategies are similar to what Osbaldiston & Schott (2012) call convenience or ‘making it easy’, another example for this category being prompts. In the following, the reasoning for the choice of certain strategies for this thesis is discussed, and these strategies are subsequently introduced.

Generally, structural changes are the strategies of choice for behaviours with high barriers (McKenzie-Mohr & Schultz, 2014; Steg & Vlek, 2009). In the research context of reducing clothing consumption, this seems to be less the case. Behavioural alternatives, e.g. upcycling or swapping old clothes instead of buying new ones, might need specific knowledge or infrastructure. However, purchasing fewer items, which is the target behaviour of this research, generally does not (see high ratings of perceived behaviour control, Appendix A, paper I). The strategies to be employed in this research therefore are chosen from the group of communication strategies. It is important to note that effect sizes of strategies are highly heterogeneous, indicating that strategies working well in one context might not do so in another (Osbaldeston & Schott, 2012). Clear guidance on the ‘boundary conditions’ of each strategy is still missing (Schultz, 2014). Ideally, the strategies chosen have been demonstrated to be particularly effective in changing a specific behaviour. However, no previous research has assessed which strategies are successful for reducing clothing consumption. Drawing on insights from conservation behaviours in other areas, e.g. water, home energy and gasoline conservation, can give valuable first directions. For home energy conservation, tailored information, goal setting and feedback proved to be successful strategies, and a combination of multiple strategies was found to be more beneficial (Abrahamse et al., 2007). Particularly successful across all three behaviours were commitment strategies (Osbaldeston & Schott, 2012). In previous studies, they have been successfully combined with feedback, rewards, cognitive dissonance and goal setting. Given these previous research results, information provision, goal setting, feedback, and commitment were chosen as strategies for behaviour change in the current research, both from an individual and group perspective. The overarching approach here is that intervention strategies (e.g. providing information) aim to change underlying behaviour determinants (e.g. increase awareness of need) and therefore work towards influencing behaviour.

#### *2.3.4. Providing information*

Providing information, e.g. in brochures or TV campaigns, is one of the most often used strategies in praxis. The assumption underlying information provision is that there is a deficit in knowledge about e.g. the environmental problem or possible actions to alleviate it (Abrahamse & Matthies, 2013). Once the deficit is eliminated, people are expected to change their behaviour. The provision of information thus should be able to influence the CADM variables of awareness of need and attitude change, e.g. by providing information about negative effects of

current and positive effects of alternative behaviours; and by providing instructions about how to perform behavioural alternatives most effectively (Klößner, 2015). The first two papers of this thesis show the importance of awareness of need for personal norms, which in turn are related to intentions. Therefore, this strategy was implemented in the research for Paper III. Several earlier studies have shown that providing information alone leads to increased knowledge, but is not successful in changing actual behaviour (Abrahamse & Matthies, 2013; Abrahamse et al. 2007; Abrahamse, Steg, Vlek, & Rothengatter, 2005; Klößner, 2015). This confirms what was discussed above: information is a necessary yet often insufficient condition for behaviour change. Further strategies to translate positive attitudes and intentions into behaviour change are necessary. It should be noted that tailoring information to specific needs of individual persons or groups has proven to be more effective than untailored information (Klößner & Ofstad, 2017). However, due to the focus on further strategies for behaviour change, this technique has not been applied in the research for this thesis.

#### *2.3.5. Goal setting, implementation intentions and goal feedback*

Goal setting is often used in the context of reduction behaviours (Abrahamse et al., 2007; Abrahamse et al., 2005; Klößner, 2015), whereby goals themselves can be understood as similar, if not equal to, intentions or goal intentions as commitments to engage in a behaviour (Bamberg, 2013c; Gollwitzer, Fujita, & Oettingen, 2008). Goals can be set by individuals themselves or externally, but they should always be clearly defined, including their timeframe, and achievable. Specific and concrete goals are more likely to be attained than general ones (Sheeran & Webb, 2016).

As discussed earlier, setting an intention or a goal not necessarily leads to behavioural change, no matter how strong the intention; goal setting is only a first step. In line with Bamberg's (2013) stage model of self-regulated behaviour change, planning with regard to goal achievement, getting started, as well as successfully completing and maintaining goals are further steps. Problems, such as failure to get started or getting distracted, can occur along each step. Therefore, goals are easier to attain when accompanied by so called implementation intentions or if-then plans (Carrington et al., 2014; Gollwitzer et al., 2008), which contain the when, where and how of action to reach a set goal. They define the behaviour that should be enacted to reach one's goal, including the context for when to take action, as well as how to

handle distracting stimuli that might hinder goal attainment. Meta-analytic results indicate a medium-to-large effect of implementation intentions on goal attainment, further supporting the notion that if-then planning increases the likelihood of achieving one's goals (Gollwitzer & Sheeran, 2006). In the current research study, participants were encouraged to express behavioural intentions in the form of a clear goal: how many fewer items they plan to purchase in one month. Additionally, they received information on strategies how to attain their goal by shielding it from potential distractors. They were encouraged to reflect on those strategies in order to form coping intentions. The strategies were based on Nielsen (2017) and contained e.g. avoiding temptations and inhibiting impulses. They are described more in detail in Appendix C (paper III).

Moreover, goal setting often is used in combination with other communication strategies, such as commitment or feedback (Abrahamse et al., 2005; Abrahamse & Matthies, 2013; Klöckner, 2015). As commitment was implemented in full in this research, it is discussed in detail in the following chapter. Feedback mechanisms were applied, too, however only specifically with regard to participant's set personal goal. It was communicated only once, indicating the emission and water saving potential of the set goal. It was not provided on an on-going basis of monitoring goal achievement, and therefore does not correspond to what is usually understood with feedback as a performance indicator in the environmental psychology literature (Abrahamse et al., 2005; McKenzie-Mohr & Schultz, 2014). Rather, it was aimed at supporting an increase in outcome-efficacy, a determinant identified as important for the development of intentions in the first two papers of this thesis. Still, it is referred to this strategy as feedback in the wider sense as it offered participants an understanding of links between certain outcomes (e.g. savings in water consumption and emissions) and behaviour necessary to reach these outcomes (e.g. reduced purchase of a specific clothing item like a t-shirt) (Abrahamse & Matthies, 2013).

#### *2.3.6. Commitment*

Commitments are pledges to show certain behaviours and are often linked to goals (Abrahamse et al., 2005; Matthies, Klöckner, & Preißner, 2006). In order to avoid inconsistencies and cognitive dissonance (Festinger, 1962), individuals are more likely to act if they committed to do so (McKenzie-Mohr & Schultz, 2014). Equally, a change in self-concept is mediating the



relationship between commitment and behaviour (Lokhorst, Werner, Staats, van Dijk, & Gale, 2013). Commitments can be made publicly, or in private, whereby results about higher effectiveness of one or the other are mixed and potentially dependent on the target group and setting (Abrahamse & de Groot, 2013). Meta-analytic results show that commitment effectively influences behaviour, even after interventions in follow-up periods and especially when combined with other strategies (Lokhorst et al., 2013). In this research, participants were asked to confirm their goal and pledged to attain it on a voluntary basis. Commitment was therefore ‘semi-public’, as participants were aware that the experimenter would see it.

### *2.3.7. Promoting pro-environmental behaviour in groups*

Our research results with regard to the collective importance of environmental issues failed to point into a clear direction in how far e.g. IWAH can be used for in an intervention strategy aiming at increasing personal norms and intentions for reduced clothing consumption (see Appendix A, paper I). At the same time, the positive relationship between model variables and identification with community encouraged us to include another perspective of the collective dimension of environmental issues in our research, that of collective action (Bamberg et al., 2018; Fritsche et al., 2018). Within sustainable consumption lies one persistent contradiction. On the one hand, global phenomena emerge from local and individual behaviour. It is individuals’ behaviour, whether on private and household, social group or organisational level, which is largely responsible for environmental damage and the pressure human activity puts on the environment. Therefore, it is also reasonable to address individual behaviour in order to mitigate the problems of climate change (Clayton, Devine-Wright, Swim, et al., 2015). On the other hand, this perspective, while breaking down the responsibility of the individual, disregards the crucial fact that large-scale environmental pressure occurs due to the aggregated impact of individuals around the globe that behave in unsustainable ways (Fritsche et al., 2018). Consequently, collective approaches to behaviour change are worth considering. In this thesis, two main mechanisms are proposed to influence collective action, social norms and collective outcome efficacy (Abrahamse & Steg, 2013; Abrahamse et al., 2007; Bamberg et al., 2018; Staats, Harland, & Wilke, 2004; Steg, 2015); for others see van Zomeren, Postmes, & Spears, 2008. Previous studies e.g. have concluded that social norms constitute a strong motive for environmental behaviour (Biel & Thøgersen, 2007; Cialdini, 2003) and found a combination of social-norm activation and persuasive information to be able to significantly diminish the

intention to buy bottled water (van der Linden, 2015) and increase towel reuse (Terrier & Marfaing, 2015). Feedback on the group level might highlight the collective effort and possibilities for reducing the environmental impact if all cooperate, thereby motivating to contribute to the shared goal (Bandura, 2015). Collective outcome efficacy has been found to be related to group performance (Stajkovic, Lee, & Nyberg, 2009) and to cooperation in social dilemmas (Kerr, 1989). Group feedback at the same time communicates a descriptive social norm in general or potentially a specific group norm, to which members of the group try to adhere once it became salient (Abrahamse & Steg, 2013). The efficiency of such strategies can be readily apprehended in the context of small, meaningful groups individuals identify with, e.g. neighbourhoods or communities. However, true solutions to large-scale problems like climate change can only be found in collective action across nations and borders. This raises question about how to define meaningful groups for collective action for climate change, and links back to the concept and discussion of IWAH.

### 3. Methodology

In order to answer the research questions, three different studies were conducted: a cross-sectional study across different countries (Study 1); a diary-study that measured daily behaviour (Study 2); and an intervention study (Study 3). All three studies were conducted as self-administered online surveys, each with its own time scale and each conducted under different conditions. Study 1 consisted of a cross-sectional design aimed to analyse correlational relationships between all proposed determinants and to find patterns that can be generalized across different demographics and cultures. Study 2 was designed as a panel survey with repeated measurement on fourteen consecutive days, to improve the behaviour measurement for clothing consumption. Study 3 used a pre-test–post-test control group design with experimental manipulations intended to achieve specific changes in consumer behaviour.

At this point, it is important to note that this research was funded by and conducted within the context of the European Horizon 2020 project Trash-2-Cash. This made it possible to seize on many synergies, e.g. in the exchange of expert and practical knowledge as well as in financial and research funding matters. At the same time, the pressure to serve many masters led to alterations of some minor characteristics of the research project. For example, project- and funding-related considerations played a role in the selection of countries. The European funding partner expected the majority of selected countries to be European. Further reasoning for the choice of countries is provided in section 3.2.1. Moreover, each survey conducted for this research contained questions that are not relevant for this research project and therefore are not discussed further.

Online studies were both suitable and convenient. All three studies consisted of closed format questions, and the survey platform Qualtrics was used to program and share the survey with participants of all three studies. Participants, measurements and statistical analysis methods partially overlap across all three studies. For this reason, they are explained across all studies in the following sections. Beforehand, each study's individual procedure is described in separate sub-sections for each study.

### 3.1. Procedure for each study

In the following, the procedure for each study will be explained briefly, including a special focus on the strengths and weaknesses of each study design. First, however, elements common to these three online surveys will be discussed.

The online surveys can collect responses from a large and diverse group of participants (e.g. across countries) at great speed and low cost and, therefore, is most suitable for the collection of large-scale cross-cultural datasets. Unsupervised administration (Bourque & Fielder, 2003) leads to low implementation cost in terms of time and money for each additional respondent; once the survey is developed and programmed into an online platform, it can be conducted with any necessary number of participants without additional cost other than participant compensation. Self-administered online surveys moreover have great flexibility, as participants can decide themselves where and when to answer the questions. Through the closed question format, the answers are coded according to a pre-defined scheme and yield a dataset that is immediately ready for statistical analysis.

While these many advantages make the self-administered online survey with closed question format an attractive research method for collecting large-scale cross-cultural datasets, some weaknesses need to be taken into account. Due to the unsupervised administration and closed question format, there is no possibility for participants to clarify in case a question or answer categories are not clear to them. Moreover, with a closed question format, there is no possibility to access participants' reflections on questions or other possible answers outside the predefined answer scheme. Even with carefully worded closed questions, it can happen that participants have to choose from a pre-set of provided answer categories, which might not always necessarily represent their everyday reality and experiences. Therefore, it is of utmost importance that questions and provided answer categories are easy to understand, meaningful and unambiguous. To this end, all surveys were pretested in a face-to-face setting with non-experts, which is an essential step in the research process in order to 'fine-tune' the survey prior to data collection (Hine, Kormos & Marks, 2016). Any item ambiguities, as well as uncertainties in the survey instructions, were improved based on their feedback. This helped to minimize problems resulting from the above-mentioned disadvantages.

The researcher cannot control the environment in which participants take self-administered surveys, e.g. whether it is quiet and without distractions. In addition, once the survey has been uploaded onto the platform, the researcher loses control over technical circumstances like readability on specific devices and whether everything is displayed as planned. While using Qualtrics as a modern, well-developed survey platform that can adapt well to a range of circumstances helped minimize technical problems, we could only make recommendations to the participants regarding a quiet and undistracted survey environment. Qualitative feedback of participants regarding readability and usability was mostly positive, therefore we conclude that no major technical issues disturbed the data collection.

### *3.1.1. Study 1: Self-administered cross-sectional online surveys and cross-cultural research approach*

Study 1, a self-administered cross-sectional online survey with a closed-question format, was conducted between October 2016 and February 2017. The title of the survey announced that it was about personal clothing consumption. Due to its length, it was split into two parts. Participants could freely decide to come back for the second survey, which they did within 2–4 weeks after the first survey. The large-scale survey across four countries generated data that could be used to analyse relationships between all behaviour determinants as proposed by the comprehensive action determination model and generalize results across countries. While this approach is easily implemented, as it only requires contact with the participants once or twice, it also has one major disadvantage: results are of purely correlational nature and conclusions cannot be drawn about e.g. whether model variables in fact influence the intention to reduce clothing consumption (Hine et al., 2016).

A special characteristic of Study 1 is its cross-cultural nature. Data was collected from Germany, Poland, Sweden and the United States (see section 3.2.1. for country selection). All survey questions were developed in English and translated into the respective country languages by ISO17100-certified translators. Additionally, the translations were proofread by native speakers and discrepancies handled with the translators. While cross-national data requires specific analytic strategies (see section 3.4.2.) it also allows for tests of the generalizability of the proposed model across different populations and yields a more nuanced picture of existing relationships.

### *3.1.2. Study 2: Diary data for improved behaviour measurement*

The diary study was conducted in December 2017. While the surveys were programmed on the Qualtrics survey platform, participants were recruited and handled via Prolific. After an intake survey, which contained a short version of the measurements for all model variables (as proposed by the CADM, see section 2.1.), participants answered a daily survey for fourteen consecutive days. In these surveys, they answered whether they had purchased clothing items or not on that particular day. The answers to the questions in this daily diary study are still retrospective, but the time frame of retrospection has shortened drastically for this study type. While cross-sectional designs with long periods of retrospection might be prone to forgetfulness, participants can surely recall whether they bought an item of clothing during the same day the question is asked. This study is not using the strength of the diary data method to the fullest (e.g. measuring intra-individual changes across time), but rather focuses on its strength to deliver an improved measurement for behaviour. On the negative side, it has to be noted that diary studies are costly in terms of both time and money. Hence, periods longer than fourteen days are difficult to realize, even though they could be beneficial – especially when studying clothing consumption.

### *3.1.3. Study 3: Multiple treatment pre-test–post-test control group design*

Study 3 was conducted from July to September 2018 with a three-month follow-up in December 2018. It consisted of an intervention aiming at reducing clothing consumption. All surveys were programmed on the Qualtrics survey platform, and intervention material was delivered to participants on a website programmed with Squarespace. Participants were recruited and handled via Prolific. In order to test the effectiveness of the three intervention conditions in comparison to a control group, a multiple treatment pre-test–post-test control group design was chosen. We refer to the three groups who received intervention material as ‘intervention’ conditions, and to the group who did not receive material as the ‘control’ condition (Abrahamse, 2016). Participants were assigned to one of the four groups at random. All groups entered specific intervention websites with the same design but different content for each group. The control condition saw a website called ‘Count Twice’ and all intervention conditions saw websites with the same name, ‘Think Twice’, but varying content. The control condition repeatedly counted the number of items purchased just as all other intervention conditions and

answered additional clothing related questions. This was to ensure that it was engaged with the topic of clothing consumption to the same level as the intervention conditions over the intervention period. The intervention condition received material on three consecutive Thursdays (see Appendix C, paper III for details). The material provided comprised written text, videos, graphics and pictures in a modern and appealing design to encourage participants to engage with the content. The pre-test measure recorded the number of items purchased one month before the intervention as well as measures of the CADM behaviour determinants. The number of items purchased was measured retrospectively at the end of two two-week intervals each before the intervention and added up to the 1-month pre-test. The post-test measure collected information about the number of items purchased in the same manner for one month past the intervention. The behaviour determinants were measured directly before and after the intervention. The pre-test and post-test measurements made it possible to observe changes in both behaviour and behaviour determinants. Moreover, the sample for Study 3 partially overlapped with the Sample from Study 2, and the follow-up survey was conducted exactly the same day as the intake of the diary study in 2017 (see 3.1.2.). This way we are able to compare participants clothing purchases in the same time three-month period across two years, with the intervention between both measurements.

Using a pre-test–post-test control group design with random assignment to the groups, we can conclude with certain confidence that the systematic variation in the intervention material is causally related to any variation we find for behaviour and behaviour determinants (Shadish, Cook, & Campbell, 2002). Yet, certain threats to internal validity, i.e. to the conclusion that it actually was the intervention that led to changes in the outcome variables, exist (Abrahamse, 2016). One example is historical events occurring outside of the intervention at the same time to the intervention, and which affect both intervention and control groups, e.g. weather conditions or political developments. If not somehow measured separately such effects are difficult to distinguish from effects of the intervention on the target behaviour and variables. Similarly, so called ‘testing’ can cause a change in post-test measurements. It refers to the effects that occur due to filling out the pre-test survey. Participants might score higher on e.g. awareness or norm items on the post-test survey only due to remembering the questions from the pre-test survey. In other words, repeatedly asking participants whether they perceive a moral obligation to act upon environmental problems in the clothing industry already might lead to higher agreement to such

questions. One way to attenuate testing effects is by choosing long enough timespans between the pre- and post-measurement, but there is no clear guidance in literature what constitutes a long enough timespan (Abrahamse, 2016). In our study, the timespan between pre- and post-measures of behaviour and behaviour determinants was two weeks and three months for the follow-up, respectively.

### 3.2. Participants

The marketing research company Qualtrics accomplished the recruitment and handling of participants for Study 1 in cooperation with its panel partners, for Studies 2 and 3 our research group did both recruitment and handling autonomously, using the research panel provider Prolific. Prolific connects researchers with potential participants of all demographics, while the researcher retains control over the whole research process (including setting quotas, communication with participants etc.). All participants received monetary compensation for their participation.

The aim of Study 1 was to analyse correlational relationships between all constructs and to find patterns that can be generalized across different demographics and cultures. The target population for Study 1 therefore consisted of residents from countries selected based on difference from one another: Germany, Poland, Sweden and the United States. As mentioned above, the selection of these countries was partially based on practical considerations related to funding opportunities. The sample of Study 1 is ‘almost’ representative with regard to sex, age, income, education and region respectively for each country. The survey in Study 1 had to be split into two parts, as it was too long to complete at once. As a result, there was a self-selection bias regarding participants who chose to return to complete the second half of the survey. Whereas respondents to the first half of the survey (N = 10,363) was perfectly representative with regard to the above-mentioned demographics, respondents to the second half (N = 4,591) disproportionately female (57 %). In addition, we chose to restrict the target group for Study 1 to participants between the ages of 18–65, reasoning people under 18 might not be in charge of clothing purchases, and that it is difficult to assemble representative samples as age increases. As a result, the mean age of Study 1 respondents, 42.2 years, is somewhat higher than the mean age of the general population



The population of interest changed over the course of the PhD project. In contrast to the first study, Study 2 aimed to refine the measurement of behaviour and Study 3 sought to apply previous results to actually change behaviour. For these purposes, not a cross-sectional but a panel design is necessary. Access to participants who are willing to participate in multiple study parts across several days or weeks is more difficult and costly than recruiting participants for a single cross-sectional survey study. Prolific emerged as an affordable panel provider that was able to reliably serve the specific requirements of Study 2's and 3's research designs. For both studies, it was decided to choose residents of the United Kingdom as the target population. The age group again was limited to participants between the ages of 18–65. Due to the elaborate research design, which required participants to partake repeatedly in surveys, it was not possible to strive for a representative sample. Instead, all participants who were willing to participate in multiple study parts and reliably did so were selected for inclusion. The final sample for Study 2 consisted of  $N = 594$  participants with a mean age of 37.4 years and females are overrepresented at 71 %. For Study 3, a similar sample emerged with  $N = 397$  participants, a mean age of 37.7 years and women overrepresented at 68 %.

### *3.2.1. Country selection*

For Study 1, Germany, Poland, Sweden and the United States were selected as target populations, for Study 2 and Study 3 the United Kingdom. Apart from the framework set by the funding project as explained in the beginning of this chapter, the country choice is based on three main theoretical and three practical considerations.

From a theoretical perspective, firstly, reducing consumption can first and foremost only be a goal for affluent Western societies. We therefore chose countries with a big clothing market, high per capita consumption of clothing items or a projected big growth in annual sales. Understanding the psychological processes behind reduced clothing consumption for these big markets provides a solid base on which to develop intervention strategies for changing behaviour. The possible impact of such strategies is high, as both the country populations and the reduction potential per capita are large. For more detailed information on the clothing markets in each country see Appendix C (paper II). Secondly, by identifying differences and similarities in what otherwise might be considered broadly similar countries, we offer important inputs for what to emphasize in intervention strategies in given cultural contexts (Boehnke et al.,

2011). 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).

Equally, two practical considerations had to be taken into account in line with the three above-described theoretical considerations. Firstly, China and India, for example, are big clothing markets with high projected growth rates and therefore would be suitable as target countries for the current study. Moreover, calls for broadening psychological research perspectives beyond the ‘WEIRD’ (Western, educated, industrialized, rich and democratic) populations have recently been voiced in all areas of social science research (Henrich, Heine & Norenzaya, 2010). However, all theories and psychological constructs this thesis is building on were developed in a Western context. Their applicability in other, significantly different cultural contexts has neither been tested nor can be simply assumed. While this certainly is a gap of utmost importance in current research, it is outside of the scope of the current thesis to address this. To ensure the applicability of the selected constructs, countries from a Western cultural sphere were selected. Secondly, the choice of countries was limited due to the design of each study and its feasibility in context. The standard cross-sectional design of Study 1 meant that it was comparatively easy and affordable to translate survey items into different languages and gain access to potential participants from different countries through standard marketing research institutes. These institutes and their panels, however, were not intended to serve the needs of multiple repeated measurement designs. Prolific is one of only a few platforms capable of realising such research designs, and the biggest population by far on Prolific is in the United Kingdom. Moreover, the more complicated nature of Studies 2 and 3 meant that a translation of all items and content in different languages was not possible and a selection of a single country had to be made. Therefore, Studies 2 and 3 have the United Kingdom as the target population.

Taking all theoretical and practical considerations together, the following countries were chosen for the research in the current PhD project: Germany, Poland, Sweden, the United States and the United Kingdom.

### *3.2.2. Online panel participants and potential biases*

As all three samples consisted of participants from online panels, who took part in the studies for monetary compensation, we would like to reflect shortly on potential biases that could occur in such a setting. Panels from e.g. market research institutes routinely provide samples for large-scale self-administered online surveys. Such panels have many advantages, e.g. easy access to a large and heterogeneous group of participants globally or easy implementation of quotas to collect samples representative with regard to key demographic variables like age, gender, occupation, income and region. Beyond these key variables, however, the extent to which panel samples are truly representative is not well researched. Weinberg, Cummins, Webb & Gwozdz (2018), for example, found significant differences in subjective well-being in otherwise demographically equal online panel data, compared with data collected face-to-face in Australia, Germany, Sweden, the Netherlands, the UK and the USA. It is therefore important to acknowledge that individuals who choose to participate in online research activity might share attributes other than age, income and so on, and thus that selecting samples according to demographic criteria does not ensure complete representativeness with the general population.

We now review a selection of additional biases that can lead to non-representativeness of online panels. Most of these biases extend to communities beyond online panel participants, but are discussed here in the context of how the research was implemented in Studies 1, 2 and 3. Firstly, panel research participants necessarily have Internet access, an attribute that might distinguish them from otherwise similar people in the general population. Even though the vast majority of households is equipped with the Internet nowadays, not all are. For the countries selected in the current study, the percentage of individuals using the Internet is high (73–90 %; ITU, 2018), which potentially dampens the effect of this bias. Still, the intensity of Internet use varies widely, and certain groups are more likely to encounter an invitation to join a panel, so the effect cannot be eliminated. Secondly, participants are incentivized with monetary rewards for their participation. This differs from addressing e.g. internal motivations to contribute to research, and might motivate certain individuals more than others. It might be a specific group of persons who are willing to partake in e.g. an online survey and spend their time in return for money. Either, this can be interesting for people with low-income levels. Or, as we reached a nearly representative sample with regard to income for study 1, there might be again other characteristics of online panel participants above and beyond standard demographics, which are

not measured. All three studies were extensive and took a total of around 1–2 h each of participants' time. Therefore, it was indispensable to compensate participants for their time. Thirdly, people who are more interested in a topic, for whatever reason, might self-select to participate. For the current studies, we tried to limit this bias by not including 'environment' in the title or introduction text of each study. Instead, we focused on clothing and emphasized that the studies are about 'everyday clothing consumption'. Nevertheless, this again can only restrict the strength of the bias. As we can see, the studies still attracted more women than men and we cannot know who decided to drop out in the repeated design, or why. We cannot preclude that it was participants who lost interest after discovering that environmental issues were at the heart of the surveys.

Taken together, it can be concluded that such biases might have influenced the construction of the sample and therefore of the results. This possibility needs to be taken into account when interpreting the results.

### 3.3. Measurements

Two of the main concerns in survey research are validity, which is the measurement of exactly the construct that should be assessed, and reliability, which is the accurate, consistent and stable measurement of the construct (Hine, Kormos & Marks, 2016). Both validity and reliability are independent, but strongly related, and form the indispensable basis for collecting data and research findings that are interpretable. One way for ensuring validity and reliability is to use developed and pretested scales. This is not always possible, however, especially when researching specific contexts. Therefore, items for each construct were developed based on previous literature (De Groot & Steg, 2009; Nayum, Klöckner, & Mehmetoglu, 2016) and combined to scales where appropriate. All research in the current PhD project is firmly grounded on the comprehensive action determination model, which in turn is based on the theory of planned behaviour and the norm activation model (see chapter 2). For all three models, the authors instruct to measure the constructs in question at the level of the specific behaviour in question, and we follow this recommendation for the item development here. Reliability and validity of all developed scales could be established exemplarily in Study 1 (see APPENDIX A, paper I). An overview over the measurement employed in this thesis and across the three studies

can be found in Table 2. In the following, if not stated otherwise, the answer categories ranged from 1 ‘Strongly disagree’ to 7 ‘Strongly agree’.

