



think twice – a social marketing toolbox for reduced consumption

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Title: Think Twice – a social marketing toolbox for reduced consumption Author: Tina Joanes & Wencke Gwozdz Mistra Future Fashion deliverable: D3.2.1.2 Edition: Only available as PDF for individual printing ISBN: 978-91-89049-48-2 Mistra Future Fashion report number: 2019:12

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Images: Unsplash Layout: Malin Wennberg

A Mistra Future Fashion Report

Mistra Future Fashion is a cross-disciplinary research program, initiated and primarily funded by Mistra. It holds a total budget of SEK 110 millions and stretches over 8 years, from 2011 to 2019. It is hosted by RISE in collaboration with 15 research partners and involves more than 50 industry partners.

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FUNDED BY

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summary

This report presents an experimental application of the behavior-change strategies introduced in Mistra Future Fashion report D3.2.1.1 (Joanes et al, 2019) and investigates their potential to change consumer behavior in practice. It reports the results of an online intervention that aimed to reduce consumers clothing purchases and to evaluate the extent to which different tools were instrumental in achieving this aim. The rationale behind the intervention and this report is to offer practitioners (like e.g. NGOs or other campaigning institutions) tested and evaluated methods to encourage reduced clothing consumption among consumers. In general, results show that a combination of both knowledge providing and awareness raising tools as well as goal setting techniques was successful in reducing the number of items consumer bought. Further results and possible limitations of the study are discussed

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1. introduction

Clothing is an inherent part of culture and everyday life. On a daily basis, people make clothing decisions not only to physically protect their body, but also to express individuality, communicate meaning and meet social and situational requirements in all kinds of contexts (Crane, 2000; Van Der Laan & Velthuis, 2016). Despite clothing's physical and cultural significance, the current way of producing and consuming clothing is problematic. First, the production of clothing induces widespread environmental problems (e.g. depletion of freshwater reservoirs and pollution of ecosystems) and social problems (e.g. poor working conditions and payment below the minimum wage). Second, clothing production has been constantly growing in the past decades, especially due to the successes of fast fashion as a business model, which has exacerbated the environmental and social problems (Kim, Jung Choo, & Yoon, 2013; Lueg, Pedersen, & Clemmensen, 2015). Also see report D3.2.2.1 (Steensen Nielsen & Gwozdz, 2019) on consumer policy recommendations for a more in-depth discussion of these issues.

Consequently, questions about the sustainability of current levels of clothing consumption arise. This is further reinforced by the fact that beyond a certain level, more material possessions do not necessarily lead to higher well-being (Jackson, 2016; Oishi & Kesebir, 2015; Roberts & Clement, 2007; Roster, Ferrari, & Jurkat, 2016). Moreover, clothing is a discretionary product where only a certain amount of clothing is required to ensure physical protection. In this light, the volume of clothing consumed today, especially in Western countries, can be characterized as overconsumption (McDonagh & Prothero, 2015). When coupled with the environmental and social problems associated with clothing, this suggests that a reduction in the overall consumption of clothing is warranted. For more on sustainability impacts of clothing production and consumption, see Mistra Future Fashion reports on Product Life Cycle of apparel.

The present report focuses on ways to reduce clothing consumption through behavioral changes. To meet the research ambition of reducing clothing consumption, an online intervention was implemented to investigate five theoretically derived behavior-change tools: awareness, goal setting, feedback, commitment and group processes. (The logic behind selecting these tools is presented in Section 2.) In the online intervention, we tracked consumers over a period of two and a half months and assessed whether they reduced their clothing consumption during that time period.

Methodologically, we applied a pre-post-control design to assess the effectiveness of the behavior-change tools in reaching our research aim. We randomly assigned participants into four conditions including a control condition and implemented different tools for each condition. No tools were implemented in the control condition. The central variable, the number of clothing items purchased, was measured before and directly after the intervention and again at a three-month follow up, which allowed us to determine the effectiveness of the different behavior-change tools. The intervention stimuli for the tools were introduced on three days (three consecutive Thursdays) where consumers were presented with different materials across the conditions, including materials such as videos, texts and graphs. In Section 3, all conditions are described in detail and with examples of the intervention materials. The section also provides further details on the participants and the intervention procedure. Section 4 reports the results of the intervention with a particular focus on whether the behavior-change tools were effective in reducing clothing purchases in the period between the pre-test and the post-test. Section 5 discusses these results and their practical implications (e.g. for policymakers, businesses or NGOs).

The research presented in this report was also part of the PhD thesis 'Sufficiency for sustainability: Determinants and strategies for reducing clothing consumption' (Joanes, 2019b). The theoretical rationale and results presented here correspond to what is reported in the PhD thesis.