Table 2 Overview over the used measurement across studies

Measurement	Study 1	Study 2	Study 3
– Behaviour (number of items bought)			
• Two-week period (daily retrospective)		X	
• One month pre-period (biweekly retrospective)			X
• One month post-period (biweekly retrospective)			X
• Three-month post period (retrospective)			X
– Intentions (to reduce consumption)			
• Intention	X	X	
• Goal		X	X
• Stages of change			X
– Identification with humanity	X		
– Awareness of need	X	X	X
– Ascription of responsibility	X	X	X
– Outcome efficacy			
• Personal outcome efficacy	X	X	X
• Group outcome efficacy			X
– Personal norms	X	X	X
– Social norms		X	X
– Attitudes		X	X
– Perceived behaviour control		X	X

### *Clothing purchase behaviour*

In the current PhD thesis, behaviour always refers to the number of items bought in a certain time period. While each of these measurements was retrospective, the time period of retrospection varied. Study 1 did not include a behaviour measurement. Study 2 included a daily behaviour measurement, asking participants on fourteen consecutive days whether they had purchased an item of clothing in the previous 24 hours. Behaviour was therefore operationalized as the number of items bought in a two-week period. For Study 3, participants were asked twice

(two times before and two times after the exposure to the experimental conditions) how many items they had bought in the previous two weeks. The bi-weekly measurements were aggregated to determine the number of items purchased in a one-month pre- and one-month post-period. Additionally, in a three-month follow-up period, participants were asked how many items they had bought in the previous month and the previous three months.

### *Intentions*

Intentions always refer to reducing personal clothing consumption and were operationalized in two different ways in the current PhD thesis: as intentions and as goals. In Study 1, intention was assessed by response to the statement *In the next three months, when buying clothing items, I intend to... Refrain from buying clothing about which I have environmental concerns*. Answer categories ranged from 1 (strongly disagree) to 7 (strongly agree). In Study 2, 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'. This same goal measurement was used in Study 3.

### *Personal Norms*

Personal norms, specifically, the perceived moral obligation to reduce clothing consumption, was operationalized with five items in Study 1 and Study 3, e.g. *Reducing my personal clothing consumption is the right thing to do* and *I feel morally obliged to reduce my personal clothing consumption*. For Study 2, the three items with the highest factor loading in Study 1 were chosen to form a shorter measurement for personal norms. These three were the above-mentioned items and the item *No matter what other people think or do, my principles tell me that it is right to reduce my personal clothing consumption*.

### *Awareness of need*

Awareness of need was measured as awareness of the existence of specific problems in the clothing production. These problems related to both environmental (e.g. *Uses a vast amount of energy and water* and *Causes tremendous harm to the environment*) and social (e.g. *Impairs the health of people living in the production countries* and *Operates under unsafe working conditions*) problems for Studies 1 and 3. For Study 2, a shorter measurement comprising only

the items related to environmental problems was applied. Participants were asked to rate their agreement.

#### *Ascription of responsibility*

For the measurement of ascription with responsibility, participants were asked to indicate whether they think they contribute, support or are partially responsible for problems raised in the surveys (e.g. *Through my personal clothing consumption, I... Am partly responsible for unsafe working conditions in clothing production*). Again, Study 2 related only to environmental problems, and Studies 1 and 3 to both environmental and social problems.

#### *Outcome efficacy (personal and group)*

Outcome efficacy was conceptualized at two levels, the individual (all studies) and the collective level (only Study 3). Participants were asked to rate their agreement with in how far they can e.g. *'reduce the environmental impact associated with clothing production'* or *'have an impact on reducing the use of hazardous chemicals associated with clothing production'*. The statements regarding environmental (all studies) and social problems (Study 1 and 3) were preceded by *'Through my personal clothing consumption, I can...'* for individual outcome efficacy and by *'Collectively, Through my personal clothing consumption, I can...'* for collective outcome efficacy.

#### *Social Norms*

The measurement of social norms included items for both descriptive and injunctive norms and therefore referred to what people important to the participant do and expect the participant to do. Six items measured social norms at Study 1, and the two items with the highest loading for descriptive and injunctive norms each were taken over for Study 2 and 3. An example item for descriptive norms is *'People who are important to me reduce their personal clothing consumption'* and for injunctive norms *'People who are important to me suggest that I should reduce my personal clothing consumption'*.

### *Attitudes*

Attitudes were measured via a semantic differential, a technique often used to assess attitudes. Participants are presented opposite adjectives as the two endpoints of a bipolar scale, and are asked to assess reduced consumption with regard to these adjectives. Examples of such bipolar scales used are ‘*unimportant*’ and ‘*important*’ or ‘*worthless*’ and ‘*valuable*’. Participants then give their rating towards either of the opposite adjectives, with the middle category being neutral. Eight bipolar pairs were used in Study 1, and the four most consistent with the attitude factor were taken over for Study 2 and 3.

### *Perceived behaviour control*

Perceived behaviour control was assessed with 4 (Study 1) and 3 (Study 2 and 3) items asking for participants agreement, e.g. to ‘*If I want to, I will be able to reduce my personal clothing consumption in the next three months*’ or ‘*It is mostly up to me whether or not to reduce my personal clothing consumption in the next three months*’.

#### *3.3.1. Ensuring data quality*

Data quality across all three studies was ensured with multiple measures for identifying and screening out careless responses (DeSimone, Harms, & DeSimone, 2015; Meade & Craig, 2011). Exemplarily, in Study 1, we applied instructed items (e.g. ‘Please select strongly agree’) and bogus items (e.g. ‘I always sleep less than one hour per night’) as attention filters. Participants failing such instructed items were filtered out automatically. Moreover, we assessed the quality of the received data through multiple quality checks, e.g. self-reported data on answer quality (e.g. ‘In your honest opinion, should we use your data in our analysis of this study’) or measures for answer patterns like straight-lining. Participants failing multiple quality checks were reported to Qualtrics and replaced.

### 3.4. Statistics

This thesis is based on quantitative statistical analysis. Above and beyond standard analysis, such as frequency analyses or ANOVA, we applied advanced analysis methods. Structural equation modelling is the most suitable analysis method in order to assess the proposed relationships between all determinants of behaviour as proposed by the complex theoretical



framework in this thesis (see chapter 2, section 2.1.). Additionally, measurement variance tests were realised as basis for the cross-cultural comparison in Paper 2. For Study 3, mixed panel regression analysis are the method of choice to analyse developments between groups and across time. In the following, each method is described shortly.

#### *3.4.1. Structural equation modelling*

Structural equation modelling (SEM) is a multivariate data analysis strategy. It combines elements from confirmatory factor analysis and path analysis. It does so, firstly, by modelling constructs of interest, e.g. a person's attitudes or perceived personal norm towards reduced clothing consumption, as latent variables. Secondly, it examines relationships between these latent variables through simultaneous multiple regressions, allowing for multiple dependent and independent variables in the same analysis (Wolf & Brown, 2013). As such, it makes it easy to estimate direct and indirect paths between all model variables at once.

There are two types of variables in SEM, latent and manifest or observed variables (Kline, 2011). A latent variable is a hypothetical construct, represented through multiple, highly correlated manifest or observed variables, also called indicators. Indicators are observed variables and assumed to measure the same latent, i.e. not directly observable, construct. As an example, an individual's personal norms cannot be observed directly, but we can measure manifestations of his or her personal norm e.g. in the form of answers to a survey item like 'Reducing my personal clothing consumption is the right thing to do'. Multiple such items are combined to represent the latent factor 'personal norm'.

Using latent variables leads to improvements in construct validity of the variables of interest, as latent variables use information from multiple indicators and therefore are closer representations of the construct in question than single items (Wolf & Brown, 2013). In a SEM analysis, the relationships between such latent variables are analysed via multiple regression analysis. Simultaneously, the analysis removes unique variance from each indicator, i.e. variance that is not explained by the latent variables the indicator represents, and models it as indicator error. The SEM approach therewith includes an explicit representation of measurement error of observed variables, which yields more accurate estimation of relationships between different variables included in the model. This is a clear advantages compared to multiple regression

(Kline, 2011). It is important to note that within SEM we assume a certain directionality of the relationship between two variables, i.e. in the path modelling we draw an arrow for example from personal norms to intentions. However, SEM is only an analysis strategy and does not allow drawing any conclusion about causality between variables when applied to cross-sectional data. When interpreting SEM results we should therefore not forget that the proposed direction of relationships are theoretical assumptions that cannot be proven, and we cannot eliminate the possibility that relationships in reality might be reversed or alternative models with different associations between the model variables might fit the data, too (Raykov & Marcoulides, 2006).

#### 3.4.2. *Measurement invariance*

In Study 1, all items, i.e. the indicators for latent variables, were developed in English and afterwards translated for the different countries. We assume that these indicators measure the same construct in the same way across all countries (Cieciuch, Davidov, Algesheimer, & Schmidt, 2017). This, however, is not necessarily the case. Across different cultural groups, differences in e.g. familiarity with a particular item wording or in the prevalence of social desirability can lead to differences in the precision with which a construct is measured. Instead of assuming equivalence, we therefore need to test for so-called measurement invariance, i.e. test that the internal structure of measurement instruments is equivalent between the countries (Fisher & Fontaine, 2011). This is only the case if there is no systematic bias in the response behaviour e.g., no bias due to translation problems or other cultural, unobservable differences (Steenkamp and Baumgartner, 1998). In our analysis we tested for measurement invariance in the framework of multiple-group confirmatory factor analysis (Cieciuch et al., 2017). There are three levels of measurement invariance which are commonly assessed. *Configural invariance* means that latent constructs can be conceptualized in the same way across all five countries, i.e. that the same items measure them across all countries. The next level, *metric invariance* requires that factor loadings are equal across countries, i.e. ‘that each item contributes to the latent construct to a similar degree across groups’ (Putnick & Bornstein, 2016, p. 5). Lastly, *scalar invariance* assumes invariance of both factor loadings and item intercepts across countries. This implies that ‘mean differences in the latent construct capture all mean differences in the shared variance of the items’ (Putnick & Bornstein, 2016, p. 5). A comparison of latent factor means across groups is only possible when all three levels of measurement invariance are established.

Putnick & Bornstein (2016) provide a detailed procedure how to test for each level of measurement invariance, and we followed their procedure in our analysis for Paper II.

### *3.4.3. Repeated measurement analysis*

In order to account for the panel structure of the data in Study 3 we applied repeated measurement analysis strategies. The data of Study 3 across the time points is nested in individuals, who are at the next level nested in the intervention groups. To account for both the variance between the groups and within the individual participants over time we applied repeated measures mixed regression models with repeated data over participants and estimated the influence of both time and group on the number of items purchased and the change in intentions and personal norms. To analyse the effects a change in different psychological determinants has on a change in behaviour, intentions and personal norms (e.g. the effect of a change in awareness of need on the change in personal norms) we employed multiple linear regression models with fixed effects and clustered standard errors across individuals. For behaviour, intentions and personal norms, respectively, we fitted models separately for each group. The fixed effects approach is modelling the within variation, i.e. the difference in values across time for individuals. It ignores differences between the groups, hence we calculate the model separately for each group.

#### 4. Discussion

One overarching question guided the research for this thesis: how can current clothing consumption patterns become more environmentally friendly? Based on theoretical deliberation, reducing overall clothing consumption emerged as a particularly promising behaviour. In order to promote this behaviour, it is important first to understand the key determinants that influence it before designing intervention strategies based on these determinants (Steg & Vlek, 2009). Accordingly, three consecutive studies investigated which psychological variables stimulate efforts to reduce clothing consumption, whether these determinants are equally relevant across different cultural contexts and whether they can be influenced to such a degree that a behavioural change in terms of fewer items purchased happens in response to the stimulus. Therewith, the three studies combine two strands of environmental psychology, namely, the analysis of factors influencing certain behaviours and the attempt to encourage such behaviours (Steg, van den Berg & De Groot, 2013). Study 1 and 2 succeeded in identifying psychological determinants related to intentions for reduced clothing consumption. The determinants identified as most important across different cultural contexts were subsequently targeted in an intervention strategy. We observed more reduced consumption for two out of four intervention conditions during the intervention period, but not in a three-month follow-up. After three months, all participants consumed less, independent of whether they were part of the control or one of the intervention conditions and whether behavioural determinants had changed for them or not. In other words, while the consumption level remained stable for the two intervention conditions that previously had reduced their consumption, it decreased for the other two conditions.

To determine which psychological variables might be relevant for our purposes, the comprehensive action determination model (CADM) was employed to analyse a multitude of determinants. Its moral concerns comprising part, mainly based on norm activation theory (NAM), was extended with the concept of identification with all humanity (IWAH) in Study 1 in order to integrate issues of global production and consumption networks that result in global impacts of local decisions. Study 2 compared the CADM across four countries and added an improved behaviour measure. Results from Study 2 show clearly that intentions alone not necessarily translate into behaviour. Insights from both Study 1 and Study 2 were used to design an intervention strategy to reduce clothing consumption. This strategy was tested in Study 3.

This last chapter will discuss theoretical and practical implications of each study. Subsequently, it will reflect on methodological strengths and weaknesses of the research conducted before embedding it in a wider context of conceptual and methodological limitations and proposing ideas for future research.

#### 4.1. Summary of results

In Study 1, based on a nearly representative sample of participants from Germany, Poland, Sweden and the US, personal norms to reduce clothing consumption were significantly and positively related to both intentions to not consume clothing deemed problematic and to reduce clothing consumption. Personal norms, in turn, were positively and most strongly related to outcome efficacy, i.e., the perceived ability to alleviate environmental and social problems of clothing production through one's consumption decisions. Moreover, awareness of need and to a lesser extent ascription of responsibility were positively related to personal norms. As for the role IWAH plays in the formation of personal norms, two results are noteworthy. Firstly, Study 1 confirms the two dimensions found in previous studies by applying McFarland et. al's (2012) IWAH scale, i.e. self-definition and self-investment. Secondly, of the two components, it is mostly self-investment that is positively related to both personal norms and awareness of need, ascription of responsibility and outcome efficacy.

Results from Study 1 show that social norms, another psychological variable, are positively and strongly related to both a personal norm to reduce clothing consumption and an intention to do the same. The total effect of social norms on intentions, including the indirect effect mediated through personal norms, was of similar magnitude to the direct relationship between personal norms and intentions. The relationship between attitudes and intentions was positive, albeit smaller, and the relationship between perceived behaviour control and intentions was not significant. In summary, as represented in Paper I, Study 1 showed the relevance of personal norms and social norms for intentions to reduce clothing consumption, as well as the importance of awareness of need and outcome efficacy for these personal norms. Additionally, results from Study 1 show that, while the proposed relationships between model variables were equal across countries, the mean of variables differed between countries.

Study 2 extended the perspective above and beyond intentions through measurement of clothing purchase behaviour. For a two-week period, participants were asked daily to report on whether they had purchased an item of clothing during the previous 24 hours. Study 2 confirmed the importance of personal norms for intentions, here operationalized as the goal to reduce clothing consumption. The goal of reducing consumption was significantly but weakly negatively related to the number of items purchased in the two-week period. That is, people who expressed a goal to reduce clothing consumption were slightly more likely to purchase less items in the two-week period. In summary, Study 2 confirmed the results of Study 1, but at the same time pointed towards a gap between intentions or goals to reduce clothing consumption and the actual number of items purchased.

Building on the results from Studies 1 and 2, Study 3 tested whether aiming at influencing exactly those psychological determinants found to be relevant in Studies 1 and 2 could foster a behaviour change towards reduced clothing consumption. Moreover, it included further strategies to overcome the gap between intentions and behaviour, i.e., to aid the translation of the former into the latter. For this purpose, a pre-test–post-test control group design with follow-up tested the impact that information provision, goal setting, feedback and commitment and coping planning have on the number of clothing items purchased. The results of Study 3 are reported in Paper III. Only the two intervention conditions including specific goal setting, feedback and commitment strategies showed a reduction in the number of items bought in the one-month post period. At the three-month follow-up, all groups had significantly consumed less compared to the pre-measurement; no inter-group differences were measured. All determinants of the CADM were significantly increased for the intervention conditions at the one-month post-measurement, and remained higher at the three-month follow. Moreover, for all conditions, only a change in personal norms was positively and directly related to a change in the goal to reduce. Likewise, for all conditions, a change in social norms was positively and significantly related to a change in personal norms. Two main results can be summarized from Study 3. Firstly, the intervention successfully increased perceived personal norms and the goal to reduce clothing consumption, partly through changing the determinants each treatment condition aimed at. Secondly, as all participants had reduced their clothing consumption at the follow up, the question remains what exactly the drivers are that ensure long-term behaviour change in consumers reaching beyond intervention periods.

## 4.2. Theoretical implications

In the following, the results with regard to a reduction in items purchased, intentions and personal norms to do so will be discussed more in detail. We chose to discuss the change in behaviour first, as it was the main aim of the thesis. The following discussion is therefore non-chronological with regard to the order of studies and draws from all of them to discuss the results for each behaviour, intention and personal norm. This approach deemed more appropriate for locating the thesis in the broader research field.

### 4.2.1. *Behaviour*

One strength of this research is the measurement of behaviour and not only intentions, including long-term evolution via a one-month post survey and a three-month follow up (Steg & Vlek, 2009). With regard to behaviour, this thesis points towards two main results. Firstly, intentions to reduce clothing consumption are positively but only weakly related to actual behaviour. This notion is confirmed both in correlational studies as well as in the intervention study, and fits well with existing literature (Bamberg & Möser, 2007; Michie, Whittington, Abraham, McAteer, & Gupta, 2009; Sheeran & Webb, 2016; Webb & Sheeran, 2006). One result of the intervention study particularly underlines this point. In the information-only condition, intentions to reduce clothing consumption were significantly higher after the intervention as compared to the control group. But, these increased intentions did not translate into a significant change in behaviour for this intervention condition. This is in line with previously noted criticism towards the information- or knowledge-deficit model, which assumes that individuals only need to be informed about the e.g. environmental harm of certain actions to induce change (Abrahamse & Matthies, 2013; Howell, 2014). On the contrary, intentions to take action, e.g. after watching a climate-related (informational) film, did not influence behaviour one month later (Nolan, 2010). Secondly, however, we can conclude that it is possible to change behaviour towards reducing the number of clothing items bought. This was possible even in an online setting without face-to-face contact, which further adds to already existing and promising results that suggest the effectiveness of Internet-based interventions in encouraging environmentally friendly behaviours (Abrahamse et al., 2007; Bell, Toth, Little, & Smith, 2016).

This behaviour change was achieved in two intervention conditions, both of which applied strategies in addition to information provision. This is in line with the stage model of self-regulated behavioural change (Bamberg, 2013b), which postulates that in order to reach a goal, e.g. behaviour change, individuals need to pass through ‘a time-ordered sequence of qualitatively different stages’ (Bamberg, 2013b, p. 152) and previously has been successfully applied to increase the use of public transport (Bamberg, 2013a). These stages comprise activities of setting specific goals and developing strategies to reach and maintain them, with individuals facing different obstacles for behaviour change at different stages. Information, for example, is mostly beneficial for individuals in the so-called pre-decisional stage, in order to increase problem awareness, personal norms and therewith intentions to act. One of the main propositions of the stage model of self-regulated behavioural change therefore is that interventions should be tailored towards the stage an individual is at in a given moment. In our study, we did not apply the notion of time-ordered stages through matching content to an individual’s stage, but by creating three consecutive intervention blocks each aiming at one stage along the model. This approach was well-founded on our findings from Study 1 and 2, which showed that the majority of individuals did not have a goal to reduce their clothing consumption. Hence, we can assume that most individuals are at the pre-decisional stage for this behaviour. Directly asking individuals at this stage to commit to a goal of showing a specific behaviour, e.g. reducing their clothing consumption, might result in psychological reactance (Bamberg, 2013a). Therefore, successively, three intervention blocks targeted 1) the development of a goal intention through information, 2) the formation of a behavioural intention through specific goal setting, goal feedback and commitment and 3) implementation intentions and coping planning through tips of how to shield the goal from obstacles, e.g. cancelling newsletters from clothing brands. Together with information provision, the strategies from block two have been successful in changing different behaviours, e.g. reducing household energy consumption (Abrahamse et al., 2005), especially also when combined with each other (Abrahamse et al., 2007). Commitment has been shown to be effective for the reduction of plastic bag use (Rubens, Gosling, Bonaiuto, Brisbois, & Moch, 2015) For participants that were willing to change, implementation intentions previously helped to engage in energy saving behaviours (Bell et al., 2016).



Furthermore, in the intervention study, these strategies were applied individually for one intervention condition and at group level for the other intervention condition, i.e. through reporting a group goal as aggregated individual goals and feedback of the saving potential this group goal has if everyone contributed their share. The latter intervention condition sought to evaluate additional effects through both increased social norms and collective outcome efficacy via the knowledge that others also pledged to reduce their clothing consumption (Abrahamse & Steg, 2013; Abrahamse et al., 2007; Staats et al., 2004; Steg, 2015). In our study, however, there was no significant difference in reduction behaviour between the two individual and group conditions. This is in line with Abrahamse et al. (2007) who also found no additional effect of group goal setting or group feedback. Potentially, this is due to the group component being too subtle to become relevant for participants. Previously, Staats, Harland and Wilke (2004) found a group-based program effective for water and waste reduction, but there the participants communicated with each other. Moreover, it has been noted previously that commitment might be more successful on an individual level than group level (Rubens et al., 2015), which furthermore could have contributed to this finding. Moreover, it could be that the expected larger increase in social norms and collective outcome efficacy did not occur for the group treatment condition. Why this might be the case is discussed in section 4.2.3 of this chapter, when we discuss the determinants for personal norms.

Few previous studies have included behaviour measurement at a follow-up time point (Abrahamse & Steg, 2013; Abrahamse et al., 2005; Armstrong, Connell, Lang, Ruppert-Stroescu, & LeHew, 2016) or had a noticeably diminished sample at the follow-up (Hanss & Böhm, 2013). For the ones that conducted a follow-up, some evidence is found that behaviour change persisted (Howell, 2014; Loy, Wieber, Gollwitzer, Oettingen, & Loy, 2016; Staats et al., 2004), especially for interventions using information, goal setting, feedback and commitment (Abrahamse et al., 2005). In line with these results, in our intervention, the goal and commitment groups did not change their behaviour back towards baseline levels. Additionally, however, we could observe that all intervention groups, both control and all intervention conditions, reduced their clothing consumption at the follow-up. This was observable in two ways.

On the one hand, the average number of items bought in the past month was reduced across all groups when comparing the post-measurement point and the follow-up. This reduction,

however, is driven by a reduction of the number of items bought by the control group and the information only group, both that did not reduce the number of items bought as recorded in the post survey. In the end, at the three-month follow up, there are no significant differences in the number of items bought between the all groups. For the two intervention conditions that reduced their consumption already at the one-month post survey, this can likely be explained as follows. They had already reduced their clothing consumption considerably ( $M = 1.63/1.82$  per month) and therefore only little room was left for further reductions. This is underlined by the fact that the number of items they bought in the month prior to the follow-up does not differ from the number of items they bought in the month prior to the post-measurement survey. In other words, they maintained the lower level of consumption they had achieved during the intervention period.

On the other hand, the picture is slightly different as regards the number of items purchased in the past three months. It was not measured in the post-survey, and was measured directly only before the intervention, at the follow-up three months after the post-survey, and in the same three-month period, but the previous year (2017). The groups behaved identically for this measurement, they all purchased fewer items in the past three-month period at the follow-up (2018) as compared to exactly the same three-month period the previous year (2017) and as compared to a three-month period directly before the intervention (2018). To our knowledge, no previous intervention has found a similar result and at this point, we can only speculate as to what caused the change in behaviour across all groups. It is possible that the intervention has had effects on clothing purchases no matter what the exact intervention content was. The control group, like all others, both counted the number of items bought during the whole intervention period and answered all model-related items, e.g. items asking about awareness of need or personal norms with regard to reducing consumption. It is thinkable, that answering these questions already elicited attitude, intention and behaviour change. Against this idea, however, we cannot find any change in model variables for the control group between any of the measurement points. What increased at the one-month post-test and three-month follow-up though is the control groups' goal to reduce consumption. Again, any explanation can only be of a speculative nature. It could be possible that simply by counting the number of items purchased consumers reflected on the amount they bought and thereby maybe realized that it was above their needs.

Yet a completely different perspective to explain these results could lie with two macro-structural reasons. Firstly, there has been specific weather events that might have limited or enhanced person's perceived need for clothes. November 2018 has been comparatively mild, potentially slowing sales in winter clothes. The three-month period prior to the intervention, however, has been characterized by a heat wave. Qualitative response from selected participants indicated that they had purchased due to that reason. Equally, weather data reports that the three month period in 2017 was characterized by a cooler than average September and particularly November (Met Office, 2018). This conceivably could explain why participants bought more in 2017 and before the intervention and significantly less at the three-month follow up. Secondly, during the study period, the United Kingdom found itself in politically turbulent times, particularly in the three months prior to the follow-up. As a result, consumer confidence was reported to have decreased especially since summer 2018 (Gfk, 2018). It is, however, at similar levels as compared to last years November and December levels, therefore of limited explanatory power for the difference in items purchased in the past three months.

Three main theoretical implications should be mentioned for these results. Firstly, it is important to measure behaviour – and not just intentions – as well as to measure sustained behaviour change with follow-up surveys after longer time-intervals. Secondly, further strategies than information provision to translate intentions into behaviour need be applied in order to successfully change behaviour. And, thirdly, it is important to integrate contextual variables, such as weather or societal developments, both in our models of explaining and changing behaviour and better understand the impact they have.

#### *4.2.2. Intentions*

We operationalized intentions in two ways across the different studies: as the goal to reduce clothing consumption and as the intention to either reduce or completely boycott the consumption of clothing deemed problematic.

Our research showed that an intention to reduce clothing consumption could be formed in an intervention setting. Namely, the goal to reduce clothing increased for all conditions between pre and post. However, the effect was more pronounced for the intervention conditions than for the control group. This is as expected, as the intervention aimed particularly at goal setting for

two intervention conditions. For the information-only group, an increase in intentions can possibly be explained through an increase in the determinants of intention, which will be discussed in the next section. At the follow-up, as compared to the post-measurement, intentions increased further for the information only and control group. As with changes in behaviour, we can again only speculate about why the goal to reduce clothing consumption also increased in the control condition. Such a change could be based again on a reflection of the number of items purchased induced simply by counting them. The goal-setting and commitment groups did not increase their intention at the follow-up but maintained it at levels higher than the control group. This can be explained by the already high level of intention at the post-measurement point, which did not leave much room for further increase.

Furthermore, we tested the relevance of different determinants for intentions to reduce clothing consumption and both cross-sectional and longitudinal data support the important role normative concerns play. In both Study 1 and Study 2, cross-sectional evidence showed that personal norms are most strongly directly related to intentions to reduce clothing consumption, and social norms are equally strongly related indirectly through personal norms. The role of social norms will therefore be discussed in further detail in the next section, which reflects on the determinants for personal norms. Equally, in the intervention, all theorised determinants for intentions, attitudes, perceived behaviour control, personal norms and social norms, were significantly increased at the post-measurement as compared to the pre-measurement for the intervention conditions. But, it was only a change in personal norms that was significantly related to increased intentions for all intervention groups. These results tie in with a rich tradition in literature identifying personal norms as important predictor for environmental intentions, e.g. De Groot & Steg, 2009; Huijts, Molin, & van Wee, 2014; Klöckner & Nayum, 2017; Van der Werff & Steg, 2015; Van der Werff, Steg, & Keizer, 2013; Van Riper & Kyle, 2014. Equally, a moral identity was found consistently connected to pro-environmental behaviours (Gatersleben, Murtagh, Cherry, & Watkins, 2017).

At the same time, this result needs to be put into perspective with the specific characteristics of the behaviour in question, reducing the purchase of clothing items. Taken by itself, i.e. not in connection with replacement behaviours like mending old clothes or swapping instead of purchasing, this behaviour in principle requires no extra knowledge, infrastructure or resources like time or money. On the contrary, it has the potential to save the latter. This is reflected in

high values for perceived behaviour control before the intervention, which additionally increased further among the goal and commitment intervention conditions at the one-month post-survey. This underlines the notion of reducing clothing consumption as a realizable behaviour, as these groups actually reduced the number of items bought in that time period, and as perceived behaviour control can be understood as reasonable proxy for actual control (Ajzen, 1991). Through these characteristics it differs significantly from other environmentally friendly behaviours, e.g. sustainable food choice (Richter, Thøgersen, & Klöckner, 2017), wood pellet heating (Sopha & Klöckner, 2011) electric car purchase (Nayum, Klöckner, & Mehmetoglu, 2016) recycling (Klöckner & Oppedal, 2011), or travel mode choice (Klöckner & Matthies, 2004), which often require more effort and have been found to be determined by different variables.

Furthermore, this result encourages the use of normative messages in communication strategies. One way is to remind individuals of the personal norms they might already have, as e.g. often is done in messages like ‘Thank you for not littering here.’ Aiming at fostering personal norms which are not prevalent yet, e.g. to reduce clothing consumption, can be done via the determinants of personal norms to our beliefs. We therefore discuss these determinants in the following section, together with perspectives on how to change behaviour via communicating social norms.

#### *4.2.3. Personal norms*

As we found personal norms to play an important role in intentions to reduce consumption, it is valuable to have a closer look at which variables determine personal norms. Reflecting on the results of all three studies, the answer needs to be that all examined variables – awareness of need, ascription of responsibility, outcome efficacy at the personal and group level and social norms – are related to personal norms as the felt moral obligation to reduce ones clothing consumption. This was expected and in line with previous research (Klöckner, 2013a; Steg & De Groot, 2010). However, the extent to which they are related varies across different samples and designs. The results from Study 1 point towards a comparatively weak relationship between ascription of responsibility and personal norms, whereas the other determinants show relationships of higher and similar magnitude. Study 2 confirms these results to some extent. In this study, the influences of each determinant on personal norms are more of similar magnitude.

Without taking the role social norms play into account, the relationship between outcome efficacy at the personal level and personal norms is particularly pronounced. This is in line with another theory not included in the framework of this thesis, namely the Protection Motivation Theory (Rogers, 1975). It concludes that individuals change their behaviour in response to fear appeals when they believe that the behaviour will actually reduce the threat. Moreover, the effectiveness of appeals to fear increases if they are accompanied by efficacy statements (Tannenbaum et al., 2015).

Across all intervention conditions in Study 3, we observe an increase in the proposed determinants between pre- and post-measurement. Moreover, the results of the intervention show that across all intervention groups a change in social norms is most strongly related to a change in personal norms. Social norms' main influence seems to be mediated through personal norms, i.e. increased social norms lead to increased personal norms, which then influence intentions, reflected in a strong indirect link in Study 1 (see also Thøgersen, 2006). In the current case, two different ways of how social norms influence reduction behaviours can be imagined. On the one hand, by perceiving a norm that constant new purchases are e.g. wasteful. On the other hand, by reducing the fear of social punishment for not following new trends. Norm-based intervention are thereby believed to be particularly effective when they aim at behaviour individuals do not necessarily appreciate but enact because they think people expect them to do so, as compared to trying to motivate to act against personal preferences (Miller & Prentice, 2016). Given the extended advertisement effort the clothing industry applies one could assume that constantly buying new clothing might constitute such a behaviour. Changes in social norm perceptions regarding this behaviour might then be particularly effective, even if only small changes occur.

In the intervention, the perceived social norm to reduce clothing consumption increased for all intervention conditions, but not for the control group. At the same time, there is no difference in either the change of the magnitude of social norms or the role a change in social norms plays for personal norms between the group goal and commitment condition and the other intervention conditions. This is contrary to our expectations, as we proposed that the group setting would elicit a larger increase in perceived social norms. The relationship was still positive, therefore this result cannot be explained by the so-called 'boomerang effect' (Kormos, Gifford, & Brown, 2015), which can occur when there is a negative relationship between intentions and descriptive

social norms, i.e. what others do. Moreover, the descriptive norm was high, with 94 out of 102 participants in this group reporting a goal to reduce their clothing, which was communicated to all participants. One probable explanation lies with the wording of the social norm item, which referred to the behaviour and expectations of relevant others. It is reasonable to believe that the Prolific participants in the group condition did not more so consider other study members to be relevant others than in the other conditions. This is consistent with previous research that has identified physical or geographical closeness, group identification and cohesion and communication as important factors for the impact group settings might have on social norms (Abrahamse & Steg, 2013; Abrahamse et al., 2007). This possible explanation is further supported by a measure of identification both with participants on Prolific in general and with participants in our Study 3, specifically. The identification was expected to be higher for the group goal and commitment treatment, which turned out not to be the case. However, only individuals who identify with a group might perceive stronger social norms communicated through the group and be more motivated to act in accordance with the social norms of that group. Likewise, such a group identification is a necessary base for collective outcome efficacy and collective action (Bamberg et al., 2018), and the lack of it in our group condition might explain that there are no differences in collective outcome efficacy nor behaviour between the groups.

Summarizing these results on personal and social norms, it can be stated that information and economic incentives are not enough to change behaviour (Miller & Prentice, 2016). Normative messages might be promising avenues for behaviour change (Bolderdijk, Steg, Geller, Lehman, & Postmes, 2012) and previously have been applied e.g. in the area of water conservation (Schultz et al., 2014). As this research suggests, the role of social norm thereby needs to be understood in connection to personal norms. In other words, it might be that it is social norms successfully internalized as personal norms, which influence intentions (Thøgersen, 2006). In a similar direction, previous research has found that personal responsibility moderated the influence that social norms have on behaviour in such a way that it took both personal responsibility and social norms for participants to turn off the light in a public setting (Dwyer, Maki, & Rothman, 2015).

Changes in the other determinants have an influence of similar strength on changes of personal norms in Study 3. A closer look at the different intervention groups reveals a somewhat more

nuanced picture, and a more detailed discussion of the single differences can be found in Paper III (see Appendix C).

Climate change affects humans around the globe and future generations, it is fundamentally an ‘intergroup issue’ (Meleady & Crisp, 2017, p. 206). Equally, individuals are more likely to help others they perceive to be part of their in-group and more willing to accept personal costs if it favours members of the in-group (Crimston, Bastian, Bain, & Hornsey, 2016). Such a willingness to incur personal costs and help others is necessary to tackle climate change, whereby, ideally, affected humans across the globe or into the future are perceived equal members of the in-group and included in an extended scope of moral boundaries. In Study 1 we therefore examined one further determinant of personal norms: identification with humanity (IWAH). Before briefly reflecting on these results, the reasons for not including IWAH in Studies 2 and 3 should be explained. They are twofold. Firstly, while the relationship between IWAH components and personal norms was significant and positive, other determinants proved to be more strongly related to personal norms. Based on the results from Study 2, it was even clearer that a change in personal norms by itself would not necessarily lead to a change in behaviour. Therefore, instead of focusing on techniques to further increase personal norms, e.g. by increasing IWAH, the focus was set on strategies to translate intentions into behaviour. Secondly, results regarding the benefit of ‘proximizing’ climate change are mixed. While selected studies show promising results, others conclude reducing psychological distance is not likely to increase environmentally friendly behaviour by itself (Brügger et al., 2015; McDonald, Chai, & Newell, 2015; Scannell & Gifford, 2013; Schuldt, Rickard, & Yang, 2018; Spence et al., 2011). This is in line with our results, which also show a mixed picture. While the self-definition part of IWAH was not or only weakly related to personal norms and its determinants, the self-investment part showed comparatively stronger links. The self-investment part does not focus on reducing psychological distance by including humans all around the globe in one’s self-definition, but on the help and support for those in need, might they be perceived as similar to oneself or not. Two possible explanations exist for this result. Either it is the case that mere self-definition or perceived similarity with all humans globally is not enough to motivate action, it needs also a further commitment to be active and help (i.e., self-investment). Or, according to Construal Level Theory (CLT), increased self-definition and the resulting reduction in psychological distance might even hinder the activation of personal moral norms. CLT proposes



that increased psychological distance leads to more higher-level construal of objects and situations, and therefore to the activation of more generalized and decontextualized high-level principles such as moral principles. The research on this topic, however, is inconclusive so far and needs further elaboration in the future (Eyal, Liberman, & Trope, 2014; Gong & Medin, 2014; Žeželj & Jokić, 2014). Our results are in line with previous research that showed self-investment to underpin the positive relationship between IWAH and personal norms (Reese et al., 2015). Equally, Reese et al. (2015) showed that the self-investment component could be experimentally manipulated, which in turn had an influence on the willingness to donate for a global charity in an experimental setting. Together, these results point towards the potential role of especially self-investment for environmentally friendly behaviours, and future studies should clarify the role of proximizing strategies as well as possible applications.

It should be mentioned that we tested the proposed CADM relationships across different European countries and the US, and therefore across similar yet different cultures. Most important in this context is that a test for measurement invariance showed that all items represented the same factors across countries. Moreover, the proposed relationships were equal; however, the levels of model variables were different across countries. While our possibilities to unambiguously explain these differences are limited, because we have not measured further country characteristics potentially responsible for the differences, we can still draw selected conclusions for practical implications.

#### 4.3. Implications for policy, business and other practitioners

This thesis is researching a consumer good, i.e. clothing, and behaviour, i.e. reduced consumption, with high environmental and social relevance but comparatively little attention in research so far. Its results offer policy, business and other practitioners valuable insights for how to design policies or intervention and communication strategies that encourage reduced consumption. Firstly, it can be pointed out that reducing consumption seemingly was not seen as a ‘difficult’ behaviour (Reisch et al., 2016). On the contrary, it was perceived as easy, which is in line with previous research finding the majority of an American survey sample agreeing that reducing consumption is desirable and beneficial (Markowitz & Bowerman, 2012). Equally, attitudes towards reduced consumption were positive and increased after the intervention. These results should encourage policy makers to discuss regulatory laws, e.g. design requirements for

long lifetimes, which would decrease planned obsolescence and therefore new purchases, or economic instruments such as higher taxation of environmentally unsound products, e.g. luxury clothing items or items not belonging to a basic range of clothing. In the past, for example, the introduction of a charge for single-use plastic carrier bags was an effective way to reduce consumption of such bags, and support for the policy was high before and after implementation (Poortinga, Whitmarsh, & Suffolk, 2013). Clothing consumption of course profoundly differs from plastic bag purchase, but the results point towards a potential acceptance of policies to reduce consumption among consumer. Policies contain important information for consumers with regard to which behaviours are valued and rewarded in society, and therefore guide consumers' behaviour (Jackson, 2005). This symbolic influence of governments and policy, above and beyond tangible tax revenues or product bans, should not be underestimated. Policies aiming at reducing consumption, as compared to constant policy efforts to spur economic growth and increase consumption could be a valuable avenue to communicate coherent messages to consumers considering the urgency of mitigating climate change.

Furthermore, these results are positive for clothing businesses that aim at selling less, high-quality, long-lasting, if also more expensive clothing products. Clothing consumption never can nor should stop completely, and the future of clothing hopefully will lie with such businesses that appreciate the craft of clothing production and communicate the value of clothing to their consumers, thereby making one step towards leading a change of consumer values. Equally, the results invite big fast fashion retailers to reflect on their current business model.

At the same time, we find social norms to reduce clothing consumption indeed perceived as low. This can be due to two reasons. Either, participants did not like to admit that they are influenced by what others do or think they should do. Or, it is due to the current societal contexts and what Jackson (2016) refers to as the 'iron cage of consumerism'. Sheer endless avenues for marketing and advertising new products are used by the clothing industry. They form another potential avenue for policy application. Conceivable could be regulations on areas where advertisement is allowed to be presented, e.g. limitations for public spaces, on advertisement content, e.g. legal prohibition of advertisement falsely relating intrinsic basic human needs such as happiness or friendship to consumer goods such as clothing, and advertisement target groups, e.g. special protection of young consumers.

Other practitioners and interest groups, such as NGOs or environmental protection organisations, can furthermore support both businesses and policy makers. All practitioners with an interest in reducing consumption can use the results of this thesis to apply theory-based and evaluated communication strategies for encouraging reduced clothing consumption among the public. All three studies thereby provide valuable insights what such communication strategies should contain. With regard to the provision of information, our results are in line with Frick, Kaiser, and Wilson (2004) who find two types of knowledge related to conservation behaviour. These are firstly, action knowledge, i.e. knowledge about the existence of behavioural alternatives that reduce environmental burdens, and secondly, effectiveness knowledge, i.e. information about the effectiveness of this behaviour for mitigating problems. Our intervention offered both types of knowledge. It introduced a comparatively easy behaviour with environmental benefits, namely reducing consumption, and elucidated the general effectiveness of this behaviour in terms of water and energy savings. Following our results, however, a campaign limited to such information provision strategies can raise intentions to reduce clothing consumption but falls short in changing behaviour.

Practitioners should develop communication strategies that go one step further, e.g. asking consumers to define a specific reduction goal for a specific time period and committing to it. Following this, the water and energy saving potential of the specific goal can be determined, which would make environmental benefits more tangible and personally relevant and therewith further support efficacy beliefs. A comprehensive strategy like described here can be perhaps implemented in contexts where a continuous contact with consumers is ensured, e.g. at schools. Teachers looking at approaching complex topics such as globalisation, sustainability and consumer responsibility in realistic and practical ways might use the results of this thesis to develop classroom material for interdisciplinary projects.

Yet, the same principles still can possibly be implemented in a reduced version. Conceivable is a connection between large-scale informational campaigns often used by NGOs, such as WWF or Greenpeace, and further personalized information, e.g. on a corresponding website. The link is particularly easy when the information already is provided via the Internet, e.g. in the form of newsletters or advertisement. When providing information about environmental impacts of clothing production, information campaigns should at the same time provide information about behavioural alternatives, such as reducing consumption. They could furthermore invite to visit a

website, where consumers can indicate how many items less they can imagine buying in a set time period. After providing feedback for the energy and water saving potential for this number of items, consumers should be consecutively asked to commit to these items as saving goal and obtain suggestions that can help them reach their goal.

Lastly, the results of the three-month follow up and their practical implications need reflection. Participants of all intervention groups reduced their clothing consumption at the three-month follow up. We therefore cannot eliminate the possibility that simply counting the items purchased can be a successful strategy for reducing consumption. Future studies with a different set up for the control group are needed to further examine this possibility.

#### 4.4. Methodological reflections

This thesis has several methodological strengths. Firstly, it conducted a cross-cultural study with measurement invariance testing. Measurement invariance testing ensures that constructs measured in different cultural contexts, e.g. countries, and with different languages represent the same factor they were intended to measure in each of these contexts. It is an important prerequisite for any cross-national comparison, but only slowly becoming standard in cross-cultural research (Boer et al., 2018). Secondly, it measured clothing consumption behaviour in addition to intentions to reduce clothing consumption. Behaviour was measured not at long retrospective intervals, but on daily and biweekly bases. Such behaviour measurements reduce the potential of unconscious failure to recall correctly. Thirdly, it deployed a pre-test–post-test control group design, which both enables conclusions about causality to be drawn and can measure the effectiveness of theory-derived intervention strategies. At the same time, some methodological characteristics of this thesis are worthy of reflection.

##### 4.4.1. *Measurement*

The measurement of actual behaviour is of central importance for this thesis, and all three studies relied on self-reports of behaviour. While not setting up the research in a lab setting, i.e. through means of a programmed online-shop, has benefits for external validity, it compromises on obtaining an objective measure of clothing consumption behaviour. Self-reported behaviour does not necessarily reflect real behaviour, but rather how people believe they behave (Gatersleben, Steg, & Vlek, 2010). Even though improved due to shorter measurement and

therefore recall intervals, the behaviour measurement used in this thesis can be distorted, due to both unconscious recall error and to social desirability. One possible example of a imaginable distortion can be found in Study 3, where on average all participants reported having bought significantly less in the past three months at the follow-up ( $M = 4.14$ ) as compared to the same three-month period the previous year ( $M = 7.76$ ) and another three-month period before the intervention ( $M = 8.88$ ). Any explanation for this can only be of speculative nature. Before indicating how many items they have bought the past three months, participants were asked whether they had bought any items in the past month. The number of items they bought in the past month most likely is smaller than what they bought in the previous three months, therefore the question regarding the last month potentially set an anchor leading to an underestimation of the items bought in the previous three months. Without an objective measurement for the actual number of items purchased we cannot exclude e.g. such anchoring or other effects (Jacowitz & Kahneman, 1995; Mussweiler, Strack, & Pfeif, 1991).

Equally, with the measurement of behaviour at the level of past-month purchases at different time points throughout the year, seasonal effects might be possible, therefore limiting the temporal validity of the results. This is particularly pronounced in the diary study, as the timeframe for data collection was only two weeks. Purchases in such short time periods might not be representative for the average level of clothing purchase, as in previous qualitative research consumers reported often buying many items at a time. An under- or over-estimation of the number of items purchased on average can therefore not be excluded. Across all studies, we tried to reduce the possible influence of this effect by relying on different time frames for behaviour measurement. In Study 3, e.g., we compare past-month and past-three months behaviour, both at different time points of the year and for the same time period across years.

Lastly, it should be mentioned that we did not measure other things that could have influenced reduced consumption, e.g. financial circumstances and whether they changed during the study period. Another example are higher-order motives (i.e. motives that influence multiple behaviours) other than morality, e.g. frugality or otherwise egoistic, self-enhancement motives (Gatersleben et al., 2017) Frugality is a voluntary forgoing of the acquisition and using of economic goods and services, and it is related to environmental behaviour through values of self-transcendence like unity with nature on the one hand and self-enhancement like ambition on the other. Morality does not necessarily motivate frugality. Possibly, the strong role of personal

norms we found would have been diminished if we had included a broader variety of further behaviour determinants.

#### *4.4.2. Sample and procedure*

With regard to the sample and therefore generalizability of the results, it is important to make clear the distinctions between Studies 1, 2 and 3. The sample of Study 1 was close to being representative with regard to age, sex, education and region. Limitations to representativeness are due to the fact that the survey was split into two parts, and participants decided themselves whether to return for part two or not. While the first part was completely representative, the procedure led to a self-selection bias and e.g. an underrepresentation of men in Poland or an overrepresentation of older participants in Germany. For Studies 2 and 3, which were both conducted in the United Kingdom, we did not aim for representativeness. The samples for both studies are characterized by an overrepresentation of female participants and lower income classes. Both biases might have influenced the results, about which we can only speculate. On average, we find that women consume more clothing items than men do. The overrepresentation of women therefore could have led to a higher average number of items purchased. Equally, we find a small but significant tendency that more income leads to a higher number of items consumed. This limits the generalizability of the results across the entire population of British citizens.

A further consideration with regard to the procedure is the mixed nature of the intervention conditions in the intervention. Each treatment condition combined multiple strategies, which is preferable if the goal is to achieve behaviour change (Abrahamse et al., 2007; Lokhorst et al., 2013). At the same time, it is a disadvantage for further theory refinement, as we are not able to identify the exact mechanisms that brought about change in the intervention conditions.

Lastly, it should be noted that participants in all studies received monetary rewards for their participation, either in the form of vouchers or as cash compensation. This potentially limits especially the applicability of the intervention design in a real life setting. When not provided with an incentive, consumers might not be motivated to follow such an extensive intervention comprising multiple input units and requiring commitment to change one's behaviour on a voluntary basis.

#### 4.5. Limits and future research

While the strengths of this thesis have been discussed in the previous chapters, it is important also to reflect on both conceptual and methodological limitations. Relating back to the introductory chapter, one major limitation of the current thesis needs to be discussed first and foremost. This is the role clothing consumption is currently playing for the emergence of the severe environmental problems described in the introduction and, hence, the role it can play in the future for their alleviation. Importantly, multiple scholars call for a focus not only on intentions to contribute to environmental protection, but also on actual impact (Gatersleben et al., 2010; Geiger, Fischer, & Schrader, 2018; Schultz & Kaiser, 2012; Whitmarsh, 2009), and environmental impact analysis repeatedly identified food, mobility and housing as the most impactful consumption categories (Ivanova et al., 2016). Given the graveness of environmental problems we are facing, the potential influence of a change in clothing consumption, independently of which exact behaviour is chosen, can only be limited. Further behaviours need to be tackled in order to mitigate climate change. One particularly promising perspective, which recently has gained popularity, is the so-called demand-side mitigation strategies approach (Creutzig et al., 2016, 2018), which seeks to integrate insights from multiple disciplines, including psychology, economics, sociology, political science and engineering research. The aim is to analyse solutions for climate change mitigation with taking into account greenhouse gas emissions of certain behaviours and saving potentials, structural, normative and value factors that shape these behaviours, the role policy and businesses can play to change them and how such changes in current behaviours would affect well-being and sustainable development. Such a synthesis across different research disciplines will help to better identify the most important and useful behaviours for climate mitigation, and therefore give invaluable guidance to e.g. psychologists with regard to which behaviour we should aim to change in future interventions. An analysis like this is missing up until to today (Creutzig et al., 2018), and the choice of target behaviour for this thesis was influenced as much by project funding requirements as by a conclusive identification of reducing consumption as the most promising behaviours for climate mitigation.

Another major limitation of this thesis is its failure to discuss social issues of clothing production in detail, and in how far reducing consumption can help to alleviate these. As mentioned before, reducing consumption can first and foremost only be an aim for developed

countries, which have reached a certain level of material comfort. However, in today's global production and consumption network, the consumption of clothing in developed countries is related to the production of clothing in developing countries, and therewith to economic development in these production countries. While we take a strong stance against workers exploitation, interdependencies between workers in production countries and consumption in developed countries need to be taken into account when reflecting on social outcomes of arguably more sustainable clothing consumption options. Nonetheless, we believe that reduced consumption does not necessarily need to be contrary to economic development where it is needed. This study is solely focusing on reducing current levels of clothing consumption, but future studies need to examine the influence such a reduction has on e.g. the willingness to buy better quality and pay higher prices for a smaller number of items purchased, and therefore on the potential to offer employment in clothing production under fair conditions.

From a practical perspective, one major limitation of this thesis is its inability to draw definite conclusions about which exact intervention strategy is most suitable for fostering a reduction in clothing consumption. As all intervention groups, both control and intervention conditions, consumed less at the three-month follow-up, we can assume that the intervention worked. But in the end, we cannot say with certainty which mechanisms spurred behaviour. One plausible explanation for these results might lay in contextual factors that we did not capture sufficiently in our studies.

Context factors, however, can be hugely important. They are often ignored in environmental psychology research (Schultz & Kaiser, 2012; Steg & Vlek, 2009), even though they have the potential to override person variables like attitudes (Schultz, 2014). Extreme external conditions, e.g. non-availability of certain products or services, constitute the boundaries for the influence of attitudes (Guagnano, Stern, & Dietz, 1995). One extreme condition, which was mentioned by participants in Study 3, was the particularly hot weather in the summer, for which some were not prepared and had to purchase appropriate clothes.

Furthermore, the focus on the internal processes of decision-making leads to an isolation of e.g. consumers as responsible actors, while it is actually also social practices that form behaviour (Howell, 2014). Social practice theory e.g. postulates that 'the individual is deeply embedded in societal, economic and political structures' (Lorek & Vergragt, 2014). Environmentally



psychology is successful at explaining and at developing strategies to change individual behaviour, e.g. through fostering individual environmental concern or encouraging the purchase of environmentally friendly products by consumers. However, it falls short in changing the exact social practices, institutions or contexts that promote unsustainable behaviours in the first place. This individualistic approach has been previously critiqued (Akenji, 2014; Geels, McMeekin, Mylan, & Southerton, 2015; Lorek & Spangenberg, 2014), as with its focus on the individual, it only marginally contributes to the fundamental societal transformations that are needed to mitigate climate change (Bamberg et al., 2018). Systemic conditions under which consumption decisions currently take place are e.g. institutional and cultural logics favouring economic growth and (over)consumption. This points towards the importance of structural changes and governments as compared to individual, voluntary approaches. From this macro perspective, a potential conflict between sufficiency strategies on the one hand and other policy objectives, such as economic growth, becomes perceptible. Such conflicts ‘cannot be ignored but have to be decided on, preferably via democratic processes’ (Reisch, 2004). With its focus on reducing consumption at the individual level, this thesis falls short in discussing the above described conflicts and potential solutions in detail. Hence, while showing the importance of e.g. social norms for reduced consumption, this thesis does not discuss ways of how to influence the current prevalent social norms that are in favour of consumption.

In support of this consideration, we also know that the ecological footprint is to a large extent explained by sociodemographic characteristics (Bleys, Defloor, Van Ootegem, & Verhofstadt, 2017) and that e.g. energy use is more strongly related to household size and income than psychological intent-variables (Gatersleben et al., 2010). Equally, income has been identified as the most important predictor of a region’s carbon footprint (Diana et al., 2017) and individual’s environmental impact, with a positive relationship between income and especially high-impact energy behaviours (Moser & Kleinhüchelkotten, 2017). The role such non-psychological person determinants play for reduced consumption should be further examined in the future, whereby person-variables like income or household size are more difficult to change than e.g. awareness of environmental issues (for some examples, however, see Anson, 2014; Gerold & Nocker, 2018; Knight, Rosa, & Schor, 2013). Potentially, then, different intervention strategies targeting different sociodemographic groups need to be developed.

In the following, more concrete ideas for valuable extensions of this research in the future are noted. Future studies should aim at extending the research sample to e.g. China or India, and testing the generalizability of the current results in emerging economies and cultures profoundly different from the Western context studied here. In addition, the role of further motives for reducing consumption, beyond norms, attitudes and behaviour control, should be examined. Especially financial motives and the aim to avoid being wasteful, both related to frugal consumer identities, could be relevant for reduced consumption. Both could be compatible with environmental concerns as researched here (Gatersleben et al., 2017). Equally, the concept of IWAH could potentially be extended by clearly including future generations of humanity as well. This would enable to analyse temporal intergroup bias more in detail, which previously was found to be related to a preference for sustainable goods (Meleady & Crisp, 2017). Such inclusion would not only reduce social distance of environmental issues, but also temporal distance and therewith further add to clarifying the role of proximizing climate change. Environmentally friendly behaviour fundamentally has to be collective action, and this research offered a first step towards integrating this fact. As for the influence group processes have on sustainable consumption, future studies should try to establish research contexts where the group setting is more natural and more meaningful to consumers, e.g. existing neighbourhoods, school classes or other communities. Further techniques, e.g. using block leaders to communicate intervention material, can be tested in such settings. Moreover, future studies could take our results as inspiration for further examining the effect purely counting, and thereby maybe reflecting on, one's purchases has for reducing consumption.