2. theoretical approach and tools for behavior change

2.1. changing behavior – basic principles

Inducing behavioral changes is rarely easy and behavioral interventions must be well-crafted to maximize the chances of success. Changing environmental behavior thus necessitates adopting a systematic approach, which involves properly assessing and understanding the behavior(s) one is aiming to change (Steg & Vlek, 2009). A successful behavior-change intervention that benefits the environment include the following four elements:

- 1. The shift from the problematic to the desired behavior must improve environmental conditions
- 2. The determinants of the desired behavior must be thoroughly analyzed
- 3. The intervention must be informed and developed on the basis of those determinants
- 4. The effectiveness of the intervention must be thoroughly evaluated

The introduction already highlighted how reducing clothing consumption can lessen environmental problems and the method for evaluating the effectiveness of the present interventions will be discussed in the methodology and result section of this report. Consequently, the next sections will focus on the determinants of successfully reducing clothing consumption and the intervention strategies that can be developed therefrom.

To identify behavioral determinants a theory-driven approach is essential (Abrahamse & Matthies, 2013). Here, we build on research by Joanes, Gwozdz & Klöckner (forthcoming) who have applied the comprehensive action determination model, CADM (Klöckner, 2013; Klöckner & Blöbaum, 2010) to analyze determinants of reducing clothing consumption. Furthermore, we apply the stage model of self-regulated behavior change, which provides a framework for assessing the different stages involved in a behavior change (Bamberg, 2013). (See Report D.3.2.1.1. for an introduction of these models.)

The reason for incorporating models is that the CADM mainly focuses on explaining intentions to perform a certain behavior, which, for example, can be fostered through information provision targeting specific CADM variables (e.g. problem awareness or outcome efficacy). However, research has shown that there is often a gap between consumers' intentions and their actual behavior (Carrington, Neville, & Whitwell, 2014; Gollwitzer & Sheeran, 2006; Sheeran & Webb, 2016). As a result, additional tools are required to help translate intentions into actual behavior, and here Bamberg's (2013) stage model is useful.

In the following, the relevant components of the CADM are presented; these components were primarily used for the first intervention day. Next, other tools for behavior change based on the stage model are described (intervention day 2 & 3). We also recognize and integrate the collective dimension of environmentally friendly behaviors and clothing consumption through the perspectives of collective action (Fritsche, Barth, Jungert, Masson & Reese, 2018). By adding a group intervention condition, we acknowledge that environmental problems only can be solved collectively (e.g. by neighborhoods, municipalities, or nations).

2.2. previous research on reduction intentions and tools for behavior change

Analyses of the determinants of environmentally friendly behaviors must be informed by theory and empirical findings (Steg & Vlek, 2009; see also D.3.2.1.1. for more details). Psychological determinants of reducing clothing consumption have been assessed in previous research (e.g., Joanes et al., forthcoming). Using the CADM framework, Joanes et al. identified awareness of need and outcome efficacy as important determinants of personal norms, which has further been recognized as an important antecedent to the performance of environmentally friendly behavior (e.g., Stern, 2000). Awareness of need refers to knowledge about the environmental impacts induced through the production of clothing (e.g. freshwater depletion and pollution of ecosystems). Outcome efficacy is the belief that one can help reduce environmental impacts through one's actions (e.g., through one's consumption decisions). In the study, personal norms were the strongest predictor of intentions, even more strongly than attitudes and perceived behavioral control. Consumers' perceived behavioral control reflects the belief that they themselves can control whether to perform the behavior in question or not. Participants in Joanes et al.'s (forthcoming) study reported a high level of perceived behavioral control supporting the notion that reducing clothing consumption is feasible and under their control. Social norms, which can refer to both perceptions about what others do (descriptive social norms) and what others expect you to do (injunctive social norms), were related both directly and indirectly to intentions. Both descriptive and injunctive social norms were found strongly related to personal norms and to a lesser extent to intentions. But importantly, Joanes et al. (forthcoming) found that intentions were only weakly related to actual purchase behavior during the two-week assessment period. Overall, their study shows the significance of formulating messages that address the important determinants of reducing clothing consumption. Moreover, it becomes clear that other tools, above and beyond this specific information, are necessary to assist consumers in translating their intentions into actions. In the following, we will explain how we realized both aspects in our research.

Information provision (intervention day 1)

Providing information is a commonly used tool to induce behavior. It is typically used to inform consumers about the unsustainable nature of certain behaviors or the importance and benefits of performing sustainable behavioral alternatives (Klöckner, 2015). However, information provision does not guarantee behavior change and must therefore be supplemented by other tools. Much research has shown that providing information can increase knowledge and can help to form an intention, which is necessary but does not automatically result in sustained behavior change (Abrahamse, Steg, Vlek, & Rothengatter, 2007; Loy, Wieber, Gollwitzer, & Oettingen, 2016). Based on Joanes et al. (forthcoming), we decided that the information material used in this intervention should focus on two main messages. Firstly, it should educate consumers about the environmental problems associated with clothing to increase awareness of need. Secondly, to improve outcome efficacy, it should communicate consumers' potential role in helping to alleviate environmental pressures through their clothing decisions.