## 5. Conclusion

This thesis is set out with one main goal: to develop and test a theory-based strategy for reducing clothing consumption, which could be readily deployed by practitioners in the future to foster urgently needed changes in consumer lifestyle. As such, reducing clothing consumption embodies only a small contribution towards alleviating the heavy pressure humans currently put on the environment. Yet, as a conspicuous consumer good and a prime example for the over-consumption occurring in developed countries, clothing is a highly suitable application for studying reduced consumption. Reducing clothing consumption is an important building block towards sustainable development. In conclusion, this thesis was successful at identifying psychological determinants of reduced clothing consumption and strategies to encourage consumers to reduce their clothing consumption. This thesis provided information, supported goal setting and commitment, and provided feedback and advice for avoiding temptation that helped consumers change their purchase behaviour. Reducing consumption, or so-called sufficiency strategies for sustainable development, are necessary but often considered difficult or unpopular (Reisch et al., 2016; Spengler, 2018). It is therefore a particularly positive and promising result of this thesis that consumers rated reducing their clothing consumption as a behaviour that is easy for them, after they had actually reduced their consumption. At the same time, we found that normative messages matter in the context of trying to foster certain behaviours for environmental reasons. Personal norms to reduce consumption were repeatedly found to be the strongest predictor of the intention to do so, and personal norms were strongly influenced by social norms. While perceived social norms (i.e. perceived expectations of others) to reduce one's clothing consumption as well as observations that others do so already were found consistently low across different countries, in particular, increased social norms were related to increased personal norms. This shows the importance of context for clothing consumption, which is currently heavily shaped by advertisement and marketing, propagating the idea of happiness and well-being through the acquisition of constantly new material objects. Even worse, such advertisements are targeted largely at young consumers, who have the future of our planet and therewith the shape of our future in their hands. While we see it as the responsibility of each individual consumer to contribute his or her share, we acknowledge that, likewise, the systems, structures, and institutions we have created for our coexistence in societies need to be revised to support the transition towards profoundly more sustainable

lifestyles. Governmental policies inform consumers in crucial ways about which behaviours and attitudes are rewarded in a society and can have a major influence on the above-described social norms that are so important. Immediate and urgent changes are needed to reduce the risk for extreme floods, heat, and droughts (IPCC, 2018), and reducing consumption must be a part of these changes. We genuinely hope that the results of this thesis might inspire policy makers and practitioners alike to reflect on the goal of reducing consumption in general as well as on particular policies or intervention programmes for fostering reduced consumption in the future. With this thesis, they will find a theory-based and evaluated approach to foster such behaviours. At the same time, this thesis contributes to the current environmental psychology and sustainable consumption literature with new insight regarding the determinants of the intention to reduce consumption and regarding the reduction behaviour. We hope our results will encourage future research (e.g. in the area of collective action or for further important consumer areas, such as the reduction of air travel; (Bamberg et al., 2018; Fritzsche et al., 2018).

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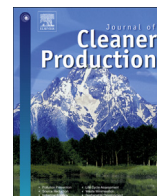
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## Appendix A



# Personal norms in a globalized world: Norm-activation processes and reduced clothing consumption

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## ABSTRACT

Sustainable growth, through efficient technologies or sustainable innovations, has failed to deliver urgently needed changes towards genuinely sustainable production and consumption. Reducing consumption across sectors, therefore, is an imperative given the state of the environment. Correspondingly, there is a need to better understand what leads consumers to reduce their consumption. Building on the Norm Activation Model (NAM), the current study explores the expression of personal norms as well as intentions to reduce clothing consumption. It extends the NAM with the concept of identification with and care for all humanity (IWAH). By employing structural equation modeling ( $n = 4123$ ), it finds evidence for positive relationships between IWAH and NAM variables. Moreover, outcome efficacy has the strongest positive relationship with personal norms, which in turn relate to intentions for reducing consumption. Additionally, the study allows drawing implications for developing future interventions aiming at fostering reduced clothing consumption.

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## 1. Introduction

For decades, the consumption of goods and services has helped to meet basic physiological human needs, such as food and shelter, as well as psychological needs for e. g. gaining prestige or demonstrating individuality. Today, consumers can find an endless amount of options to fulfill those needs in a global marketplace of goods and services. At the same time, however, household consumption puts extensive pressure on the environment, accounting for approximately 60% of the global greenhouse gas emissions and 50–80% of the total resource use (Ivanova et al., 2016).

These developments can be seen explicitly in the clothing industry (Connell, 2010; Lueg et al., 2015) where fast fashion has become a well established and successful business model (Kim et al., 2013). Fast fashion provides growing numbers of clothing items with a short shelf life at affordable prices. The production of this vast amount of clothing puts heavy pressure on the environment, through the extensive use of energy and water. Equally, pesticides and chemicals used during the production process pollute local ecosystems (Choudhury, 2014). Often outsourced to developing countries, the production of clothing furthermore comprises major social concerns including long working hours,

unsafe working conditions, child labor, payment below the minimum wage and denial of labor rights (Dickson et al., 2009).

Against this backdrop, changing consumption patterns towards more sustainable ways of consuming clothing is of utmost importance to protect the environment and alleviate social problems. One potential avenue is changing consumer preferences towards more sustainable product alternatives. While consuming clothing made from e. g. organically grown cotton might be beneficial, it remains unclear whether this will suffice. So far, sustainable growth via more efficient technology or sustainable innovations has failed to deliver urgently needed changes towards genuinely sustainable production and consumption, both from an environmental as well as social justice perspective (Brown and Vergragt, 2016; Hueting, 2010; Kalmykova et al., 2016; Lorek and Spangenberg, 2014; Martínez-Alier et al., 2010). Therefore, reducing overall consumption levels through buying less, or deciding not to buy specific environmentally and ethically harmful products at all, has previously caught scholarly attention. Such ‘strong sustainable consumption’ focusing on the problem of overconsumption, as opposed to technological solutions and ‘weak sustainable consumption’ (Gunderson, 2018; Lorek and Fuchs, 2013), is a promising avenue towards the development of more sustainable societies (García-de-Frutos, Ortega-Egea, & Martínez-del-Río, 2016; Capstick et al., 2014; Clayton et al., 2015a).

The current paper focuses on consumers’ efforts to reduce personal consumption based on environmental and social concerns in

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the area of clothing, which can be achieved by buying fewer items or by deciding to stop the purchase of clothing one deems problematic (e. g. non-consumption of virgin material clothing).

Since the behavior of society, organizations and ultimately individuals causes environmental damage, it is reasonable to consider ways of addressing the issue at the level of the individual (Clayton et al., 2015b). The Norm Activation Model (NAM) is one psychological approach to identify individual characteristics that lead to or hinder engaging in specific behaviors. In the current paper, it serves as a theoretical framework for exploring the role awareness of need, an ascription of responsibility and outcome efficacy play in developing a personal norm to reduce clothing consumption.

The environmental and social impact of clothing production often takes place far away from the point of consumption and the consumer. This results in the particular condition of psychological distance, i. e. spatial, temporal and social (Liberman and Yaacov, 2008), between object and subject of the personal norm. In this context personal consumption decisions, made individually, gain normative relevance only in a global perspective. The current paper, therefore, extends the NAM with the concept of identification with humanity (IWAH), which is the categorization of oneself as part of, as well as a concern for all humanity, above and beyond one's community and nation (McFarland et al., 2012).

The contribution of the current study is threefold:

- 1) Theoretically, it extends the NAM with the concept of IWAH, (McFarland et al., 2012). Given the global context of clothing production and consumption, it investigates the relationship between general care for all humankind on a global scale, including those afar who are suffering the results of environmental degradation and social injustices, and the expression of personal norms to reduce clothing consumption.
- 2) Contextually, it applies the extended NAM to a behavior highly relevant for future emission reductions, which comparatively few studies have examined in depth so far: the phenomenon of reduced consumption. It furthermore focuses on the area of clothing consumption, which, after food, transportation, and housing, ranks as the product category with the highest environmental impact. However, clothing consumption is still an understudied area of consumption.
- 3) Methodologically, it bases its results on a large and diverse sample of 4123 respondents across four countries (United States, Germany, Poland and Sweden), which allows insights valid for the four biggest clothing markets in different geographical areas.

## 2. Conceptual framework

Fig. 1 summarizes the proposed model for the current study. In the model, intentions to reduce personal clothing consumption are

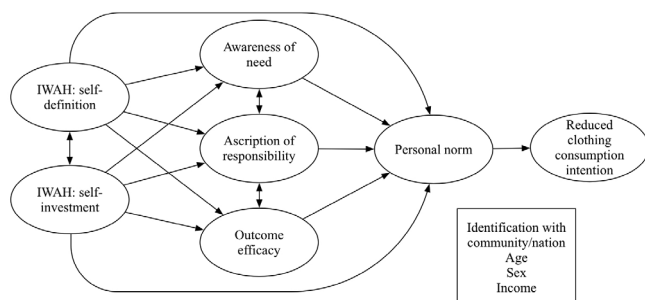


Fig. 1. Proposed structural model (IWAH: Identification with all Humanity).

related to feelings of moral obligation to do so. Antecedents for these personal norms are awareness of need, an ascription of responsibility and outcome efficacy. Two dimensions of IWAH – self-definition and self-investment – are both directly related to personal norms and indirectly through antecedents. Age, sex, income, and identification with community and nation are included as control variables.

### 2.1. Norm activation theory

The NAM (Schwartz, 1977) was originally developed in the context of pro-social behavior, but it repeatedly has been applied in the environmental behavior domain. According to the NAM, activated personal norms as feelings of personal obligation are the driving force for pro-social behavior. Previous studies mainly focus on two factors that are important for the activation of personal norms in a given situation: awareness of need and attribution of responsibility. Thereby awareness of need, in the original sense, is often labeled as awareness of consequences and both are used interchangeably (Klöckner, 2013). The assumption is that a person a) has to be aware of an existing problem, b) needs to be aware of the potential consequences of his or her behavior related to the need or problem and c) accepts a certain responsibility for these consequences. If awareness of consequences and attribution of responsibility increase, behaviors are more likely to be in line with existing personal norms (Van Liere and Dunlap, 1978).

Schwartz initially theorized other important steps for the activation of a personal norm, e. g. the perception that there are actions which can be taken to relieve a problem (i. e. outcome efficacy) as well as the recognition of one's own capability to perform these actions (i. e. self-efficacy) (Broman Toft, Schuitema and Thøgersen, 2014; Harland et al., 2007; Nordlund et al., 2016; Schwartz, 1977). Accordingly, De Groot & Steg (2009) and Steg and De Groot (2010) found outcome efficacy and He and Zhan (2018) consumer effectiveness as 'the extent to which a person believes he or she can control the relevant problems' with his or her actions to be an important predictor of personal norms.

Prior studies provide evidence that the NAM is a valuable theoretical framework for the prediction of a range of pro-environmental intentions and behavior. Personal norms are linked to pro-environmental behavior intentions in various areas such as travel mode choice (Bamberg et al., 2007), buying environmentally friendly products or organic food (Aertsens et al., 2009; Onwezen et al., 2013) and purchase of hybrid or electric vehicles (Nordlund and Garvill, 2002). Equally, the NAM has been used in the context of intentions to reduce energy consumption (van der Werff and Steg, 2015). The scope of the current study is to test whether the NAM can serve as a useful framework for explaining intentions to reduce personal clothing consumption. Based on previous literature, the following hypotheses are developed.

**H1.** There is a significant positive relationship between personal norms and intentions to reduce personal clothing consumption.

**H2.** There is a significant positive relationship between personal norms to reduce personal clothing consumption and

2a: the awareness of environmental and ethical issues within clothing production,

2b: the ascription of responsibility for these issues,

2c: outcome efficacy beliefs regarding the ability to remedy them with one's actions.

## 2.2. Identification with humanity as an antecedent for perceived personal obligations to act

Consumers in Western countries rarely experience the negative impacts of the production of the clothing they consume. There is a spatial, temporal and social distance between the places and subjects of production and consumption, as well as uncertainty about the actual existence of specific problems from a consumer perspective. Nevertheless, calls for individuals to act and mitigate environmental and social issues are as ubiquitous as they are reasonable. Noticeably, such appeals presume that consumers have some form of 'mental connection to those who are or will be threatened' (Fritzsche et al., 2018). In the following, two lines of research that inform how such a perspective of collective thinking is shaped are discussed.

Generally, humans can define themselves and their identity along different levels of inclusion as individuals (personal identity), as members of particular groups (social identity) or, at the highest level of inclusion, as members of the most inclusive group of human beings. Defining oneself as a member of a specific group and therewith the group as 'in-group' leads to behavior in favor of the group's interests (see social identity theory, *Tajfel and Turner, 1986* & self-categorization theory, *Turner et al., 1994*). Hence, identification with the most inclusive 'in-group' of all humans may contribute to behaviors that serve all humans, such as behaviors that tackle global environmental and social problems.

One psychological concept addressing the notion of a superordinate group of all humans is IWAH as the categorization of oneself as part of, as well as a concern for all humanity (*McFarland et al., 2012*). Recent research has refined the concept of IWAH and identified a two-factor structure with the two dimensions self-definition and self-investment (*Reese et al., 2015; Reysen and Hackett, 2016*). Self-definition relates to defining oneself as part of the most inclusive group of all humans and group similarities, and self-investment stands for solidarity and loyalty with and proactive concern for humans all over the world.

Previous research repeatedly established links between the identification with humanity and pro-social and cooperative behaviors (*Reese, 2016*) as well as a felt responsibility to take action for a better world (*Reysen and Katzarska-Miller, 2013*) and pro-environmental behaviors (*Der-Karabetian et al., 2014; Rosenmann et al., 2016*). An identification with the common human group was positively related to a preference for choosing a smaller fair-trade chocolate bar as a reward instead of a bigger conventional chocolate bar (*Reese and Kohlmann, 2015*). Moreover, *Reese et al. (2015)* could show in a laboratory setting that an experimental group with higher self-investment donated significantly more to a local and global charity than a control group.

People high in IWAH should have an increased interest in events and situations that affect humanity as a whole as well as humans in distant places, which should translate in higher knowledge about such events and situations as well as wish to learn about them. Previous research has found IWAH to be related to such a desire as well as increased actual knowledge of global concerns (*McFarland, 2017*). The Psychological Sense of Global Community (*Malsch and Omoto, 2007*), a measure highly correlated with IWAH (*McFarland and Hornsby, 2015*), was found strongly correlated to a measure of global social responsibility. *Devine-Wright et al. (2015)* found that relatively strong attachment at the global scale (defined as a strong sense of belonging to the area 'whole world') relates to an increased belief that climate change is happening and induced by humans. Together, this research points towards the significance of IWAH for behavioral intentions to act up environmental and social issues. At the same time, it shows links between IWAH and the concepts of awareness of need and ascription of responsibility from the NAM.

Somewhat contrary to this global perspective, previous research examined the effect of reducing psychological distance on concerns about and willingness to act concerning e. g. climate change. Intuitive at first glance, the results of such 'proximizing' strategies on attitudes and motivation are mixed. While some studies found lower psychological distance as well as personal experience of climate change related events linked to heightened concerns and willingness to act (*Scannel and Gifford, 2013; Spence et al., 2011*), other studies fail to show this relationship (*Brügger et al., 2015; Brügger et al., 2016; McDonald et al., 2015; Schuldt et al., 2018*).

The framework of Construal Level Theory (CLT) (*Liberman and Yaacov, 2008; Trope and Liberman, 2010*) can help to understand these inconsistencies. It theorizes that psychological distance first and foremost affects mental representations of situations or objects and the type of information that is used to evaluate them. Increased psychological distance points to an increase in higher-level construal, which leads to an evaluation of situations and objects in favor of more abstract and generalized principles as compared to contextual information. One example for generalized and decontextualized high-level principles are moral principles. Under circumstances of psychological distance, persons are therefore more inclined to base their judgments and decisions on generalized values and moral principles (*Eyal et al., 2008*). This line of research highlights the possible benefits of a higher-level, abstract construal of humanity for the activation of moral principles and theoretically points towards a relationship between IWAH and personal norms.

Apart from this direct link of IWAH with personal norms, an indirect connection of IWAH with personal norms, mediated through NAM variables, is theorized. In line with the NAM, which conceptualizes awareness of need, an ascription of responsibility and outcome efficacy as antecedents to personal norms, I understand IWAH as an antecedent to awareness of need and ascription of responsibility. Concluding the following hypotheses are postulated:

**H3.** There is a significant positive relationship between the two IWAH components of self-definition and self-investment and

3a: personal norm as the felt personal obligation to reduce personal clothing consumption.

3b: awareness of need and ascription of responsibility regarding environmental and social problems of clothing production.

To my knowledge, no previous research has examined the relationship between both self-definition and self-investment and outcome efficacy. I do not have an a priori hypothesis about the magnitude or direction of this relationship but include it in the model for exploratory purpose.

## 3. Method and data

### 3.1. Procedure and sample

An online survey, administered by the research institute Qualtrics, was carried out in four countries between October 2016 and February 2017 with a target population aged 18 to 65. The four countries are the United States as the worldwide biggest market for apparel and footwear, Germany as Europe's biggest market, Sweden as the biggest market among the Scandinavian countries and Poland as biggest Eastern European market (*Euromonitor, 2017*). The survey contained multiple measures to ensure data quality and eliminate careless responses, such as instructed items (e. g. "Please select strongly agree") (*DeSimone et al., 2015*). The final sample was  $N=4591$  with a mean age of 42.17 years ( $SD=13.55$ ) and 56.70% female respondents (for an extensive description of the sample see *Gwozdz et al., 2017*).

### 3.2. Measurements

Unless otherwise stated, respondents indicated what applies for them on a 7-point Likert scale from ‘Strongly disagree’ to ‘Strongly agree’. The primary outcome variable ‘reduced clothing consumption’ was defined as the intention to either reduce or entirely boycott the consumption of clothing products deemed problematic. Future intention to reduce consumption was measured with the two items *in the next three months, when buying clothing items, I intend to ...* (1) *Refrain from buying clothing about which I have environmental concerns* and (2) *buy fewer clothing items than usually/before*.

All items are listed in [Appendix A](#). For the NAM constructs we developed our own measurements based on item formulations in previous literature ([De Groot and Steg, 2009](#); [Nayum et al., 2016](#)). Five items measured personal norms, six items awareness of need, ascription of responsibility and outcome efficacy each, referring to both issues of environmental and social concern. IWAH was measured by the Identification with all Humanity Scale ([McFarland et al., 2012](#)) containing nine items and respondents were asked to answer on a 5-point Likert scale. Besides, we measured identification with one's community and nation. Both variables are not directly of interest but included in the model as control variables to find the unique associations of IWAH ([McFarland et al., 2012](#)). The items were identical for all three types of identification, but the phrase “People all over the world” was replaced with “my community” and e. g. “Americans” respectively. For the remainder of this paper, the focus of the measurement lies on IWAH with its two dimensions – namely self-definition and self-investment.

### 3.3. Statistical analyses

Firstly, the descriptive structure of the data was explored using STATA 14.2. Secondly, the confirmatory factor model was fitted with AMOS 24.0 to validate the a priori measurement model. The procedure of listwise deletion resulted in a sample size of  $n = 4123$  used cases. Selected observed variables, belonging to the same latent variable, were allowed to correlate if their wording indicated a possible relationship. Finally, the analysis of the structural model was conducted with maximum likelihood estimation and bootstrapping ( $n = 2000$ ) to obtain robust standard errors. [Fig. 1](#) depicts the structural model. To account for the structure of the data as clustered in countries a multi-group comparison by country was conducted. Individual country results are not presented in the current paper, as country-specific differences are neither part of the theoretical framework nor the focus of the current analysis.

However, the author of the study can provide results for the different countries on request.

## 4. Results

### 4.1. Descriptive results and prevalence of reduced clothing consumption behaviors

Descriptive statistics of all scales and control variables are depicted in [Table 1](#). All scales show adequate reliability (Cronbach's  $\alpha = 0.84$ – $0.97$ ) and zero-order correlations indicate significant weak to moderate positive relationships between all scales. Asked about their intention not to consume clothing deemed problematic in next three months, 37% of the participants indicated that they disagree having this intention (see [Fig. 2](#)). 28% reported being neutral and 35% reported that they agree having such an intention ( $M = 3.81$ ,  $SD = 1.84$ ,  $Range = 1$ – $7$ ). In comparison, 25% disagreed with having an intention to consume fewer items in the next three months. 33% remained neutral and 42% agreed to have such an intention ( $M = 4.27$ ,  $SD = 1.71$ ,  $Range = 1$ – $7$ ) (see [Table 1](#)).

### 4.2. Confirmatory factor analysis and structural equation model results

The results of the confirmatory factor analysis with ML estimator show satisfactory standardized loadings (all apart from one item  $> 0.79$ ) of all indicators on their respective latent factor (for the unstandardized and standardized factor loadings see [Appendix A](#)). In line with previous research, the IWAH item “How much do you identify with (that is, feel a part of, feel love toward, have concern for) each of the following?” was excluded due to cross-loading on both self-definition and self-investment ([Reese et al., 2015](#)). Equally, one item of the self-definition dimension with a loading  $< 0.70$  was excluded from further analysis. The fit of the measurement model was overall adequate with  $\chi^2(1910, n = 4123) = 6749.57$ ,  $p < .001$ ,  $CMIN/DF = 3.53$ ,  $NFI = 0.97$ ,  $CFI = 0.98$ ,  $TLI = 0.98$ ,  $RMSEA = 0.02$  (90% confidence interval =  $[0.02, 0.02]$ ,  $SRMR = 0.02$ , suggesting the proposed factor structure is one possible representation of the given data ([Iacobucci, 2010](#)). Satisfactory Composite Reliability ( $CR \geq 0.84$ ), Average Variance Extracted ( $AVE \geq 0.64$ ) and Maximum Shared Variance ( $MSV \leq 0.55$ ) scores for each factor established reliability, convergent and discriminant validity of the model factors (see [Appendix A](#) for details) ([Hair et al., 2010](#)).

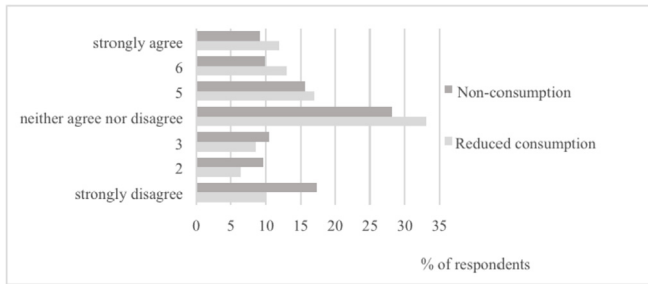
In a next step, the path and proposed structural model were tested together. The fit was adequate with  $\chi^2(2950,$

**Table 1**  
Descriptive results.

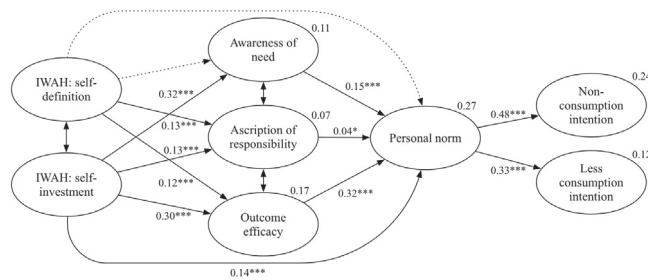
Scale	M	SD	Range	1	2	3	4	5	6	7	8	C1	C2
(1) IWAH: Self-definition (SD)	2.68	0.89	1–5	$\alpha = .84$									
(2) IWAH: Self-investment (SI)	3.40	0.98	1–5	0.64	$\alpha = .89$								
(3) Awareness of need (AN)	5.45	1.29	1–7	0.23	0.30	$\alpha = .94$							
(4) Ascription of responsibility (AR)	4.18	1.61	1–7	0.19	0.19	0.42	$\alpha = .96$						
(5) Outcome efficacy (OE)	4.58	1.58	1–7	0.34	0.38	0.43	0.38	$\alpha = .97$					
(6) Personal norm (PN)	4.18	1.74	1–7	0.28	0.34	0.36	0.26	0.47	$\alpha = .95$				
Intention													
(7) Non- consumption	3.81	1.84	1–7	0.30	0.34	0.32	0.21	0.42	0.48	1.00			
(8) Less consumption	4.27	1.72	1–7	0.09	0.13	0.15	0.11	0.21	0.34	0.35	1.00		
C1 Identification with community	3.35	0.83	1–5	0.37	0.42	0.19	0.12	0.27	0.26	0.17	0.09	$\alpha = .91$	
C2 Identification with nation	3.39	0.78	1–5	0.39	0.47	0.14	0.04 <sup>1</sup>	0.24	0.21	0.13	0.08	0.68	$\alpha = .90$
C3 Female	0.57	0.50	0–1										
C4 Age (years)	42.52	13.56	18–65										
C5 Income (11 categories)	4.69	3.15	0–1										

Note. IWAH: Identification with all Humanity; C: control variables;  $n = 4123$ ; all but one correlations are significant with  $p \leq .001$  (<sup>1</sup>  $p \leq .05$ ).





**Fig. 2.** Prevalence of intention to reduce clothing consumption in the next three months.



**Fig. 3.** Structural model with standardized path coefficients, bootstrapped standard errors ( $n = 2000$ ) and multiple squared correlations ( $R^2$ ) for dependent variables at the top right corner; \*\*\* $p < .001$  \*\* $p < .01$  \* $p < .05$  (IWAH: Identification with Humanity).

$n = 4123$ ) = 13502.30, CMIN/DF = 4.58,  $p < .001$ , NFI = 0.95, CFI = 0.96, TLI = 0.95, RMSEA = 0.021 (90% confidence interval = [0.02, 0.02], SRMR = 0.07. Fig. 3 indicates standardized path coefficients and the explained variance of the dependent variables ( $R^2$ ) for the structural part of the model. Standardized path coefficients and bootstrapped 95% confidence intervals for the standardized path coefficients are presented in Table 2.

The standardized path coefficients show a significant direct positive relationship between personal norm and the intention to not consume clothing deemed problematic ( $\beta = .48$ ,  $p < .001$ ) and consume less clothing ( $\beta = 0.33$ ,  $p < .001$ ), which provides evidence for the acceptance of H1. The explained variance of the former intention is  $R^2 = 0.27$ , of the latter  $R^2 = 0.12$  (see Fig. 3).

In line with H2a, H2b, and H2c there are significant direct positive relationships between awareness of need, an ascription of responsibility, outcome efficacy and personal norm. Outcome efficacy has the strongest relationship with personal norm ( $\beta = 0.32$ ,  $p < .001$ ) and ascription of responsibility the weakest ( $\beta = 0.04$ ,  $p < .05$ ). The relationship between awareness of need and personal norms is significant and positive ( $\beta = .15$ ,  $p < .001$ ).

There is a positive direct relationship between personal norm and self-investment ( $\beta = 0.14$ ,  $p < .001$ ), partially confirming H3a. Furthermore, significant direct positive relationships are found between IWAH components and awareness of need, an ascription of responsibility and outcome efficacy. The self-investment component of IWAH is the main driver of the relationship, as indicated by higher standardized path coefficients between self-investment and awareness of need ( $\beta = .32$ ,  $p < .001$ ) and outcome efficacy ( $\beta = 0.30$ ,  $p < .001$ ). Self-definition ( $\beta = 0.13$ ,  $p < .001$ ) and self-investment ( $\beta = 0.13$ ,  $p < .001$ ) are equally strongly associated with ascription of responsibility, but there is no significant connection between self-definition and awareness of need. The results mostly confirm H3b and shed some light on the relationship between IWAH and outcome efficacy.

**Table 2**

Standardized path coefficients for the full structural equation model.

From	To	Full model
IWAH Self-definition definition	AN	0.00 (n. s.) [-0.07; 0.07]
	AR	0.13*** [0.07; 0.19]
	OE	0.12*** [0.06; 0.18]
	PN	0.01 (n. s.) [-0.04; 0.07]
IWAH Self-investment	AN	0.32*** [0.25; 0.39]
	AR	0.13*** [0.07; 0.19]
	OE	0.30*** [0.23; 0.36]
	PN	0.14*** [0.08; 0.2]
AN	PN	0.15*** [0.11; 0.19]
AR	PN	0.04* [0; 0.07]
OE	PN	0.32*** [0.28; 0.35]
PN	Non-consumption	0.48*** [0.45; 0.5]
PN	Less-consumption	0.33*** [0.29; 0.36]
Obs.		4.123

Model fit:  $\chi^2 = 13502.30$ ;  $df = 2950$ ;  $p \leq .001$ ;  $\chi^2/df = 4.58$ ; CFI = 0.96; NFI = 0.95; TLI = 0.95; RMSEA = 0.02. SRMR = 0.07.

Note: \*\*\* $p \leq .001$  \*\* $p \leq .01$  \* $p \leq .05$ ; standardized coefficients, bias-corrected bootstrapped 95%-confidence intervals in parentheses ( $n = 2.000$ ); controls: age, income, sex, identification with community, identification with nation; multi-group comparison by country to account for data structure.

#### 4.3. Effects of control variables

The relationships between awareness of need, ascription of responsibility, outcome efficacy, personal norm and the IWAH components remain positive and significant after including identification with community and nation as control variables. Moreover, identification with community itself is significantly connected to awareness of need ( $\beta = 0.12$ ,  $p < .001$ ), ascription of responsibility ( $\beta = 0.12$ ,  $p < .001$ ), outcome efficacy ( $\beta = 0.12$ ,  $p < .001$ ) and personal norm ( $\beta = 0.11$ ,  $p < .001$ ). Identification with nation has a significant negative relationship with awareness of need ( $\beta = -0.08$ ,  $p < .001$ ) and ascription of responsibility ( $\beta = -0.15$ ,  $p < .001$ ). Age is positively connected to non-consumption intention ( $\beta = 0.05$ ,  $p < .01$ ) and less consumption intention ( $\beta = 0.04$ ,  $p < .05$ ). Similarly, gender path coefficients are significant with being a woman positively connected to non-consumption intention ( $\beta = 0.03$ ,  $p < .05$ ) and intention to buy less ( $\beta = 0.06$ ,  $p < .001$ ). Income is negatively related to personal norm ( $\beta = -0.03$ ,  $p < .05$ ), non-consumption intention ( $\beta = -0.05$ ,  $p < .01$ ) and less consumption intention ( $\beta = -0.07$ ,  $p < .01$ ).

## 5. Discussion

The current paper identifies psychological factors that are related to a person's intention to reduce their clothing consumption. The results support that felt personal norms to reduce personal clothing consumption are related to behavioral intentions. Such personal norms are also associated with awareness of need, an ascription of responsibility and outcome efficacy. The latter was



found to have the strongest positive relationship with personal norms, indicating that an increase in outcome efficacy is one of the primary determinants for increased activation of personal norms to reduce personal clothing consumption. These findings are in line with previous research, particularly for energy saving behaviors (van der Werff and Steg, 2015) as well as willingness to ban products produced by children (Steg and De Groot, 2010) or buying environmentally friendly products (Antonetti and Maklan, 2014). Additionally, similar results are found within the application of Protection Motivation Theory, which includes 'the availability and effectiveness of a coping response' (Rogers, 1975, p. 97) as an important component for attitude change. For example, with respect to electrical vehicle adoption, Bockarjova and Steg (2014) found response efficacy (i. e. the belief, that electric vehicles can help to solve problems caused by the conventional car) to be the second strongest predictor for the positive evaluation of electric vehicles and strongest predictor for the acceptability of policies promoting the use of electrical vehicles. Raine and Christensen (2017) equally found response efficacy as the strongest predictor of behavior intention for different pro-environmental behaviors, such as driving less or turning down the thermostat.

As the current results show, IWAH is another factor contributing to the development of personal norms and thereby behavioral intentions, which is the case above and beyond ones' identification with community and nation. The results are in line with previous research, which found IWAH related to environmentally friendly behaviors (Reese, 2016; Reese and Kohlmann, 2015; Renger and Reese, 2017). Likewise, the current data confirm the previously found two dimensions of the identification with humanity scale, one reflecting the identification with all humanity as belonging to one common in-group and perceiving group similarities (self-definition) and another one indicating care, solidarity, and loyalty for all humanity (self-investment). Both dimensions correlate highly, and similar to previous research it is mainly self-investment that is underpinning the positive relationship between IWAH and personal norms (Reese et al., 2015). An increased self-investment does not only directly influence personal norms positively but is also positively related to increased awareness of need about environmental and social problems of clothing production, as well as increased outcome efficacy beliefs. These results directly link to recent research on compassion and sustainable clothing consumption. Geiger and Keller (2017) found compassion to explain variance in the endorsement of sustainable clothing and willingness to pay for fair trade labeled clothing. Compassion in this context is defined as evoking emotions as well as behavioral tendencies to relieve the pain of people suffering, and conceptually overlaps with the self-investment component of IWAH.

In this context, two particular results require further discussion. Firstly, the non-significant relationships between self-definition and awareness of need as well as personal norms should be addressed. These findings are in line with previous research, which found the dimension of self-definition unrelated to e. g. justice beliefs and intention to act against global injustice (Reese et al., 2015). One preliminary explanation is that mere self-definition and a perceived similarity is not enough, but that it also needs active willingness to invest in and commitment to help all humanity to motivate action. However, interpreting these non-significant results under the lens of Construal Level Theory can add a different perspective and possible explanation. The processes of self-definition are different from self-investment, as they are focusing on perceiving similarities between the self and the group of all humans and ingroup homogeneity (Leach et al., 2008). Such processes potentially bring the abstract conception of humanity closer to the self, thereby reducing psychological distance. The self-investment component, however, does not necessarily reduce

psychological distance but is more connected to solidarity and wanting to help the abstract group of humanity. According to Construal Level Theory, this more abstract construal of humanity would more likely allow people to act in line with their moral convictions than reduced psychological distance would.

Secondly, further elaboration is necessary for the significant positive relationships between IWAH components and outcome efficacy, which were included for explorative purposes. Based on the current research, possible explanations can only be of presumptive nature. One possible reason is that the feeling of belonging to a group raises feelings that together as a group one can help alleviate large-scale problems like e. g. environmental burden connected with clothing production and consumption. Previous research has established that manipulations increasing collective efficacy raise pro-environmental intention through enhancing self-efficacy in parallel (Jugert et al., 2016). As the current study has not measured collective efficacy, this idea cannot be further tested, and future research would have to analyze the connection between IWAH, collective efficacy and personal efficacy more in detail. Furthermore, in line with this thinking, research by Greenaway et al. (2015) in the context of health and well-being showed that identification with social groups (e. g. the group world citizens) is connected to greater perceived personal control. Equally, future studies should seek to understand how far this translates into the environmental domain and specifically to outcome efficacy as the perception that one's actions can have an impact on environmental and social issues.

### 5.1. Practical implications

These findings can give valuable input for e. g. NGOs or other public actors who wish to design successful interventions and communication strategies aimed at reducing overall clothing consumption and its environmental and social impacts. The current results not only show that personal norms are connected to intentions to reduce consumption, but also illustrate possible antecedents that can foster feelings of personal obligation. As a general setting, they point towards a need for carefully considering e. g. strategies to bring environmental or social issues close to the self against strategies which capitalize on psychological distance. 'Proximising' such issues translates not necessarily into more engagement. This perspective can offer new opportunities for engagement and communication techniques, which should focus more on setting the stage of solidarity with spatial and socially distant citizens of the world. For example, Reese et al. (2015) explored an experimental manipulation of IWAH by showing an image depicting 'hands and arms of obviously varying ethnic background reaching for a globe image', which should cause more perceptions of solidarity with all humans despite psychological distance than of ingroup homogeneity. In line with this reasoning, the intervention successfully increased self-investment among the experimental group, but not self-definition. Moreover, participants from the experimental group donated more money for both a local and global charity as compared to the control group. Increasing identification on the more abstract level of self-investment can furthermore facilitate the processing of other information on a fitting abstraction level, e. g. about distant environmental and social problems related to clothing production (Brügger et al., 2016). Increased awareness of these problems, in turn, is related to felt moral obligations to reduce clothing consumption.

Lastly and importantly, intervention strategies should focus on communicating that individual consumers' actions can have a real impact on reducing environmental and social problems (Raine and Christensen, 2017). Supplemented by information about concrete actions consumers can take, these messages can be promising

avenues for communicating with consumers and reducing clothing consumption.

## 5.2. Limitations and future studies

The results need to be set in context within the limitations of the current study. The two main limitations are its cross-sectional design as well as reliance on self-reported measurements.

The results are of a correlational nature, and the proposed directions of relationships between different model components are assumptions that cannot be proven, i. e. cause and effect cannot be tested. Furthermore, the study only assesses intentions for future reduction of clothing consumption, and research across multiple behavior domains has repeatedly shown that it is often a long way from intention to behavior (Carrington et al., 2016). Hence, future studies should focus on collecting longitudinal data containing information on intentions to perform a specific behavior in the future as well as on actual behavior at a later point in time.

Using self-reported data always harbors the risks of social desirability bias leading to an over- or underestimation of actual intentions or behavior, which can be especially relevant for socially accepted behaviors like environmentally friendly consumption. Moreover, single items were used to measure intentions for non-consumption of items deemed problematic and less consumption. Additionally, the item formulation for reduced consumption intentions does neither contain environmental nor social concerns as reasons for reduced consumption and the wording of 'usually/before' can be understood differently for each participant. Therefore, it cannot be identified why participants decided to consume fewer items. Possible alternative explanations, such as saving money or seasonal fluctuation in one's needs, cannot be ruled out. Future studies, therefore, could aim at improving the measurement of reduced consumption. Thereby behavior ideally would not only be measured by recalling past behavior or intention via self-reports, but also cross-validated via observation or real-time data collection.

## 6. Conclusion

The current study examines psychological antecedents for the development of a felt personal obligation, or personal norm, to reduce personal clothing consumption due to environmental concerns. It furthermore assesses the connection between such a norm

and intentions to reduce personal clothing consumption in the future. The proposed model is based on the NAM but extends previous studies by adding the concept of IWAH as the categorization of oneself as part of and concern for all humanity. The model fit is satisfactory, and all but two proposed relationships are significant. Together, the findings prove the usefulness of the NAM to explain personal norms for reducing personal clothing consumption, which in turn are related to consumers' indicated intention to reduce their consumption in the following three months. IWAH has proven to be a valuable addition to the traditional components of the NAM and to make a contribution as an antecedent for them. Given the urgency of environmental issues and the pressing need for resolving them, questions regarding the ability of consumers to leverage solutions solemnly through personal behavior changes need to be taken seriously. Focusing on individual consumers' consumption patterns can only be seen as one building block, although an important building block, towards more sustainable societies. Despite its shortcomings, the current study contributes by providing a valuable overview of psychological components that are potentially valuable in fostering consumers' intention to reduce their clothing consumption.

## Conflicts of interest

None.

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## Appendix A

	B	S. E.	p	beta	95%-confidence interval
Personal norm (CR = 0.95, AVE = 0.78, MSV = 0.19)					
→ I feel obliged to reduce my personal clothing consumption because of my personal values	1			0.92	[0.91; 0.93]
→ No matter what other people think or do, my principles tell me that it is right to reduce my personal clothing consumption	0.89	0.01	***	0.85	[0.83; 0.86]
→ Reducing my personal clothing consumption is the right thing to do	0.85	0.01	***	0.80	[0.78; 0.81]
→ I feel morally obliged to reduce my personal clothing consumption	0.99	0.01	***	0.92	[0.90; 0.93]
→ I feel a strong personal obligation to reduce my personal clothing consumption	1	0.01	***	0.93	[0.92; 0.94]
Awareness of need (Clothing production ...) (CR = 0.94, AVE = 0.73, MSV = 0.12)					
→ Uses vast amounts of energy and water	1			0.83	[0.81; 0.84]
→ Causes tremendous harm to the environment	1.13	0.02	***	0.88	[0.87; 0.89]
→ Uses vast amounts of hazardous chemicals	1.09	0.02	***	0.88	[0.87; 0.89]
→ Operates under unsafe working conditions	1.01	0.02	***	0.82	[0.80; 0.83]
→ Operates under precarious employment conditions	0.95	0.02	***	0.79	[0.76; 0.80]
→ Impairs the health of people living in the production countries	1.11	0.02	***	0.87	[0.85; 0.88]
Ascription of responsibility (Through my personal clothing consumption, I ...) (CR = 0.96, AVE = 0.81, MSV = 0.05)					
→ Am contributing to the harm done to the environment	1			0.91	[0.90; 0.92]
→ Am contributing to the amount of energy and water used in clothing production	0.96	0.01	***	0.88	[0.86; 0.89]
→ Am contributing to the use of hazardous chemicals in clothing production	1.04	0.01	***	0.93	[0.92; 0.94]
→ Am contributing to the health impairment of people living in countries that produce clothing	1.03	0.01	***	0.92	[0.91; 0.93]
→ Am partly responsible for unsafe working conditions	1.03	0.01	***	0.89	[0.88; 0.90]
→ Am supporting precarious employment conditions	1.01	0.01	***	0.86	[0.85; 0.88]
Outcome efficacy (Through my personal clothing consumption, I can ...) (CR = 0.96, AVE = 0.81, MSV = 0.19)					

(continued on next page)

(continued)

	B	S. E.	p	beta	95%-confidence interval
→ reduce the environmental impact	1			0.89	[0.88; 0.91]
→ have an impact on water and energy savings	0.98	0.01	***	0.88	[0.86; 0.89]
→ have an impact on reducing the use of hazardous chemicals	1.05	0.01	***	0.92	[0.91; 0.93]
→ influence improvements in working conditions	1.04	0.01	***	0.90	[0.89; 0.92]
→ influence improvements in the health of people living in production countries	1.04	0.01	***	0.91	[0.89; 0.92]
→ influence improvements in precarious employment conditions (e.g. child labor. long working hours. and low wages)	1.04	0.01	***	0.89	[0.88; 0.91]
IWAH: Self-definition (CR = 0.84, AVE = 0.64, MSV = 0.55)					
→ How close do you feel to people all over the world?	1			0.79	[0.77; 0.81]
→ How often do you use the word 'we' to refer to people all over the world?	1.14	0.02	***	0.79	[0.77; 0.81]
→ How much would you say you have in common with people all over the world?	1.03	0.02	***	0.83	[0.82; 0.85]
IWAH: Self-investment (CR = 0.89, AVE = 0.67, MSV = 0.55)					
→ How much would you say you care (feel upset. want to help) when bad things happen to people anywhere in the world?	1			0.81	[0.79; 0.83]
→ How much do you want to be a responsible citizen of the world?	0.99	0.02	***	0.8	[0.77; 0.81]
→ How much do you believe in being loyal to all mankind?	1.01	0.02	***	0.78	[0.76; 0.80]
→ When they are in need, how much do you want to help people all over the world?	1.06	0.02	***	0.85	[0.83; 0.86]

Note: \*\*\*p ≤ .001 \*\*p ≤ .01 \* p ≤ .05; bias-corrected bootstrapped 95%-confidence intervals in parentheses (n = 2.000).

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## Appendix B

# Reducing personal clothing consumption: A cross-cultural validation of the Comprehensive Action Determination Model

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## **Abstract**

Clothing is a consumer good with a high environmental impact, and reducing the amount of clothing items purchased an important pathway towards urgently needed genuine sustainable production and consumption. The present study examines the usefulness of the comprehensive action determination model (CADM) for identifying psychological variables related to reduced clothing consumption in a cross-cultural setting. The model was tested employing structural equation modeling on a large sample ( $n = 5,185$ ) of consumers from five different countries. The results show that the model has good model fit in each country, and most proposed relationships between model variables are confirmed. Normative variables were most strongly related to intentions to reduce consumption, which in turn are only weakly negatively related to the actual number of items bought in a two-week period. As hypothesized, structural paths were equal across countries, but latent factor means varied. Implications for policy and intervention development are discussed.

**Keywords:** Sustainable consumption, reducing consumption, clothing, intention-behavior relations, norms, cross-cultural comparison

## 1. Introduction

In 2016, a large part of the world community committed itself to limiting global temperature rise to less than 2 degrees Celsius above pre-industrial levels by the end of the current century (United Nations, 2016). Based on developments in the recent past, warming of only 2 degrees Celsius by 2100 is highly unlikely (5%). In order to reach this goal, major transformative changes to current socioeconomic systems and consumption patterns are necessary, especially among consumers with high income and consumption (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. For land and water use, for example, 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 footprints can be found in clothing, with material footprint doubled, water footprint increased by 50% and carbon footprint increased by 20% since 1995 (Wood et al., 2018). Equally, pesticides and chemicals used during the production process pollute local ecosystems in the producing countries (Choudhury, 2014). Major social shortcomings characterize clothing production, e. g. long working hours and low payment, unsafe working conditions, child labor and denial of labor rights (Dickson, Loker, & Eckman, 2009). They similarly contribute to globally unjust systems of production and consumption, but are not further discussed in the current paper.

A reduction of the environmental impacts caused by clothing production is urgently needed and has to be a shared effort across countries and markets. So far, sustainable growth via more efficient technology or sustainable innovation has failed to deliver urgently needed changes towards truly sustainable production and consumption (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. It constitutes an environmentally friendly behavior, which paves a promising avenue towards the development of sustainable societies (García-de-Frutos, Ortega-Egea, & Martínez-del-Río, 2016; Capstick, Lorenzoni, Corner, & Whitmarsh, 2014; Clayton, Devine-Wright, Stern, et al., 2015). To date, none of these studies have focused on reduced clothing consumption.

The present study aims to identify psychological factors that motivate individual reduction behavior for clothing across different cultural contexts. Our study contributes to the existing literature in three ways:

First, we strive to identify the most relevant psychological factors related to reducing clothing consumption and to assess their validity across five countries (Germany, Poland, Sweden, the US and the United Kingdom). We use Klöckner's (2013) Comprehensive Action Determination Model (CADM) as the theoretical frame. While the strength of the CADM lies with its comprehensive inclusion of a vast array of psychological variables, some variables usually are more important than others in given specific contexts (Klöckner, 2013).

Second, we investigate the current level of each CADM variable in the five countries named above. We believe that these countries vary in relevant cultural aspects. We define 'culture' as set of values or beliefs that are more similar within one country and differ between countries (Boehnke, Lietz, Schreier & Wilhelm, 2011). Individuals living in each country experience the country's culture as a set of normative values that influence their attitudes, beliefs, goals and behavior, which then in turn become manifestations of the culture (Schwartz, 2011). While we acknowledge existing critique towards the assumption of cultural coherence (Poortinga, 2013), for the remainder of this paper, we set countries equal to people living in them and use both terms interchangeably.

Third, both analyses together can provide valuable input for designing targeted communication or intervention strategies to foster individual reduction behavior for clothing behaviors (Klößner, 2015). The current findings are discussed against this practical backdrop, and offer a solid foundation for the development of country-specific targeted intervention strategies to researchers and practitioners (e.g. NGOs or governmental agencies) alike.

The data for the present analysis is drawn from two main sources: an online consumer survey (Germany, Poland, Sweden and the US) and daily diary surveys of clothing consumption (United Kingdom).

### 1.1. The Comprehensive Action Determination Model

The main strength of the CADM is its 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 (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. By contrast, the CADM integrates both normative and non-normative variables (Klößner, 2013; Klößner & Blöbaum, 2010) and serves as theoretical framework for the current research in abridged form (Figure ???). The model takes into consideration that normative motivations as felt moral obligations to perform a behavior can interfere and compete with or support other non-moral motivational factors, e.g. attitudes. Above and beyond the TPB variables, personal norms as felt moral obligation to perform a specific behavior are integrated as a direct predictor of intention, which together with perceived behavior control is direct predictor of environmentally friendly behavior. In line with the TPB, attitudes towards the specific behavior as well as social norms are further predictors of intention. In line with NAM and VBN theory, the CADM expects that personal norms have to become activated before they can influence intentions and

environmentally friendly behavior. Activation can occur in the context of one becoming aware of the negative consequences of one's own behavior for the environment and ascribing responsibility for these consequences on oneself. Both awareness and responsibility, together with social norms, then activate felt moral obligations towards performing a specific behavior in question. The model has been empirically tested with 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, as the belief that one can help alleviating problems through one's actions, is another variable identified to be important for personal norms (Schwartz, 1977). Even though commonly not 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 therefore include it in our model. An overview of our model can be seen in Figure 1. For Study 1, the model is used to assess intentions to reduce clothing consumption. For Study 2, we include actual behavior. Another important variable included in the CADM are habits as automated behavioral response pattern to cues in stable situations (Klöckner & Matthies, 2004; Verplanken & Arts, 1999). They are an additional predictor for behavior and weaken the norm-behavior and intention-behavior relationship especially for frequent, meaning daily or weekly, behaviors. The average consumer purchases 5.9 items of clothing in a three-month period (Gwozdz, Steensen, & Müller, 2017), hence clothing purchase is considerably less frequent than e. g. travel mode or food choices. Moreover, clothing purchase choices are usually related to higher spending than e. g. food purchases, wherefore more deliberation accompanies them. We therefore assume that for most

consumers habits do not exert a strong influence on clothing purchase behavior. Another psychological variable, however, which is of direct relevance for the number of items bought and not included in the CADM, is impulsive purchase behavior. Impulsive buyers engage in repetitive buying and purchase larger amounts of items at more frequent intervals than average consumers (Ridgway, Kukar-Kinney, & Monroe, 2008). In Study 2, we therefore included impulsive purchase behavior as variable directly related to the number of items bought.

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 et al., 2002; Poortinga, 2013, 2015; Wang, 2016; Wang & Ware, 2013). We therefore hypothesize that the relationships between the CADM variables are equal across countries.

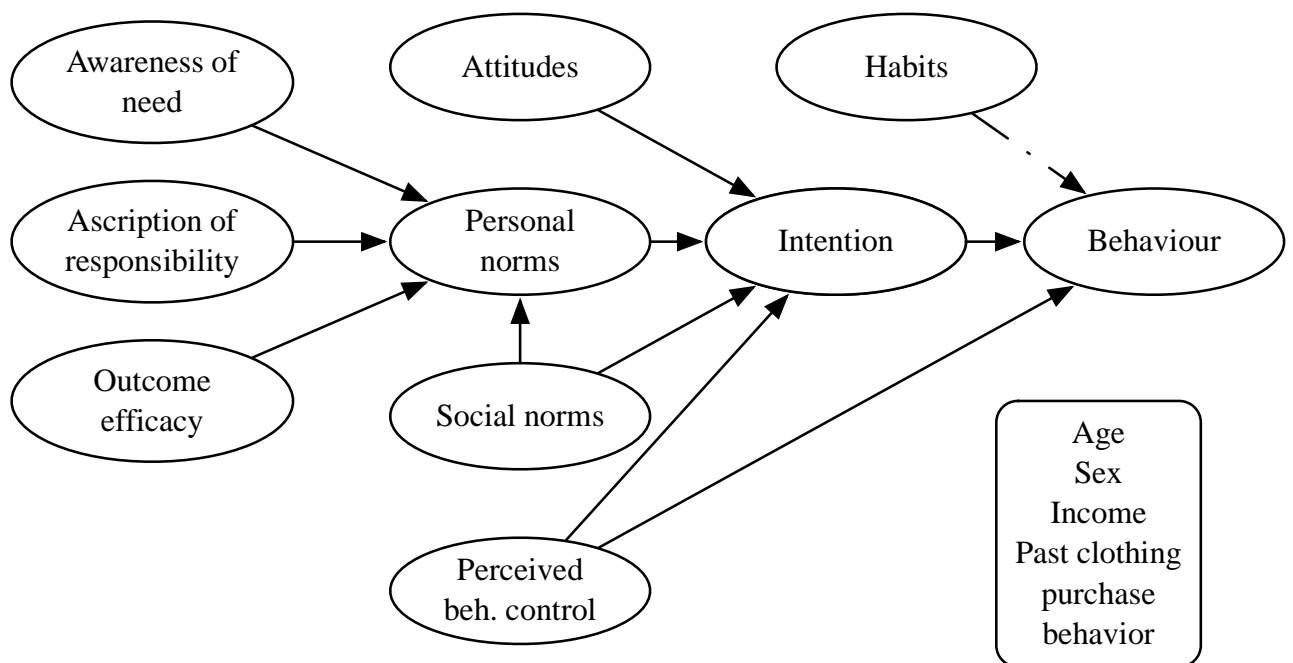


Figure 1 Abridged CADM as used in this paper (Klößner & Blöbaum, 2010)

## 1.2. Choice of countries for comparison

We base the choice of countries on three main considerations: Firstly, reducing consumption can

first and foremost only be a goal for affluent Western societies. Of special interest are countries with a big clothing market and high per capita consumption of clothing items or a projected big growth in annual sales. Secondly, countries with similar cultures better serve identifying differences across countries, as the probability for differences and of rival hypotheses explaining them are lower (Boehnke et al., 2011, van de Vijver & Matsumoto, 2011). By identifying differences and similarities in what otherwise might be considered broadly similar countries, we offer important inputs for what to emphasize in intervention strategies in given cultural contexts. Lastly, there is 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 biggest clothing markets in Western, developed countries: Germany, Poland, Sweden, the United States and the United Kingdom. Appendix A summarizes the main characteristics of the clothing market for each country. The United States currently is the biggest clothing market, both in gross and per capita terms. The United Kingdom is the biggest European clothing market with the highest average gross consumption per capita and a high projected growth rate. Culturally, the United Kingdom is close to the United States (Inglehart & Welzel, 2005). In order to address the relevance of cultural variation for psychological factors related to reduced consumption, we have included Germany, Europe's second-biggest clothing market. To deepen our exploration of cultural-psychological variation, we have also included the biggest 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.

### 1.3. Country differences and their relation to CADM variables

Country characteristics relevant for reducing clothing consumption and their level in each selected country are discussed in the following. The characteristics, which include 47 seven value orientations (Schwartz 2004, 2014, see Appendix B), beliefs about anthropogenic climate change, and economic factors, vary between the selected countries and are theorized to be relevant for the level of specific CADM variables. Table 1 summarizes the countries and their characteristics.

*Autonomy vs. Embeddedness.* Cultures that score higher in autonomy are characterized as valuing individual preferences, feelings and ideas, whose formation and expression are guiding principles for thinking and behavior. This cultural dimension splits into two sub-parts. The first dimension is intellectual autonomy, which refers to cherishing individual ideas as well as curiosity, creativity and broadmindedness. The second dimension is affective autonomy, which is about the pursuit of pleasure and enjoyment of life (Schwartz, 2011). Embeddedness refers to a focus on tradition and social order. In cultures high in embeddedness people are understood as part of a collective and participating in a shared way of life. We expect autonomy to be relevant for ascription of responsibility, personal norms, attitudes and perceived behavior control and embeddedness particularly for social norms.

*Egalitarianism vs. Hierarchy.* People who live in countries high in egalitarianism support ideas like equality, responsibility for one's actions, commitment to cooperate as well as being

concerned for the welfare of all. Countries characterized by higher hierarchy, in contrast, rely on ‘hierarchical systems of ascribed roles to ensure responsible, productive behavior’ (Schwartz, 2014, p. 551). They appreciate authority, social power and wealth. We expect egalitarianism vs. hierarchy to play a role for ascription of responsibility and personal norms.

*Harmony vs. Mastery.* Countries high in harmony value the protection of the environment and unity with nature, they support beliefs and actions that fit into the social and natural world and emphasize a world at peace as well as unity with nature. To the contrary, countries high in mastery encourage ambition and daring. They appreciate active self-assertion in order to change the natural and social environment and thereby to attain group or personal goals. We expect harmony vs. mastery to have an influence on awareness of need, personal norms and attitudes.

*Believes in anthropogenic climate change.* In Sweden the highest proportion of people believe that environmental pollution is the most serious problem of the world (Inglehart et al., 2014, World Value Survey Wave 5), followed by Poland, then Germany and the US. According to the IPSOS Mori Global Trends 2014, Swedes tend to believe most that climate change is human made while a much smaller proportion of consumers in the US and UK share this view. We expect beliefs in anthropogenic climate change to be relevant for particularly outcome efficacy, but also awareness of need, ascription of responsibility and attitudes.

When ranking *economics growth versus environmental protection*, Germany, Sweden and the UK value environmental protection over economic growth. Poland tends to value economic growth at the cost of the environment – but the picture is not as clear. The data show clearly that US consumers prioritize economic growth over environmental protection (Drews, Antal, & van den Bergh, 2018). We expect this preference domain to play a role for awareness of need,

ascription of responsibility and attitudes.

Based on these country similarities and differences and their role for the CADM variables, we hypothesize to find differences regarding the level of each CADM variable. For example, we expect awareness of needs, ascription of responsibility and personal norm to be highest in Germany and Sweden because of the higher harmony values as well as the higher prioritization of the environment over economic concern. For Poland and the United States, we assume social norms are highest, as both countries score higher on embeddedness. We anticipate Germany and Sweden on the one hand and Poland and the United States on the other to be similar to each other.

Table 1 Country characteristics, paired for similar countries

Country	Main characteristics
Germany and Sweden	Higher harmony values and higher prioritization of the environment over economic concerns. Score comparatively higher on affective autonomy (similar to the UK). Sweden scores highest in intellectual autonomy, and embeddedness scores are similarly lower for both countries. Value egalitarianism and score lower in hierarchy compared to the other countries. Sweden shows highest environmental concern and agreement to climate change being anthropogenic.
Poland and United States	Both score comparatively low on affective and intellectual autonomy. In line, embeddedness scores are higher. Poland scores highest on hierarchy, closely followed by the US. The US believes less that climate change is human made, similarly to the UK. The US also scores lowest on harmony, followed by Poland and the UK. However, Poland scores high on environmental concern.
United Kingdom	Shows equal appreciation for autonomy and egalitarianism, but higher levels of hierarchy than Germany and Sweden. Believes less in human made climate change and scores lower on harmony than Germany, Poland and Sweden.



## 2. Method

We carried out two studies with a varying focus. Study 1 analyses data from 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 in two parts with a 2- to 4-week interval between completion. Participants to the first part of the survey were a representative sample by age, income, education and region within each country. 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). The questionnaire was developed in English and translated by ISO17100 certified translators. Study 1 aims to explain variables related to intentions to reduce consumption. However, intentions do not always translate into behavior (Sheeran & Webb, 2016). Study 2 therefore sheds more light on the intention-behavior relationship by collecting data through daily diaries over 14 days. Additionally, daily assessment of behavior enables to measure 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 variables were measured with a pre-survey. The final sample consists of 594 participants with a mean age of 37.44 and a median monthly net income of £1000. Females, 71% of the participants, are overrepresented. During the two weeks, actual consumption behavior was measured daily. Both surveys included further items not discussed in the current paper.

### 2.1. Measurements

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 7-point Likert scale ranging from “strongly disagree” to “strongly agree” if not indicated otherwise. Apart from behavioral and intention items, the same measurements were used in both studies.

#### *Behavior and intention and behavior*

Actual 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 by response to the statement: *I 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’.

#### *Awareness of need, ascription of responsibility, outcome efficacy and personal norm*

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*.

### *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 7-point semantic differential scale with four polar adjectives as 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*.

### *Impulsive purchase behavior*

Impulsive purchase behavior is theorized to have a direct impact on behavior, equally to habits, above and beyond other motivational variables in the CADM. Study 2 contained three measures of impulsive purchase behavior from Ridgway et al.'s (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. Confirmatory factor analysis and measurement invariance across countries and samples

In a first step, we test for invariance of the measurement model, comprising awareness of needs, ascription of responsibility, outcome efficiency, personal norms, attitudes, social norms and perceived behavioral control, in the full sample across all countries with a combined sample size of  $n = 5185$  (Cheung & Rensvold, 1999, Fischer & Poortinga, 2018). 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 fits the data well in each country, confirming *configural invariance* (Table 2) 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  $X/df^2$  as additional goodness of fit indicator. All other goodness of fit indicators including  $X/df^2$  showed an acceptable model fit (Hu & Bentler, 1999).

Table 2 Baseline measurement models for individual countries

Country	N	$X^2$	df	$X/df^2$	P	RMSEA	CFI	TLI	SRMR
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
United Kingdom	594	474	207	2.29	.000	.047	.975	.970	.036
<b>All countries</b>	<b>5185</b>	<b>2591</b>	<b>1035</b>	<b>2.50</b>	<b>.000</b>	<b>.038</b>	<b>.982</b>	<b>.978</b>	<b>.038</b>

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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

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*Metric and scalar invariance* were established in the following steps. Table 3 contains information on the goodness of fit indicators for each invariance model, Table 4 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  $\chi^2(1162, N = 5,185) = 3,836.52$ ,  $p < 0.001$ , CMIN/DF = 3.00, CFI = .97, TLI = 0.97, RMSEA = .05 (90% confidence interval = [.05, .05], SRMR = .05. T All indicators show satisfactory loadings on their respective latent factor across all countries (all above 0.7 apart from the freely estimated item named above).

Table 3 Measurement Invariance Testing

Invariance type	$\chi^2$	df	P	RMSEA	CFI	TLI
Configural Invariance	2591.39	1035	.000	.038	.982	.978
Full Metric Invariance	2914.78	1099	.000	.040	.979	.976
Partial Scalar Invariance	3836.52	1162	.000	.047	.970	.967
Full Scalar Invariance	4204.54	1163	.000	.050	.965	.962

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

Table 4 Changes in Model Fit

Invariance type	$\Delta\chi^2$	$\Delta df$	P	$\Delta RMSEA$	$\Delta CFI$	$\Delta TLI$
Configural Invariance						
Full Metric Invariance	323.39	64	0	.002	-.003	-.002
Partial Scalar Invariance	921.74	63	0	.007	-.009	-.009
Full Scalar Invariance	1289.76	64	0	.010	-.014	-.014

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

### 2.3. Structural model

Lastly, a structural model was estimated for both Study 1 and Study 2. Both structural models are based on the same measurement model but contain different endogenous variables (behavioral intention in Study 1 and behavior in a two-week period in Study 2). 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<sup>1</sup> were included to control for their influence on both intention and in Study 2 also behavior.

<sup>1</sup> Past clothing consumption behavior was operationalized by the number of items bought in the previous three months.

### 3. Results

In the following, results for both Study 1 and Study 2 are reported. First structural results are described, afterwards differences in latent factor means are explained.

#### 3.1. Relative importance of CADM factors to reduced consumption behavior across countries

##### *Study 1*

We tested the relationships between the CADM variables and the intention to not buy clothing items due to environmental concerns in Germany, Poland, Sweden and the US. At the same time we tested for the validity of the model across all countries. The fit of the structural model across all countries was adequate, with  $\chi^2(1399, N = 4591) = 5843.94$ ,  $CMIN/DF = 4.18$ ,  $p < 0.001$ ,  $CFI = .94$ ,  $TLI = 0.94$ ,  $RMSEA = .05$  (90% confidence interval =  $[.05, .05]$ ),  $SRMR = .07$ . This model with structural path coefficients restricted to be equal across countries fits the data only marginally worse than the model with structural path coefficients estimated freely for each country ( $\chi^2(1363, N = 4591) = 5644.03$ ,  $CMIN/DF = 4.14$ ,  $p < 0.001$ ,  $CFI = .95$ ,  $TLI = 0.94$ ,  $RMSEA = .05$  (90% confidence interval =  $[.05, .05]$ ,  $SRMR = .07$ ). Together, this confirms our hypothesis.

Standardized path coefficients and explained variance values for each country are listed in Table 5. Unstandardized path coefficients are equal across all countries and reported in brackets in the following. Awareness of need ( $\beta = .31$ ,  $p < .001$ ), outcome efficacy ( $\beta = .36$ ,  $p < .001$ ) and social norms ( $\beta = .35$ ,  $p < .001$ ) have similarly strong, significant, positive relationships with personal norms. Ascription of responsibility has a significantly positive, but smaller link with personal norm ( $\beta = .06$ ,  $p < .001$ )

Personal norm has the strongest significantly positive direct relationship with intention to reduce clothing consumption ( $\beta = .38$ ,  $p < .001$ ). Attitudes and social norms are equally, if also less

strongly, significantly positively linked to intention ( $\beta = .24, p < .001$  &  $\beta = .29, p < .001$ , respectively). Perceived behavior control is not significantly related to intentions. Social norms have a significant, positive, indirect relationship with intention ( $\beta = .13, p < .001$ ). The total unstandardized effect of social norms on intentions is  $\beta = .42, p < .001$ .

### *Study 2*

Here, we tested the relationships between the same model variables<sup>2</sup>, but included a measure of actual purchase behavior in a two-week period as well as impulsive buying. We find that respondents bought on average 2.12 items ( $SD = 2.68$ , range = 0–25) in the two-week period. The fit of the structural model was adequate, with  $\chi^2(418, N = 594) = 1042.36$ ,  $CMIN/DF = 2.50, p < 0.001$ ,  $CFI = .95$ ,  $TLI = 0.94$ ,  $RMSEA = .05$  (90% confidence interval = [.05, .05]),  $SRMR = .06$ . The standardized path coefficients indicate that awareness of need and social norms have the strongest significant positive relationship with personal norms by point estimate (both  $\beta = .26, p < .001$ ). Ascription of responsibility and outcome efficacy show a weaker relationship ( $\beta = .18, p < .001$  &  $\beta = .19, p < .001$ , respectively). However, the 90% confidence intervals of all four factors overlap, indicating a potentially similar relevance of all four for personal norms. Similarly to Study 1, the strongest significant positive direct relationship exists between personal norm and the goal to reduce clothing consumption ( $\beta = .40, p < .001$ ). Likewise, attitudes and social norms are significantly positively linked to the goal of reducing ( $\beta = .09, p < .05$  &  $\beta = .15, p < .001$ , respectively). Perceived behavior control again is not significantly related to intentions. However, it is significantly negatively related to actual 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 the that period ( $\beta = -.11, p < .01$ ).

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<sup>2</sup> We treat the goal to reduce consumption as conceptually equal to the intention of not buying a clothing item due to environmental concern.

Impulsive purchasing is significantly positively connected to actual purchase behavior ( $\beta = .15$ ,  $p < .01$ ), whereas the goal to reduce consumption shows a significant, yet weaker, negative relationship with actual items purchased ( $\beta = -.08$ ,  $p < .05$ ).

Table 5 Estimated parameters of the structural model

	Dep variable	R <sup>2</sup>	Ind variable	St. coeffs	S.E.	95% C. I.
Germany	Non-purchase intention	0.31	Attitude	0.29	0.06	[.18;.38]
			Personal Norm	0.36	0.04	[.29;.42]
			Social Norm	0.34	0.06	[.24;.45]
			Perceived BC	0.06	0.05	[-.02;.14]
	Personal norm	0.38	AwarenessN	0.37	0.05	[.28;.46]
			AscriptionR	0.01	0.03	[-.06;.08]
			OutcomeEff	0.36	0.03	[.29;.42]
			SocialN	0.38	0.05	[.29;.48]
Sweden	Non-purchase intention	0.40	Attitude	0.39	0.05	[.30;.48]
			Personal Norm	0.42	0.04	[.35;.49]
			Social Norm	0.18	0.06	[.06;.31]
			Perceived BC	0.05	0.05	[-.03;.13]
	Personal norm	0.43	AwarenessN	0.32	0.05	[.23;.41]
			AscriptionR	0.12	0.04	[.06;.19]
			OutcomeEff	0.29	0.04	[.22;.37]
			SocialN	0.58	0.06	[.47;.70]
Poland	Non-purchase intention	0.26	Attitude	0.12	0.05	[.03;.20]
			Personal Norm	0.28	0.04	[.22;.35]
			Social Norm	0.33	0.05	[.24;.44]
			Perceived BC	0.11	0.07	[0;.24]
	Personal norm	0.37	AwarenessN	0.38	0.05	[.29;.46]
			AscriptionR	0.04	0.03	[-.01;.09]
			OutcomeEff	0.26	0.04	[.18;.33]
			SocialN	0.41	0.05	[.32;.51]
United States	Non-purchase intention	0.28	Attitude	0.13	0.05	[.05;.22]
			Personal Norm	0.39	0.04	[.32;.45]
			Social Norm	0.23	0.04	[.14;.31]
			Perceived BC	0.02	0.05	[-.06;.10]
	Personal norm	0.44	AwarenessN	0.19	0.04	[.12;.27]
			AscriptionR	0.09	0.03	[.04;.15]
			OutcomeEff	0.46	0.03	[.38;.53]
			SocialN	0.21	0.04	[.13;.28]
United Kingdom	Number of items purchased	0.13	Reduced con int	-0.08	0.04	[-.14;-.01]
			Perceived BC	-.11	0.04	[-.19;-.03]
			Habit	.15	0.05	[.08;.23]
	Reduced	0.28	Attitude	.09	0.05	[.02;.26]



consump. goal		Personal Norm	.40	0.05	[.44;.67]
		Social Norm	.15	0.04	[.11;.37]
		Perceived BC	.02	0.05	[-.12;.21]
Personal norm	0.42	AwarenessN	.26	0.05	[.16;.35]
		AscriptionR	.17	0.05	[.08;.26]
		OutcomeEff	.19	0.06	[.07;.30]
		SocialN	.26	0.04	[.18;.34]

### 3.2. Current level of CADM factors to reduced consumption behavior in each country

ANOVA analyses based on factor scores reveal statistically significant differences in latent factor means for all CADM variables. In the following, we describe the similarities and significant differences across all four countries in detail for each variable. For readability reasons test statistics are not reported, but can be obtained from the authors upon request. An overview with latent factor means is depicted in Table 6.

German and Swedish participants rate awareness of need the highest and equally. In comparison, Polish participants rate it significantly lower, but still significantly higher than the UK and US, which rated it lowest and did not differ in their rating. There is no significant difference in the rating of ascribed responsibility between Germany, Sweden and the UK. Polish participant rate it significantly lower than those three, and ratings from the US are significantly lower than from all other. Outcome efficacy is highest in Sweden and significantly different from all other countries. Poland, the UK and the US rate it lowest and equally. Germany rates it slightly higher, which results in a significant difference compared to the UK but not Poland and the US.

Personal norms are rated similarly high in Germany, the UK and the US. Poland differs significantly from the US, but not from the other two. Swedish participants gave personal norms the lowest rating, they differ from all other countries. Attitudes, on the contrary, are most positive in Sweden and Poland without significant differences. US participants' rating is in the middle and not different from Poland's. The UK shows the least favorable attitudes and is

significantly different from all other countries. German's rating is similar to the US and significantly lower than Sweden and Poland. Perceived behavior control is lowest in Poland, followed by the US. Both countries' ratings do not differ from each other, but Poland's rating is significantly lower than the other three countries. German participants score is equal to that of Sweden and the UK, but significantly higher than Poland and the US. Sweden, the US and the UK rate it similarly. Social norms are highest in Poland and the US, where they do not differ from each other. On the other hand, they are lower in Germany, Sweden and the UK, where they are rated equally. The intention to reduce is highest and equal in Germany and Sweden. The intention is equal in the US and Sweden, but significantly lower in the US than in Germany. The UK and Poland rate it equal and lower than all others.

Table 6 Estimates means for latent variables derived from the model

	Germany*	Sweden	UK	Poland	US
AwarenessN	5.66	-.04	-.80	-.44	-.70
AscriptionR	4.49	-.08	-.12	-.38	-.72
OutcomeEff	4.66	.17	-.27	-.16	-.16
Personal Norm	4.42	-.41	-.04	-.10	.13
Attitude	5.45	.28	-.45	.18	.11
Perceived BC	5.94	-.10	-.07	-.23	-.18
Social Norm	2.85	.08	.01	.67	.61
Intention*	4.06	3.96	3.29**	3.32	3.84

\*descriptive results, latent factor means of the group Germany are set as 0

\*\* goal instead of intention (recoded to a scale of 1–7 for comparison purposes)

#### 4. Discussion and conclusion

The aim of the current study was to identify the most relevant psychological factors related reduce clothing consumption. To this end, we analyzed a comprehensive range of psychological

variables, as summarized in the CADM. Model fit indices show that the CADM is a fitting theoretical framework for understanding reduced clothing consumption. Moreover, the data confirmed our two hypotheses. While the relationships between CADM variables are equal across countries, their level differs in each country.

Particularly the two normative components, personal norms and social norms, show strong relationships with intention to reduce consumption. Personal norms seem to be the factor with the strongest direct positive relationship to behavioral intentions. Personal norms in turn are strongly related to social norms and awareness of need in both studies and to outcome efficacy particularly in Study 1. Ascription of responsibility more strongly relates to personal norms in the second study. 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.

Perceived behavior control was not related to intentions, but to purchase behavior in a two-week period. This is in contrast to previous studies, which found perceived behavior control important for e. g. 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 conversation (López-Mosquera & Sánchez, 2012) or environmentally friendly travel mode choice (Klößner & 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 can implement immediately without further resources like knowledge, time or money. Besides, the finding is in line with Ajzen (1991) who argued that in situations where normative influences are strong, perceived behavior control might be less related to intentions.

When it comes to actual purchase behavior, the current results point towards reflecting on the role intentions play for actual 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. This is not surprising; the so-called ‘intention-behavior-gap’ is a well-known and researched phenomenon (Sheeran & Webb, 2016; Sniehotta, Pesseau, & Araújo-Soares, 2014) and our research aligns with previous work e. g. in the area of recycling (Davies, Foxall, & Pallister, 2002).

We include past purchase behavior to reflect average level of clothing consumption and control for its potential influence on intentions to reduce consumption and number of items bought. Past behavior was found to have the strongest positive relationship with actual purchase. This does not come as surprise, especially given the fact that past behavior is a good predictor of future behavior. This is especially the case in stable contexts (Ajzen, 2002), which clothing consumption can be assumed to be.

In parallel, the results show that there are considerable differences in the level of each psychological factor between the countries. In the following, selected differences potentially relevant for intervention strategies are discussed. As expected based on cultural similarities and cultural differences, we found Germany and Sweden on the one side and Poland and the US on the other to share equal characteristics in many instances. This is in line with our cultural analysis, which found multiple similarities between Germany and Sweden on the one hand and Poland and the US on the other. Specifically, Germans and Swedes tend to have higher levels and Poland and the US often lower levels on each variable related to reduced clothing consumption. For attitudes and social norms an inverse pattern is shown. Social norms are higher in Poland and the US, which stand in connection with higher levels of embeddedness in both countries. Another noteworthy exception are personal norms, which are lowest in Sweden. At the same time, outcome efficacy is higher in Sweden than in any other country, which is in line with Swedes beliefs in anthropogenic climate change. Awareness of need is similarly low in

the US and UK, comparatively high in Germany and Sweden and in the mid range in Poland. In general, results for the UK are more mixed. Its position is closer to Germany and Sweden in ascription of responsibility and social norms, and closer to the US and Poland in terms of awareness of need and outcome efficacy. This is in line with our cultural analysis, which saw the UK more similar to Germany/Sweden in some aspects and closer to Poland/US in others.

#### 4.1. Practical implications

In summary, while the psychological processes underlying intentions to reduce clothing consumption seem to be the same across countries, the levels of each psychological variable are different across countries. This has important practical implications, especially for policy and intervention development in countries that otherwise might be perceived as similar. Based on our results we conclude that what might be effective in one country could be less so in others.

Public policy as well as intervention strategies can connect with what already exists by reinforcing existing tendencies and reminding consumers of these, or try to focus on increasing important psychological variables with currently low levels. Based on the current results, the two main variables that have the largest potential for reducing consumption intentions are of normative nature: personal norms and social norms, by themselves as well as internalized as personal norms. Current levels of personal norms are similar in Germany and the UK; they are slightly lower in Poland and slightly higher in the US, and considerably lower in Sweden. This can point towards aiming at increasing the perception of personal norms especially in Sweden, for example through focused messages on the environmental impact of clothing as well as on possibilities to alleviate such through own reduced consumption (outcome efficacy). Both are comparatively high in Sweden already and reminding people of these could help activating personal norms in an intervention context. Equally, social norms have an influence on personal norms and are comparatively low in Sweden as compared to e.g. Poland and the US. However,

there is a difference for communicating social norms. While awareness of need can be raised through information, the problem is that there might not be a social norm for consuming less in a given country. Hence, it is difficult to make consumers perceive such. The situation is different for e. g. Poland, which already shows comparatively high levels of perceived social norms. There it could be beneficial to remind people of such perceived social norms in order to increase personal norms and intentions to reduce. Future studies would have to further disentangle the reasons for these perceived higher social norms in Poland as well as the US. Above and beyond environmental concerns other possible explanations, such as the perception of frugality and modesty as a virtue, could be analyzed and intervention messages formulated accordingly for these countries. Moreover, in countries like e. g. the US, where awareness of need is comparatively low, information campaigns in conjunction with normative messages have the potential to foster reduced consumption intentions. In a similar way outcome efficacy, as the knowledge that one's behavior helps to alleviate problems, can be communicated. Tailored information on e. g. how much water and energy can be saved for each item not bought can enhance the perception of outcome efficacy and is therefore a valuable addition for potential intervention strategies. The UK, for example, scores lower on outcome efficacy than any of the other countries and such messages might help to increase intentions in British consumers. Additionally, across all countries, possible intervention strategies can focus on reminding consumers that reducing clothing consumption is an easy and accessible way to reduce the burden on the environment. Lastly, designers of all policy or intervention strategies following these pathways towards increasing intentions have to remember that the actual 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. First, the measurement of reducing consumption can be improved. We used a generally improved measurement of actual 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. Most customers can recall purchases made in the previous week or two.

Second, the variance explained in actual purchase behavior across the two-week period is rather low. This points towards the importance of purchase behavior influencing variables not assessed in the current study. While such can be manifold e.g. personality variables like materialism or fashion involvement, future studies could also put a focus on contextual factors that might have an influence on the actual number of items purchased. Examples are the contact with fashion advertisement (on social media, public spaces etc.) or proximity of clothing stores to home and on daily commutes. Moreover, 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. Third, while focusing on culturally similar countries has its advantages as described above, a look at emerging countries will be of merit in the future. Two big clothing markets come to mind as potential objects for future comparisons: China and India. China's market for clothing consumption is comparable to the US (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 big market (US\$86,178m for 2018) with again a comparatively low average per capita of 18 pieces. But 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 degrees Celsius goal. Studies exploring this conflicting issue, how it is perceived among consumers in emerging countries and what possible alternative developing pathways are imaginable and acceptable, add valuable insights for how to reach the 2 degree Celsius goal through working together globally.



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## APPENDIX A

Country (population)	Gross consumption, 2018 (US\$millions)	Expected annual growth rate, 2018–2021	Consumption per capita 2018 (US\$)	Average volume per capita, 2018 (% growth since 2010)
Germany (83m)	65.16	0.6 %	788.25	60 pieces (13.90%)
Poland (38m)	11.96	4.0 %	316.14	30 pieces (23.08%)
Sweden (10m)	9.70	2.7 %	964.42	56 pieces (3.11%)
United States (326m)	326.11	2.3 %	994.69	96 pieces (10.68%)
United Kingdom (66m)	80.48	3.5 %	1212.83	68 pieces (8.90%)

Source: Statista, 2018

## APPENDIX B

	Autonomy (affective)	Autonomy (intellectual)	Embeddedness	Egalitarianism	Hierarchy	Harmony	Mastery
Germany	4.20	4.84	3.10	5.01	1.82	4.54	3.93
Poland	3.32	4.31	3.86	4.48	2.51	3.86	3.84
Sweden	4.24	5.09	3.12	4.90	1.83	4.46	3.81
United Kingdom	4.26	4.62	3.34	4.92	2.33	3.91	4.01
United States	3.87	4.19	3.67	4.68	2.37	3.46	4.09

Source: Schwartz (2008)



## Appendix C

Think twice – an intervention strategy to reduce personal clothing consumption

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## **Abstract**

This study reports the effectiveness of a theory-driven Internet based intervention aiming at reducing consumers' (n= 379) clothing consumption. An information-only intervention and a combination of information, goal setting, goal feedback, commitment and coping planning was applied. At a one-month post-test, treatment groups receiving the combined treatment significantly reduced their clothing consumption, as compared to a one-month pre-test period and compared to the control and information only group, by 60.24% for a condition with individual goal setting and by 47.08% for a condition with group goal setting. At a three-month follow up, consumers across all groups reduced their clothing consumption. Likewise, consumers across all groups increased their intention to reduce consumption during the intervention period. Changes in personal norms most strongly predicted changes intentions. Further psychological determinants for behavior and intentions are discussed and their influence on behavior and intention changes examined.

**Keywords:** intervention, behavior change, reducing consumption, information, goal setting, follow-up

## 1. Introduction

Across the globe, a large percentage of individuals expresses awareness about climate change or a concern about the environment in surveys and opinion polls (Capstick, Whitmarsh, Poortinga, Pidgeon, & Upham, 2015; Drews & van den Bergh, 2016; European Commission, 2017). Yet, in past decades, CO<sub>2</sub> emissions, one of the main contributors to global climate change, and other environmental footprints have been steadily increasing (Wood et al., 2018). Likewise, pressure on other important processes regulating the Earth System, such as land-system change, biochemical flows and biosphere integrity, is mounting through e. g. land and water degrading (Rockström et al., 2009; Steffen et al., 2015).

Private households play a crucial role in these developments due to consumption (Ivanova et al., 2016). On the one hand, private consumption is connected to high environmental impacts, yet on the other hand, it offers extended leeway for individuals to take action and change behavior (Bjørn et al., 2018). Therefore, while technological advancements are necessary, individual behavior change is equally important for climate mitigation and adaption strategies (Creutzig et al., 2016, 2018; Dietz, Gardner, Gilligan, Stern, & Vandenbergh, 2009; Wolske & Stern, 2018). Behavior change thereby can be broadly divided into two categories: firstly, the adoption of new and more efficient or otherwise environmentally friendly technologies, and secondly, the reduction of the overall levels of consumption to avoid rebound effects (Berkhout, Muskens, & Velthuisen, 2000). Knowledge about how to help individuals to translate their environmental concerns into actual behavior change is crucial for both categories.

In the area of private household consumption, clothing is a product characterized by a high water and land footprint as well as a considerable carbon footprint in the production phase. Equally, pesticides and other chemicals used during e.g. cotton production or coloring of garments pollute ecosystems in production countries (Holmquist et al., 2016; Roos, Sandin, Zamani, Peters, & Svanström, 2017). At the same time, clothing is a prime example for over-consumption (McDonagh & Prothero, 2015).

While previous research has identified multiple psychological and situational determinants for a variety of environmental (un-)friendly behaviors, only a few have analyzed determinants of environmentally friendly clothing consumption (Gwozdz, Nielsen, & Müller, 2017; Joanes, 2019; Joanes, Gwozdz, & Klöckner, forthcoming). The current study seeks to translate the

results of these studies into practice and apply them in an intervention strategy aiming at changing behavior. The aim of the current research is twofold. Firstly, we aim to encourage consumers to reduce their clothing consumption<sup>1</sup>. Secondly, we aim at identifying underlying processes that facilitate such behavior change in consumers. To achieve both aims, we compare consumption behavior as well as levels of psychological determinants of importance in a pre-test post-test controlled design with a follow-up measurement. We test the effectiveness of three different theory-driven intervention strategies for reducing clothing consumption, which are combinations of information and goal setting, feedback, commitment and coping planning each. Furthermore we test the additional effect of a group intervention setting.

## 2. Theoretical framework for behavior change

Interventions aiming at behavior change need to be informed by knowledge about the behaviors' determinants and designed with reference to these determinants (Steg & Vlek, 2009). For the identification of such behavioral determinants a theory-driven approach is essential (Abrahamse & Matthies, 2013). The current intervention strategy therefore combines insights from two theoretical approaches.

Firstly, the comprehensive action determination model (CADM) (Klöckner, 2013) serves as a theoretical framework for the development of intervention components aiming at increasing the goal intention to reduce consumption. Previously, the CADM was successfully applied in the area of reduced clothing consumption and important behavioral determinants for this behavior were identified (Joanes et al., forthcoming). At the same time, research repeatedly finds only weak relationships between intention and actual behavior – the so called 'intention-behavior gap' (Sheeran, 2002). Equally, all variables proposed by the CADM as relevant for behavior can be categorized as informational variables. Yet, previous research repeatedly has shown the provision of information does not necessarily lead to behavior change (Abrahamse & Matthies, 2013; Abrahamse, Steg, Vlek, & Rothengatter, 2005, 2007; Klöckner, 2015)

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<sup>1</sup> Traditionally, consumption comprises purchase, use and maintenance and discarding behavior. In this paper, we use the terms consumption and purchasing interchangeably. When referring to consumption we mean the purchase of clothing.

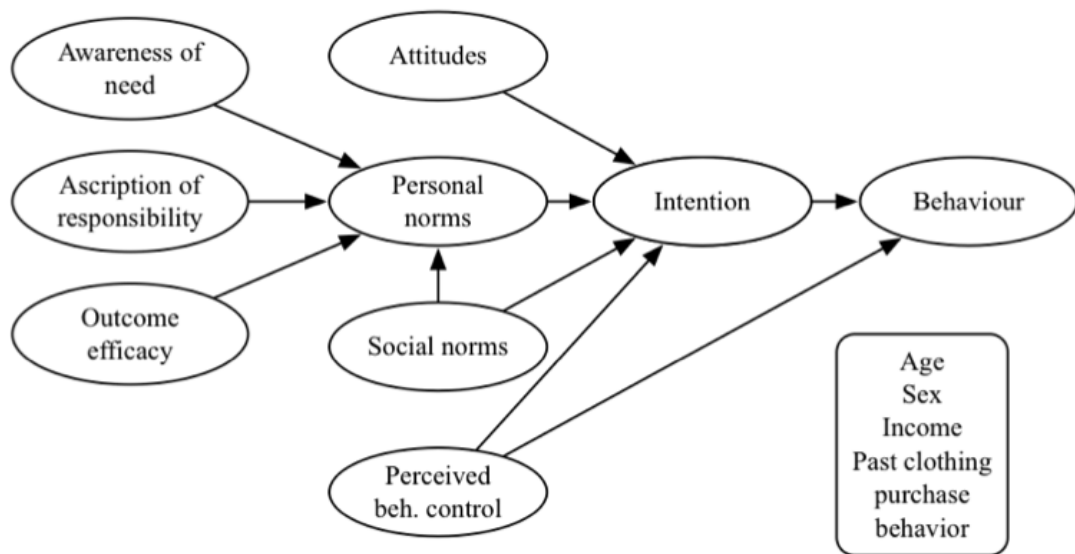
Therefore, secondly, the current intervention integrates the stage model of self-regulated behavior change (Bamberg, 2013a) to develop further intervention components above and beyond information provision, aiming at translating goal intentions into actual behavior change.

Additionally, interventions work better when different strategies are combined. Hence, the current intervention conditions use a combination of goal setting, feedback and goal commitment. A combination of all three components has been shown to be effective for e. g. saving energy (Abrahamse et al., 2007). Lastly, the potential additional effect of group goals as compared to individual goals is taken into account (Abrahamse & Steg, 2013; Bamberg, Rees, & Schulte, 2018). In the following, each of the above listed considerations, which form the basis for the current intervention, is examined more in-depth.

### 2.1. Antecedents for goal intentions – the comprehensive action determination model

The CADM (Klöckner, 2013; Klöckner & Blöbaum, 2010; Klöckner & Oppedal, 2011; Nayum & Klöckner, 2014) combines two well-established models of consumer and pro-social behavior: the theory of planned behavior (TPB) (Ajzen, 1991) and the norm activation model (NAM) (Schwartz, 1977). As such, it proposes multiple psychological variables as possible determinants for intentions and environmentally friendly behavior. It takes into consideration that, when it comes to the formation of an intention to show a behavior in question, moral motivations, e. g. perceived personal obligation or personal norms to perform a certain environmentally friendly behavior, can compete with or support other non-moral motivational factors. Such other factors are e. g. attitudes towards the behavior or perceived behavior control, i.e. the belief that one can show the behavior. Personal norms at the same time are linked to further psychological variables, namely awareness of the problem (awareness of need), acceptance that one's behavior is, at least partially, causing the problem (ascription of responsibility) and a belief that personal behavior change can help alleviating the problem (outcome efficacy). Moreover, social norms as the behavior and perceived expectation of relevant others are directly related to intentions for pro-environmental behavior and to personal norms. The model includes habit as an additional factor with strong links to behavior. While the strength of the CADM lies with its comprehensive inclusion of a vast array of psychological variables, some variables usually are more important than others in given specific contexts (Klöckner, 2013). Previous research has analyzed the CADM in the context of reduced clothing consumption and found that awareness of need, outcome efficacy and social norms were strongly linked to personal norms for reducing

clothing consumption across different countries (Joanes et al., forthcoming) (see Figure 1). Equally, there was a strong link between personal norms and perceived social norms and intentions to reduce clothing consumption. This is in line with other previous research, which identified personal norms as crucial in an environmental behavior context (De Groot & Steg, 2009; Fornara, Pattitoni, Mura, & Strazzera, 2016; He & Zhan, 2018; Van der Werff & Steg, 2015). The model as tested by Joanes et al. (forthcoming) is depicted in Figure 1. Based on their results, we put a particular emphasize on providing content to increase awareness of need, outcome efficacy and social norms, and therewith personal norms, in our intervention.



*Figure 1* Theoretical model as tested in Joanes et al. (forthcoming). Note: they furthermore included impulsive purchase behavior instead of habits, neither which are included in the current study

At the core of the CADM lies the relationship between intentions and behavior. However, in their study, when controlling for past purchases, Joanes et al. (forthcoming) found intentions to reduce clothing consumption only weakly significantly negatively related to the number of items purchased in a two week diary period. This is in line with previous research which raised doubts about the strength of the intention-behavior relationship (Bamberg & Möser, 2007; Carrington, Neville, & Whitwell, 2014; Gollwitzer & Sheeran, 2006; Loy, Wieber, Gollwitzer, Oettingen, & Loy, 2016; Sheeran & Webb, 2016). Summarizing previous research, intentions seem necessary,

yet not sufficient for actual behavior change. Moreover, this result supports our approach to employ further strategies in our intervention in order to translate intentions into action.

## 2.2. From goal intention to behavior – the stage model of self-regulated behavioral change

These further strategies are based on the stage model of self-regulated behavior change (Bamberg, 2013a), which integrates theoretical perspectives about behavior change above and beyond intentions. Based on Gollwitzer's model of action phases (Gollwitzer, 1990), and in line with previous stage models (Prochaska & Velicer, 1997), the model assumes that individuals change their behavior by moving through a sequence of four 'time-ordered, qualitatively different stages' (Bamberg, 2013, p.152), whereby the transition through these stages reflects changes in the readiness for change. The four stages are called (1) predecision, (2) preaction, (3) action and (4) postaction.

The transition from *predecision* to *preaction* is marked by the formation of a goal intention to change a specific behavior or perform a new behavior, e.g. *the goal to reduce ones clothing consumption*. The formation of such a goal intention can be based e.g. on changes in personal or social norms (Bamberg, 2013b). Goal intentions are conceptually aligned with the intention concept in the CADM. Yet, the stage model of self-regulated behavior change proposes further steps from intention to behavior, which are missing in the CADM. Upon goal formation, the preaction stage is entered, in which a *behavioral intention* is developed. For this, different behavioral alternatives (e.g. acquiring less clothing items, swap instead of buying new items) for reaching the goal are compared with regard to their potential consequences and difficulty. A behavior intention, for example *I will not purchase any new items of clothing in the next month*, is formed, which is connected to the transition in the *action stage*. In the *action stage* it is mainly so called 'implementation planning' that helps to form implementation intentions, e.g. *When I feel the urge to buy an item of clothing I remember myself of my goal and think twice*. Implementation planning is about the when, where and how of how to engage in a behavior. In our case, implementation intentions are less relevant, as reducing clothing consumption is about *not* performing a purchase behavior. Another relevant component that helps translating behavioral intentions into action at this stage is coping planning, i.e. 'the ability to imagine scenarios that may hinder the performance of an intended behavior, and then to develop one or more plans to cope with such a challenging situation' (Bamberg, 2013, p.154). Conceptually, there is a close relationship between the concept of implementation intentions and self-



regulation strategies for goal attainment (Nielsen, 2017). The last stage is the *postactional* stage, which is connected to e.g. recovery self-efficacy for the case of relapsing back to old behaviors.

The stage model of self-regulated behavior proposes that there is no one-intervention solution that fits all, but that instead intervention content needs to be developed to fit the needs of consumers depending on their current position along the stages. For example, asking a consumer who is not aware of the negative impacts clothing production has on the environment to reduce his or her clothing consumption might lead to psychological reactance and therewith to a failure of the communication (Steindl, Jonas, Sittenthaler, Traut-Mattausch, & Greenberg, 2015). In contrast to theoretical assumptions of the stage models of self-regulated behavior change, the intervention material was not provided tailored to participants' current stage in the current intervention. According to Joanes (2019), the majority of consumers in a representative survey indicated that they had no intention to reduce their clothing consumption. We therefore assumed that a large proportion of consumers currently is at the *predecisional stage* with regard to clothing consumption. Accordingly, we developed three consecutive intervention blocks each aiming at raising goal intentions, behavioral intention and coping intention, respectively, in order to guide participants through the stages of change. In the following, the strategies for behavior change that form the single blocks are revised.

#### *Information provision (block 1)*

Providing information is commonly used strategy (Klöckner, 2015) and usually informs people about either the disadvantages of current unsustainable behaviors, or the importance and benefits of engaging in sustainable behavior alternatives. The latter should be accompanied by further suggestions about alternative behaviors. Multiple examples of previous research could prove that providing information alone leads to increased knowledge, but they mostly failed to show that this is changing actual behavior (Abrahamse et al., 2007). Information can help to form an intention, which are necessary yet not automatically sufficient for sustained behavior change (Loy et al., 2016) Providing information should be a part of change programs, but accompanied with further tools (McKenzie-Mohr, 2011). Based on Joanes et al. (forthcoming), we assume that information material should focus on two main messages. Firstly, it should educate about environmental problems related to clothing to increase awareness of need, and secondly, targeting outcome efficacy, it should make clear the role consumers can play to help alleviating environmental pressures through their clothing decisions.

### *Goal setting, feedback and commitment (block 2)*

Goal setting is used often in the context of reduction behaviors (Abrahamse et al., 2007; Abrahamse et al., 2005; Klöckner, 2015). It is referring to what Bamberg (2013) calls behavioral intentions. They can be set by individuals themselves or externally, and specific and concrete goals are more likely to be attained than general ones (Sheeran & Webb, 2016). A goal can refer to e.g. the aim to save a certain percentage of energy or, in our context, buy a certain amount of clothing items less in a specific time frame. Goal setting often is used in combination with other communication strategies, such as commitment or feedback (Abrahamse et al., 2005; Abrahamse & Matthies, 2013; Klöckner, 2015).

Feedback refers to providing consumers with information on their performance. It offers participants an understanding of links between certain outcomes (e.g., savings in water consumption and emissions) and the behavior necessary to reach it (e.g., limiting the purchase of water-intensive clothing products, such as jeans; Abrahamse & Matthies, 2013). The feedback has to be understandable and meaningful to individuals, and it showed to be most effective if provided tailored to the individual, frequently and in close proximity to the behavior (Abrahamse et al., 2005; McKenzie-Mohr & Schultz, 2014). Feedback has shown to be particularly successful if provided repeatedly. Due to practical constraints, in the current research feedback was not provided as an on-going basis of monitoring goal achievement, and therefore does not correspond to what is usually understood with feedback as a performance indicator in the environmental psychology literature (Abrahamse et al., 2005; McKenzie-Mohr & Schultz, 2014). We rather included a feedback once with regard to participant's set personal goal, indicating the emission and water saving potential of the set goal to support their perceived outcome-efficacy, a determinant identified as important for the development of intentions by Joanes (2019). Still, we referred to it as feedback throughout this paper as it offered participants an understanding of links between certain outcomes (e.g. savings in water consumption and emissions) and behavior necessary to reach it (e.g. reduced purchase of a specific clothing item like a t-shirt) (Abrahamse & Matthies, 2013).

Commitments are pledges to show certain behaviors linked to goals (Abrahamse et al., 2005; Matthies, Klöckner, & Preißner, 2006). In order to avoid inconsistencies and cognitive dissonance (Festinger, 1962), individuals are more likely to act if they committed to do so (McKenzie-Mohr & Schultz, 2014). Equally, a change in self-concept is mediating the

relationship between commitment and behavior (Lokhorst, Werner, Staats, van Dijk, & Gale, 2013). Commitments can be made publicly, or in private, whereby results about higher effectiveness of one or the other are mixed and potentially dependent on the target group and setting (Abrahamse & de Groot, 2013). Meta-analytic results show that commitment effectively influences behavior, even after interventions in follow-up periods and especially when combined with other strategies (Lokhorst et al., 2013). Commitment previously helped consumers to reduce their use of plastic bags (Rubens, Gosling, Bonaiuto, Brisbois, & Moch, 2015).

### *Coping planning (block 3)*

Translating intentions into behavior requires self-regulation, i.e. individuals' planning, i.e. effort to act in the intended way, independent of e.g. habitual responses or situational cues. Self-regulation theory proposes that if individuals encounter a risk situation, e.g. a tempting new item in a shop window or in an email newsletter, or when they lack the resources to effortful steer their behavior, e.g. due to tiredness, they run at risk to act against their intentions (Baumeister, Heatherton, & Tice, 1994). Two self-regulation strategies in order to shield intentions from such influences are implementation intentions about the when, where and how to enact a specific behavior (Bell, Toth, Little, & Smith, 2016; Gollwitzer, Fujita, & Oettingen, 2008; Gollwitzer & Sheeran, 2006) and coping planning as the anticipation of possible obstacles and risk situations and how to react to them (Sniehotta, Scholz, & Schwarzer, 2006). Conceptually similar to both, Nielsen (2017) introduced self-regulation based strategies for goal striving in an environmental behavior context. These are planning, e.g. forming implementation intentions and avoiding temptations, automatization, e.g. establishing new habits, cognitive change, e.g. reappraisal of current behaviors in light of the intention or goal, and effortful inhibition as inhibiting refraining from acting on thoughts, feelings or behavioral tendencies when they arise.

### 2.3. Group intervention settings

The role of collective action for climate change has recently been acknowledged (Bamberg et al., 2018; Fritsche, Barth, Jugert, Masson, & Reese, 2018). According to the social identity model of collective action (SIMCA) (van Zomeren, Postmes, & Spears, 2008) identification with a group is one main factor for encouraging collective action. Moreover, identification with a group can lead to rational group efficacy beliefs as well as group-based emotions like group

anger, which in turn also can have an influence on collective action. In the context of this study, it is the so-called concept of collective efficacy, i.e. individuals' believes in their shared ability to reach common goals, which informs the intervention strategy. Reaching goals of climate protection, like many other goals, is only possible through shared efforts. Hence, collective efficacy was found to positively influence group functioning and investment of group members with the group and its goals (Bandura, 2000). Collective efficacy is related to attempts to cope with climate change and with pro-environmental behaviors (Homburg & Stolberg, 2006), whereby it was found in collectivist cultures to be even more relevant than self-efficacy (Chen, 2015). An increase in collective efficacy was found to be linked to increased pro-environmental intentions, whereby collective efficacy was only influential if it lead to a simultaneous increase in self-efficacy (Jugert et al., 2016). In addition to highlighting collective efforts and fostering collective efficacy, group feedback for example can also be an indicator of what other people are doing and therefore can potentially influence social norms (Abrahamse & Steg, 2013). It has the potential to convey a group norm and therefore induce behavior change by means of peer pressure to behave according to that norm. Joanes (2019) and Joanes et al. (forthcoming) found both, outcome efficacy beliefs and social norms, to be particular relevant for reduced clothing consumption.

In summary, the present study examines the effectiveness of three treatment conditions integrating different aspects of the above theoretical deliberations compared to a control. These employ following techniques: a) an information only treatment condition, b) an information combined with individual group setting, goal feedback and commitment condition (individual G-F-C) and c) an information combined with group goal setting, group goal feedback and commitment to the personal goal in order to contribute to the group goal (group G-F-C). The latter two techniques were furthermore combined with coping planning. Based on the existing body of literature we hypothesize that only participants in the individual and group G-F-C condition will reduce their actual clothing consumption (H1), whereas participants of all three treatment conditions will increase their intentions (H2) and personal norms (H3) to reduce clothing consumption. We hypothesize that changes in reduction intentions (H4a) and perceived behavior control (H4b) will be related to changes in the number of items purchased. Furthermore, we propose that changes in personal norms (H5a) and social norms (H5b) will be the main drivers for changes in intentions. It is postulated that personal norms change across all treatment groups (H6), and that this change is mainly influenced by changes in awareness of

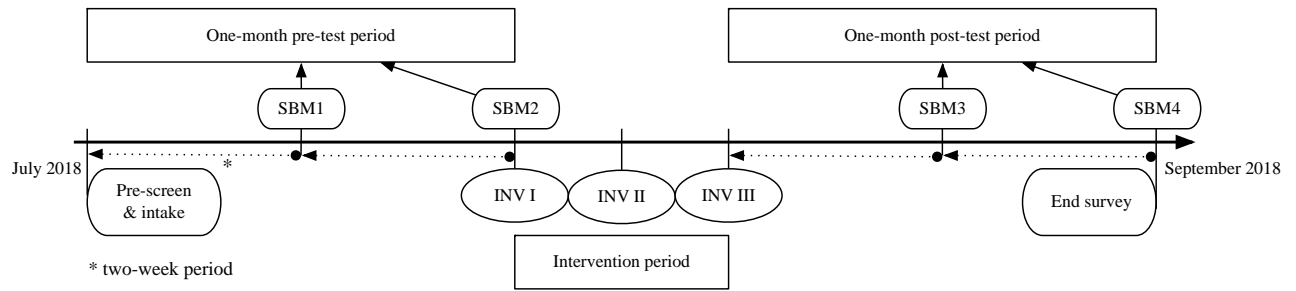
need (H7a), outcome efficacy (H7b) and social norms (H6c). Furthermore we expect the group G-F-C condition to exhibit higher levels of collective outcome efficacy and social norms and therefore higher personal norms than all other groups (H8).

### 3. Method

For the current research we do not only focus on the measurement of behavior but also on the change in model variables and therefore behavioral determinants as described above. Following we are able to analyze more in depth which factors had an influence on actual behavior (Abrahamse et al., 2007)..

#### 3.1. Participants and procedure

The study took place between July and September 2018 with a three-month follow up in December 2018 and was realized via Qualtrics' surveys and as a website. Participant recruitment took place on the research platform Prolific and the target population was current residents of the United Kingdom between 18-65 years. In order to identify consumers with a high enough level of clothing consumption a pre-screen survey was conducted identifying consumers who bought at least three to four items in the past three months and indicated that this is not a little or much more than they would buy on average. In a first step, we re-contacted participants from a previous study in December 2017 (Joanes et al., forthcoming). From these participants we already had information about their clothing consumption from this previous study. In a second step, we opened up the pre-screen survey to new participants. Out of 855 participants (365 re-contacted and 490 new participants) who took part in the pre-screen survey 525 qualified for the intervention study according to those criteria. Those 525 participants were invited for the following seven-part study and participated for monetary compensation in return for each study part as well as a bonus payment for taking part in all seven parts, adding up to a total of £12.00 compensation payment. The study took place over two months and two weeks. A timeline and overview over all study parts is depicted in Figure 2. The first two parts (pre-screen & intake and short behaviour measurement (SBM1)) were equal for all participants. They took place at the beginning and end of a two-week interval and were solely questionnaires assessing different characteristics of participants again reported on the number of clothing items they had purchased



*Figure 2* Overview over the intervention timeline; SBM = short behaviour measurement; INV= intervention blocks, provided at the beginning, in the middle and at the end of a two-week period

in the past two weeks (SBM2). SBM1 and SBM2 together form the one-month pre-test period. The following three parts contained both questionnaires and intervention parts (INV1, INV2 & INV3), which varied between participants. At INV1, all participants filled in a questionnaire measuring the determinants for reduced clothing consumption as proposed by the theoretical model. Participants were then provided with additional information and communication material, depending on their membership in one of the four experimental groups. The four experimental groups were the following: control group (not exposed to any intervention), information only, individual goal setting, feedback and commitment group (individual G-F-C) and group goal setting, feedback and commitment group (group G-F-C). Participants were assigned at random to each group, resulting in 132 participants in the control group and 131 participants in each of the other groups. As common for longitudinal studies, some participants dropped out of the study at different time points in the course of the two months and two week period. In addition, some participants could not be uniquely identified across all measurement points and were not included for further analysis. 397 participants completed the whole study, resulting in a pre-post-test attrition rate of 24.38%. Of the final sample, 110 participants were in the control group, 100 participants in the information only group, 93 participants in the individual G-F-C and 94 participants in the group G-F-C.

The final sample was not representative for the British population. Women were overrepresented with 60%. The mean age was 37.7 years (SD = 12.1) and median personal monthly net income was 1,101-1,300 British pounds. The majority of the sample had A levels or

an undergraduate degree (68%) and was employed (57.7%). Slightly more than half of the sample had children (52%). There were no significant differences between the

### 3.2. Experimental groups and materials on the intervention days

#### *Count Twice*

This control group was not presented with any intervention material. Participants filled in the same questions regarding model variables and purchase behavior like participants in all other groups. In order to distract them from the items with environmental association they were asked additional, clothing-related items, which were not linked to environmental aspects. This also ensured that they were reflecting on the topic of clothing and clothing consumption to a comparative extent as other participants. Simply thinking about a consumer good might be a potential source for prompting purchase behavior (Klößner & Ofstad, 2017 and Klößner, June 2018, personal communication during conference). Therefore, we aimed to engage all participants in equal amounts of thinking about clothing consumption. Participants were instructed that they will see repeated measures regarding their clothing consumption behavior ('count twice' what you bought) in the upcoming study period and that this is part of the research. At all three intervention points, to avoid any potential differences due to differences in the study procedure, the control group equally filled in the questionnaire on the website, which was branded 'Count Twice' for them.

#### *Think Twice*

This information only intervention condition aimed at increasing the intention to reduce through increased awareness of need, outcome efficacy and action knowledge. This treatment condition aimed at moving participants from the predecisional stage to the preactional stage. Informational material was provided through a website called 'Think Twice' in form of videos, texts and figures.

#### *I Think Twice & We Think Twice*

The third intervention group (individual G-F-C) ('I Think Twice') and fourth intervention group (group G-F-C) ('We Think Twice') both received the same information material as the information only group. However, beyond the mere provision of information they were encouraged to set themselves goals for reducing their clothing consumption in the one-month

period following the three intervention units on the second intervention day. This aimed at helping them to form a behavioral intention and move from the predecisional stage to the action stage. The individual G-F-C group was asked to set a personal goal, the goal setting of the group G-F-C condition was set in context of all participants in their study group and a group goal. They were provided with feedback about the carbon and water saving potential of their individual or group goal and asked to commit to their goals. Both groups furthermore received content related to coping planning in order to support them in the action stage and ensure that intentions are translated into behavior.

### *Materials*

On intervention day 1, for all three treatment groups, disseminations of knowledge regarding environmental and social impact of clothing production, over-consumption of clothing, the business model of fast fashion and marketing principles took place via three videos. Participants in the information only group were encouraged a) that they can make a difference through thoughtful consumption decisions (outcome efficacy message) and b) to reflect on possible alternatives to buying new items provided to them (action knowledge). Participants in individual G-F-C condition saw the same message and additionally a call to think about whether they would be willing to reduce their consumption. Participants in the group G-F-C condition saw the same message as participants in the individual condition, but all communication was direct towards ‘we’ as consumers (instead of ‘you’ as consumer). This holds true also for all following descriptions of the other intervention days. At the end of intervention day 1, a short knowledge survey assessed whether participants had watched the knowledge videos and understood the main content. For all treatment groups, intervention day 2 offered a repetition of the knowledge videos. In the following, written in-depth and UK country-specific knowledge about carbon and water footprint of British households’ clothing consumption in 2016 was provided. Moreover, participants learned more in depth about possible alternatives to purchasing new items of clothing (e. g. mending, re-coloring, updating or swapping). They listed up to three recent purchases and which alternative they could have applied. Participants of both G-F-C conditions additionally were given the chance to set themselves a goal of reducing their clothing consumption in the four-week period following the intervention days. They could chose from the following options: a goal of not buying any new item, a goal of buying a certain number of items less, a goal of buying less but without setting a fixed number of items and no goal. On



intervention day 3, the information only group was not provided with any further intervention material. Both G-F-C conditions received feedback on their goal setting from intervention day 2. Participants of the individual G-F-C condition received individual feedback about their goal and its saving potential in terms of carbon and water footprint. Participants of the group G-F-C condition received the same information, however relating to the group goal (= accumulated goal of all participants in this group). Subsequently, all participants who have set themselves a goal were provided with advice how to reach their goal based on self-control strategies, e. g. try avoiding temptations, automatizing and reappraising non-consumption. Across all groups and intervention days, the contact website was programmed separately for each group and contained modern and appealing graphics matching the groups intervention techniques (e.g. multiple people that formed a goal to reduce their clothing consumption depicted).

### 3.3. Measurements

Clothing purchase behavior was measured five times retrospectively for two-week periods with the question *'How many items of clothing did you acquire during the last two weeks (since the last time we asked you)?'*. For the pre and post measurement, the first two and last two measurements were aggregated to a one-month period before and a one-month period after the three intervention days. Moreover, clothing purchase behavior in the past three months was measured in the intake survey and again at the three-month follow up with the question *How many items of clothing did you acquire during the three months?'*.

Intentions were measured via the importance of the goal *to reduce my clothing consumption* with answer categories ranging from 0 'I do not have this goal' over 1 'not very important' to 7 'very important' before the intervention, after the intervention and at the three-month follow up.

For the behavior determinants as proposed by the CADM we used the same measurements as Joanes (2019), new in this context is only the measure for collective efficacy. Five items measured personal norm, 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 six items each and referred to issues of environmental and social 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: *'Through my personal clothing consumption, I am*

*contributing to the harm done to the environment.*’; for personal outcome efficacy: ‘*. Through my personal clothing consumption, I can influence the health of people living in production countries*’. Collective efficacy was assessed similarly but referring to the group, e. g. ‘*Collectively, through our clothing consumption decisions, we as consumers can influence improvements in working groups associated with clothing production*’.

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 7-point semantic differential scale with four polar adjectives as 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*’.

#### 4. Results

In the results section we firstly report descriptive results and test whether the randomization prior to the intervention into each condition was successful with regard to the main variables of interest. Afterwards, for each of the variables behavior, intention and personal norms, we analyze changes across groups and time to evaluate the effectiveness of the intervention for encouraging change in these variables. Additionally, we examine in how far these changes are predicted by changes in the determinants of behavior, intentions and personal norms as proposed in our theoretical framework.

##### 4.1. Descriptive results and randomization check

For the pre-test time period before the intervention, participants across all groups reported an average number of  $M = 3.65$  ( $SD = 4.40$ , range 0-48) clothing items purchased in four weeks. Before the intervention, 27% of all participants indicated to not have the intention to reduce their consumption. The remaining 73% reported a moderate intention ( $M = 3.46$ ,  $SD = 1.66$ , range 1-7). We calculated ANOVAs for purchase behavior, intentions and the further model variables to compare the different conditions before the intervention and found no significant

differences for any variable between the groups. Equally, tests for differences with regard to age ( $F(3,393) = 1.60, p = .19$ ), sex ( $X^2(3, N = 397) = 1.62, p = .66$ ), income ( $F(3,392) = 0.03, p = .99$ ) and number of children ( $X^2(3, N = 397) = 1.22, p = .75$ ) between the groups yielded no significant results. Hence, we assume that the randomization was successful. The average levels of further determinants as proposed in the theory section can be found in Appendix A for each the pre-test, post-test and follow-up.

#### 4.2. Reduction in the number of clothing items purchased

Means and standard deviations of the number of items purchased in the past one-month periods and past three-month periods for each groups and the different measurement points are listed in Table 1. Comparing the one-month pre-test and one-month-post test we find that the individual and group G-F-C conditions reduced the number of items they bought by  $M = 2.47$  (60.24%) and  $M = 1.62$  (47.08%) items, respectively. It can be noted, that the individual G-F-C group descriptively had bought more items in the pre-month and therefore more possibility to reduce, however this difference at the pre-test was not significant. In contrast, the control group reduced their number of items bought 8.45% and the information only group by 10.14%. At the follow-up measure we see a different picture. Comparing the one-month pre-test and the past one-month period at the follow-up we find the following reduction in the number of items bought: 44.79%

Table 1 Means (standard deviation) of the main variables across groups and time

	Condition	1-month pre	1-month post	Follow-up
Purchases past 1-month	Control group	3.55 <sup>a</sup> (3.72)	3.25 <sup>a</sup> (4.31)	1.96 <sup>b*</sup> (1.67)
	Information only	3.55 <sup>a</sup> (3.89)	3.19 <sup>a</sup> (3.39)	2.23 <sup>b*</sup> (2.16)
	Individual G-F-C	4.10 <sup>a</sup> (6.01)	1.63 <sup>b</sup> (2.35)	1.77 <sup>b</sup> (2.10)
	Group G-F-C	3.44 <sup>a</sup> (3.74)	1.82 <sup>b</sup> (3.09)	2.10 <sup>b*</sup> (3.02)
	n	397	397	341
		<b>2017</b>	<b>1-month post</b>	<b>Follow-up</b>
Purchases past 3-months	Control group	8.15 <sup>a</sup> (5.45)	9.23 <sup>a</sup> (7.63)	4.20 <sup>b</sup> (3.43)
	Information only	8.18 <sup>a</sup> (4.55)	9.25 <sup>a</sup> (6.08)	4.83 <sup>b</sup> (5.16)
	Individual G-F-C	7.41 <sup>a</sup> (5.02)	8.85 <sup>a</sup> (5.77)	3.81 <sup>b</sup> (3.48)
	Group G-F-C	7.23 <sup>a</sup> (4.59)	8.11 <sup>a</sup> (4.86)	3.58 <sup>b</sup> (4.39)
	n	178	397	341
		<b>1-month pre</b>	<b>1-month post</b>	<b>Follow-up</b>
Intentions	Control group	2.45 <sup>a</sup> (2.03)	3.09 <sup>b*</sup> (2.17)	3.10 <sup>b*</sup> (2.12)
	Information only	2.67 <sup>a</sup> (2.14)	3.98 <sup>b</sup> (2.18)	3.64 <sup>b</sup> (2.24)
	Individual G-F-C	2.32 <sup>a</sup> (2.03)	4.60 <sup>b</sup> (1.88)	4.01 <sup>c*</sup> (2.07)
	Group G-F-C	2.61 <sup>a</sup> (2.20)	4.56 <sup>b</sup> (2.05)	3.86 <sup>c*</sup> (2.13)
	n	397	397	341
Personal norms	Control group	3.82 <sup>a</sup> (1.56)	4.01 <sup>a</sup> (1.53)	4.07 <sup>a</sup> (1.57)
	Information only	3.65 <sup>a</sup> (1.52)	4.56 <sup>b</sup> (1.57)	4.51 <sup>b</sup> (1.70)
	Individual G-F-C	3.75 <sup>a</sup> (1.67)	5.00 <sup>b</sup> (1.27)	4.77 <sup>b</sup> (1.45)
	Group G-F-C	3.78 <sup>a</sup> (1.65)	5.04 <sup>b</sup> (1.54)	4.72 <sup>b</sup> (1.64)
	n	390	397	341

Note: for each row, unequal subscripts indicate a significant difference between means at  $p \leq .001$  or  $*p \leq .05$  (Bonferroni adjusted); reference group in the first column

for the control group, 37.18% for the information only group, 56.83% for the individual G-F-C condition and 38.95% for the group G-F-C condition. Comparing the past three-month period from 2017 with the same past three-month period at the follow-up (in 2018) we find a similar pattern: the control group reduced the number of items bought by 48.47%, the information only group by 40.95%, the individual G-F-C condition by 48.58% and the group G-F-C condition by 50.48%.

A repeated measures mixed regression model was conducted with Stata 15.1 with repeated data over participants to test for significant changes in the number of items bought in the different

one-month periods across time points and groups (see Table 2). Figure 3 depicts predictive margins of the average number of items bought in the past month by the different groups across all three measurement points.

*Table 2* Mixed-effects REML regression results for purchase in the past month

Variable	beta	SE	z	P> z	LLCI	ULCI
Time (1-mont pre vs.)						
1-month post	-0.29	0.41	-0.71	0.48	-1.09	0.51
Follow-up	-1.64	0.42	-3.89	0.00	-2.47	-0.81
Group (Control vs.)						
Information	0.00	0.49	0.01	0.99	-0.95	0.96
Indiv. G-F-C	0.55	0.50	1.11	0.27	-0.42	1.52
Group G-F-C	-0.11	0.49	-0.22	0.83	-1.08	0.86
Time x Group						
1 x Information	-0.07	0.59	-0.12	0.91	-1.23	1.09
1 x Indiv. G-F-C	-2.17	0.60	-3.61	0.00	-3.35	-0.99
1 x Group G-F-C	-1.33	0.60	-2.21	0.03	-2.50	-0.15
2 x Information	0.35	0.61	0.57	0.57	-0.85	1.54
2 x Indiv. G-F-C	-0.70	0.64	-1.10	0.27	-1.94	0.55
2 x Group G-F-C	0.33	0.63	0.53	0.60	-0.90	1.56

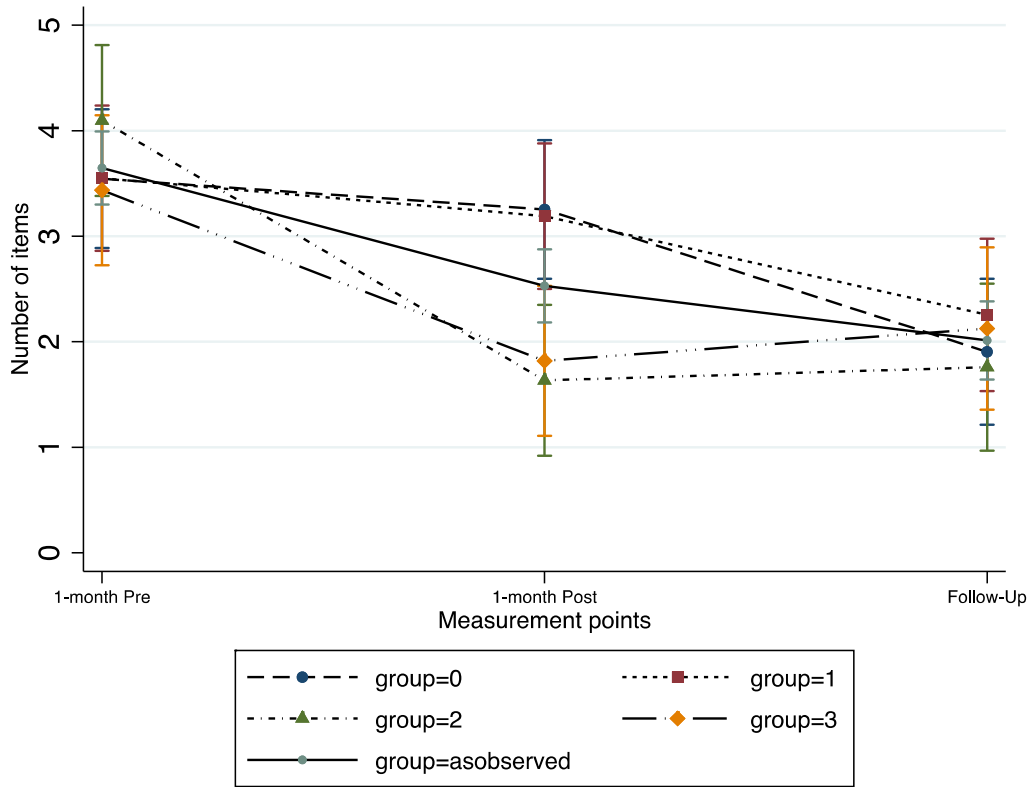


Figure 3 Predictive margins with 95% CIs for items bought in the past month across time

A joint test of the main and interaction effects reveals a significant main effect of time ( $X^2(2, N = 397) = 58.48, p < .001$ ), indicating that across all time-points participants across all groups had significantly reduced the number of items purchased. Additionally, we find the interaction effect between time x group was significant ( $X^2(6, N = 397) = 21.03, p < .001$ ), meaning that across time-points there are significant differences in the reduction of clothing items between groups. A closer look at the simple effects will explain this significant interaction effect in the following.

There was no significant difference between the control group and information only group at any of the three time points. Likewise, the two G-F-C treatment groups did not differ at any time. However, at the one-month post-test, the latter two groups bought significantly fewer items than the control and information only group. Both the individual G-F-C treatment condition ( $\beta = -2.17, p < .001$ ) and group G-F-C condition ( $\beta = -1.33, p < .01$ ) predicted fewer items purchased in the past month. Together, this confirms H1.

At the follow up, we observed no difference in the number of items purchased in the past month between the groups ( $X^2(3, N = 341) = 1.00, n.s.$ ). Against our expectations, all participants independent of group had purchased significantly fewer items in the past month ( $\beta = -1.64, p < .001$ ) as compared to the one-month pre-test. There was no significant difference in the number of items bought between the one-month post-test and the follow up for all treatment groups, indicating the two G-F-C conditions remained at their lower level of purchases from the one-month post period. However, for the control group the reduction in items was significant ( $z = -3.20, p < .01$ ).

With the same analysis method we find a significant main effect of time for the number of items bought in the three-month period ( $X^2(2, N = 397) = 226.44, p < .001$ ). For past-three month periods, participants across all groups had indicated a similar amount of items bought at the pre-test measurement as compared to 2017, and, again against our expectation, independent of group participants reported significantly fewer items at the follow-up compared to 2017 ( $\beta = -3.92, p < .001$ ). There was no difference between the groups in the number of items they had bought in the previous three-months at the follow-up (see Table 1).

In a next step, for each group separately, we examine in how far a change in the number of items a participant purchased in the three one-month periods across pre-test, post-test and follow up is predicted by a change in participant's intentions or perceived behaviour control. For this analysis we applied a linear regression model with fixed effects and clustered standard errors across participants and regressed the number of items purchased in the past month on intentions and perceived behaviour control. Intentions predicted the number of items bought in the individual G-F-C condition ( $\beta = -.36, p < .01$ ) and in the group G-F-C condition ( $\beta = -.31, p < .01$ ), indicating that an increase in intention was related to a decrease in the number of items bought (confirming H4a). Perceived behavior control predicted the number of items bought in the control condition ( $\beta = .51, p < .05$ ), suggesting that for this group a decrease in perceived behavior control accompanied a decrease in the number of items bought. For the individual G-F-C condition an increase in perceived behavior control predicted a decrease in the number of items purchased ( $\beta = -.60, p < .05$ ). This is mixed evidence for hypothesis H4b.

#### 4.3. Intention and their predictors

Equal to behavior, we want to analyze changes in intentions and how changes in the determinants of intentions, as proposed by our theoretical framework, predicted those changes in intentions. Firstly, we conduct repeated measures mixed regression models again to test for significant changes in intentions across time points and groups. We find a main effect for group ( $X^2(3, N = 397) = 14.85$ ),  $p < .01$ , time ( $X^2(2, N = 397) = 214.39$ ,  $p < .001$ ) and an interaction effect for time x group ( $X^2(6, N = 397) = 35.25$ ,  $p < .001$ ). At the one-month post-test, across all groups participants significantly increased their intentions compared to the pre-test ( $X^2(3, N = 397) = 34.78$ ,  $p < .001$ ). Participants in all three treatment conditions increased their intentions significantly more compared to the control group from pre- to post-test. This partially confirms H2, as we did not expect an increase in intentions for the control group. At the follow-up we observe a significant decrease in intentions for the individual G-F-C condition ( $z = -2.66$ ,  $p < .05$ ) and the group G-F-C condition ( $z = -3.12$ ,  $p < .01$ ) compared to the post-test. The other two groups kept a stable level of intentions between post-test and follow up. Still, at the follow-up there is a difference in intentions between the groups ( $X^2(3, N = 397) = 10.53$ ,  $p < .05$ ), with the two G-F-C conditions still expressing higher intentions than the control group.

For the analysis of determinants, we again applied linear regression models with fixed effects and clustered standard errors across participants for each group separately. For all experimental groups changes in personal norms significantly predicted changes in intentions (confirming H5a), whereby this effect was stronger for all three treatment groups than for the control group ( $\beta_{Control} = .38$ ,  $p < .05$ ;  $\beta_{information\ only} = .70$ ,  $p < .00$ ;  $\beta_{ind.\ G-F-C} = .73$ ,  $p < .00$ ;  $\beta_{group\ G-F-C} = .90$ ,  $p < .00$ ). Neither changes in attitudes, perceived behaviour control nor social norms predicted changes in intentions above and beyond changes in personal norms. We therefore dismiss hypothesis H5b.

#### 4.4. Personal norms and their predictors

We conducted the same analysis for personal norms as described above. We find a main effect for group ( $X^2(3, N = 397) = 11.69$ ),  $p < .01$ , time ( $X^2(2, N = 397) = 204.04$ ,  $p < .001$ ) and an interaction effect for time x group ( $X^2(6, N = 397) = 49.12$ ,  $p < .001$ ). The control group did not increase their personal norms at any time. At the one-month post-test all personal norms were significantly increased across all groups ( $X^2(3, N = 397) = 29.37$ ,  $p < .001$ ), and we did not



observe any significant differences in the level of personal norms between the treatment groups. The same holds for the follow up, with no significant changes in the level of personal norms between the post-test and follow-up for any of the groups. Together, this confirms H6.

The results for the analysis of determinants of personal norms are as follows. An increase in social norms consistently predicts an increase in personal norms across all groups, confirming H7c. For the control group, above and beyond, we find an increase in awareness of need ( $\beta = .25, p < .01$ ) and in outcome efficacy ( $\beta = .25, p < .01$ ) significant predictors for an increase in personal norms. For the information only group, it is a change in ascription of responsibility that positively predicts changes in personal norms ( $\beta = .32, p < .01$ ), whereas outcome efficacy plays no role for this group. But, changes in individual outcome efficacy predict changes in personal norms for both G-F-C groups ( $\beta_{ind. G-F-C} = .39, p < .01$ ;  $\beta_{group G-F-C} = .22, p < .01$ ). Changes in collective outcome efficacy are significantly related to changes in personal norms only for the group G-F-C group ( $\beta = .29, p < .01$ ). Together, these results mostly confirm H6a for the control group and H6b for all but the information only group.

#### 4.5. Changes in determinants

Awareness of need, personal and collective outcome efficacy and social norms are theorized to be determinants of personal norm and intentions and were the target of our intervention conditions. As such, we expected them to change between the pre-test and post-test. An overview over the means of all determinants for each group at the pre-test and post-test can be found in APPENDIX A. As expected, we did not observe a significant change for any of the determinants in the control group. Across all groups, all determinants changed significantly between pre-test and post-test. Against our expectations, however, we did not observe significant differences in the level of any of the determinants at the post-test between the treatment groups, i.e. the group G-F-C condition differed not from the other two treatment conditions. We therefore have to dismiss H8.

### 5. Discussion

The present study examined the effect providing information and goal setting combined with feedback, goal commitment (G-F-C) and coping planning has on the number of items purchased

in a one-month period. Additionally, the difference between individual goals and group goals was examined. The current study shows that intervention strategies for reduced consumption can be successful in reducing consumers clothing consumption. As expected, providing only information leads to an increase in intentions to reduce clothing consumption. However, participants in the information only group did not significantly differ from the control group in the actual number of items bought in a one-month post-test. The two treatment groups that combined information and G-F-C in contrast, significantly reduced the number of items bought in the one-month post period.

Two results need to be discussed more in detail. Firstly, we could observe that all intervention groups, both control and all treatment groups, reduced their clothing consumption at the follow-up. This was observable in two ways. On the one hand, people across all groups purchased fewer items in the past three-month period at the follow up (2018) as compared to exactly the same three-month period the previous year (2017) and as compared to a three-month period directly before the intervention (2018). On the other hand, across all groups the average number of items bought in the past month reduced when comparing the post measurement point and the follow-up. This reduction, however, is driven by a reduction of the number of items bought by the control group and the information only group, both that did not reduce the number of items bought at the post survey. In the end, at the three-month follow up, there are no significant differences in the number of items bought between the intervention groups.

For the two intervention groups that reduced their consumption already at the one-month post survey this can potentially be explained the following. They had reduced their clothing consumption already to a considerable level ( $M = 1.63/1.82$  per month) at the post-test and therefore only little room was left for further reductions. This is underlined by the fact that the number of items they bought in the past month at the follow-up does not differ from the number of items they bought at the post measurement point. To rephrase it, they maintained their lower level of reduction from the intervention period.

Unexpected, however, is the reduction in items bought by the control and information only group, both in the past month and the previous three months. To our knowledge, no previous intervention has found a similar result and at this point, we can only speculate what caused the change in behavior across all groups. Based on the results, we cannot exclude that the intervention had effects on clothing purchases no matter what the exact intervention content

was. Secondly, also the intention to reduce consumption was increased for the control group at both the one-month post-test and three-month follow-up.

Any explanation for this can only be of speculative nature. The control group was, in line with all treatment groups, regularly counting the number of items bought during the whole intervention period. Furthermore, they answered all model related items, e.g. items asking about awareness of need or personal norms with regard to reducing consumption. One possible explanation can be that answering the items already fostered an intention to reduce consumption, which then translated into behavior. Against this notion speak two results of our study. Firstly, a change in intentions did not predict a change in the number of items bought for the control condition. Secondly, we cannot find any change in model variables for the control group between any of the measurement points. Another potential explanation therefore could be that simply by counting the number of items purchased consumers reflected on the amount they bought, maybe realizing that it was above their needs. Such a reflection could have an impact on both intentions and in the long term also purchase behavior.

Yet another completely different perspective to potentially explain these results could lie with two macro structural reasons. Firstly, there has been specific weather events that might have limited or enhanced person's perceived need for clothes. November 2018 has been comparatively mild, potentially slowing sales in winter clothes. The three-month period prior to the intervention, however, has been characterized by a heat wave. Qualitative response from selected participants indicated that they had purchased due to that reason. Equally, weather data reports that the three month period in 2017 was characterized by a cooler than average September and particularly November. This potentially could explain why participants bought more in 2017 and before the intervention and significantly less at the three-month follow up (Met Office, 2018). Secondly, during the time of study, the United Kingdom has found itself in political turbulent times, particularly in the three months prior to the follow up. As a result, consumer confidence was reported to have decreased especially since summer 2018 (Gfk, 2018). It is, however, at similar levels as compared to last years November and December levels, therefore of limited explanatory power for the difference in items purchased in the past three months.

With regard to the determinants of intentions and personal norms, changes were as expected. None of the determinants changed for the control group, and all increased for the three treatment

groups. In line with Joanes et al. (forthcoming), it was a change in personal norm only that predicted a change in intentions. Likewise, the role of social norms and outcome efficacy for in personal norms was confirmed.

The expected effects for the group condition, however, were not observed. One possible explanation lies within the nature of the group setting deployed here. We observed that participants did not identify with the group of other participants on Prolific. Therefore, the group intervention most likely was to subtle, and the group of Prolific participants not relevant enough. Moreover, participants did not communicate with each other, which was the case in previous studies successfully working with groups (Staats, Harland, & Wilke, 2004).

We further analyzed how changes in determinants influenced changes in behavior, intentions and personal norms. At this point, only selected differences between the groups are discussed. For the control group, it is indeed only changes in social norms that have a positive influence on changes in personal norms, again underlining the importance of social norms. Furthermore, and more in line with our expectations, changes in both collective and individual outcome efficacy are related to changes in personal norms for the group goal and commitment group. This is not the case for the individual goal and commitment group, where it is only outcome efficacy at the individual level, which is related to a change in personal norms. Therefore, while not leading to a higher increase in personal norms for the group treatment condition as expected, collective outcome efficacy was still relevant for norm development processes in this group.

While this study provides valuable insights for possible behavior change strategies, its limitations and future research ideas need to be discussed. One major limitation of this study is the fact that at the follow-up all participants had reduced their clothing consumption. Therefore, we can assume that the intervention has worked, but we cannot exactly determine how. The simple counting and reflecting on number of items purchased might have motivated the control group to reduce consumption, and future studies need to design a different control group to rule out this possibility. Furthermore, as we combined multiple behavior change strategies, we also cannot say exactly which mechanism has motivated the individual and group G-F-C conditions to change their behavior in the post-test period. While we assume that a combination of all strategies as used here is the most promising avenue for behavior change, for practitioners, however, who might not be able to deploy the whole strategy, more detailed information is needed. Lastly, our group condition did not show the expected results. Future studies could e.g.

try to use natural occurring group settings, e.g. neighborhoods or schools, and test for additional effects through group settings.

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Behavior and determinants	Control group (n=110)			Information only (n=100)			individual G-F-C (N=93)			group G-F-C (n=93)		
	1	2	3	1	2	3	1	2	3	1	2	3
Number of items purchased in the past month	3.55 (3.72)	3.25 (4.31)	1.96 (1.67)	3.55 (3.89)	3.19 (3.39)	2.23 (2.16)	4.10 (6.01)	1.63 (2.35)	1.77 (2.10)	3.44 (3.74)	1.82 (3.09)	2.10 (3.02)
Reduction intention	2.45 (2.03)	3.09 (2.17)	3.10 (2.12)	2.67 (2.14)	3.98 (2.18)	3.64 (2.24)	2.32 (2.03)	4.60 (1.88)	4.01 (2.07)	2.61 (2.20)	4.56 (2.05)	3.86 (2.13)
Personal norms	3.82 (1.56)	4.01 (1.53)	4.07 (1.57)	3.65 (1.52)	4.56 (1.57)	4.51 (1.70)	3.75 (1.67)	5.00 (1.27)	4.77 (1.45)	3.78 (1.65)	5.04 (1.54)	4.72 (1.64)
Social norms	2.59 (1.26)	2.74 (1.15)	2.78 (1.23)	2.51 (1.42)	3.06 (1.35)	3.11 (1.49)	2.52 (1.28)	2.99 (1.31)	2.98 (1.42)	2.58 (1.36)	3.07 (1.45)	2.76 (1.28)
Attitudes	4.63 (1.37)	4.78 (1.31)	4.89 (1.44)	4.64 (1.13)	5.27 (1.28)	5.23 (1.34)	4.74 (1.24)	5.50 (1.30)	5.50 (1.07)	4.81 (1.37)	5.53 (1.45)	5.35 (1.49)
Perceived behaviour control	5.95 (0.99)	5.84 (1.02)	5.65 (1.21)	5.79 (1.15)	5.93 (1.18)	5.76 (1.20)	5.61 (1.12)	6.11 (0.91)	5.99 (0.90)	5.92 (1.02)	6.20 (1.01)	5.66 (1.34)
Awareness of need	4.91 (1.00)	4.89 (1.01)	4.96 (1.14)	4.71 (1.31)	5.52 (1.13)	5.34 (1.21)	4.61 (1.25)	5.81 (0.95)	5.51 (1.01)	4.72 (1.17)	5.77 (1.04)	5.44 (1.05)
Ascription of responsibility	4.21 (1.28)	4.33 (1.28)	4.09 (1.33)	4.71 (1.31)	4.85 (1.24)	4.59 (1.13)	4.06 (1.39)	4.98 (1.21)	4.61 (1.16)	3.96 (1.40)	4.89 (1.40)	4.22 (1.52)
Outcome efficacy (personal)	4.02 (1.36)	4.21 (1.33)	4.07 (1.47)	4.01 (1.36)	4.67 (1.36)	4.54 (1.43)	3.91 (1.27)	4.94 (1.21)	4.80 (1.35)	4.13 (1.48)	4.80 (1.47)	4.60 (1.50)
Outcome efficacy (collective)	5.24 (1.01)	5.42 (1.02)	5.17 (1.22)	4.09 (1.33)	5.54 (1.23)	5.61 (1.01)	5.06 (1.30)	5.81 (0.95)	5.78 (1.11)	5.10 (1.37)	5.67 (1.01)	5.64 (1.12)

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