Goal setting, feedback and commitment (intervention day 2)

Goal setting is used often in the context of behavioral reduction (Abrahamse, Steg, Vlek, & Rothengatter, 2005, 2007; Klöckner, 2015). Goals can be set by individuals themselves or externally, but they should always be clearly defined, including their timeframe, and be achievable. Specific and concrete goals are more likely to be attained than general goals (Sheeran & Webb, 2016). The initiation of the pursuit towards these goals can be facilitated by implementation intentions (Carrington et al., 2014; Gollwitzer et al., 2008), which are "if-then" plans that help implement the behaviors that are instrumental to goal attainment. "If-then" plans create a mental link between a certain cue or situation and a goal-directed behavior: "If situation X arises, I will do Y" (Gollwitzer, 1993, 1999). Thus, implementation intentions define the behavior can be performed. Meta-analytic results show a medium-to-large effect of implementation intentions on goal attainment, 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 formulate behavioral intentions in the form of a concrete goal: how many fewer items they plan to purchase in one month. Additionally, they received information on strategies for how to attain their goal by shielding it from potential distractors (see coping planning in the following). In line with several studies, goal setting was used in combination with feedback and commitment in the current research (Abrahamse et al., 2005; Abrahamse & Matthies, 2013; Klöckner, 2015). Feedback was communicated only once and indicated the greenhouse gas emissions and water saving potential of the adopted goal for each participant (individual G-F-C condition) or for the group of participants (group G-F-C condition). This type of feedback 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 and a strengthening of intentions in Joanes et al. (forthcoming).

Commitments are pledges to perform certain behaviors 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 behavior (Lokhorst, Werner, Staats, van Dijk, & Gale, 2013). Commitments can be made publicly or in private. So far, research has found mixed results about the effectiveness of either, which suggest that the effectiveness may be dependent on the target group and setting (Abrahamse & de Groot, 2013). But generally, meta-analytic results show that commitment effectively influences behavior, 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.

Coping planning (intervention day 3)

Translating intentions into behavior requires self-regulation. Self-regulation refers to people's capacity to influence, modify and control their own behavior in ways that support important goals (Baumeister & Heatherton, 1996). Because people's capacity for self-regulation is influenced by both dispositional and situational factors, people may not always be able to effectively regulate their behavior. This suggests that people will sometimes fail to regulate their behavior and to act in accordance with their intentions. For example, self-regulation failure can occur when encountering potent and tempting stimuli, such as seeing a desirable new item in a shop window or in an email newsletter, or when people lack the cognitive and/or motivational resources to effortfully regulate their behavior (e.g. due to stress or tiredness; Baumeister, Heatherton, & Tice, 1994). To help facilitate self-regulation and acting in accordance with intentions, different self-regulation strategies can be utilized. Two such strategies are implementation intentions (Bell, Toth, Little, & Smith, 2016; Gollwitzer, Fujita, & Oettingen, 2008; Gollwitzer & Sheeran, 2006) and coping planning as the anticipation of possible obstacles and tempting situations and how to deal with them (Shiehotta, Scholz, & Schwarzer, 2006). These and other strategies are also relevant in the environmental domain. For example, (Nielsen, 2017) identified the following self-regulation strategies as being relevant for goal striving in an environmental behavior context:

- planning, e.g. forming implementation intentions and avoiding temptations,
- automatization, e.g. establishing goal-supporting habits,
- cognitive change, e.g. reappraisal of current behaviors in light of the intention or goal, and
- effortful inhibition, i.e. refraining from acting on thoughts, feelings or behavioral tendencies when they arise.

Both G-F-C conditions were introduced to these techniques and provided with examples for the context of clothing purchases. They were invited to reflect on which of the techniques they could apply.

Group setting

Previous research has found a positive relationship between CADM variables and the identification with community (Joanes, 2019a). This encouraged the inclusion of collective action as another perspective of the collective dimension of environmental issues (Bamberg et al., 2018; Fritsche, et al., 2018). In accordance with existing research, we propose two main mechanisms to influence collective action: social norms and collective outcome efficacy (Abrahamse et al., 2007; Bamberg et al., 2018; Staats, Harland, & Wilke, 2004; Steg, 2015). Previous studies have shown that social norms can act as powerful motivator to perform environmental behavior (Biel & Thøgersen, 2007; Cialdini, 2003) and have found that a combination of social-norm activation and persuasive information can motivate people to forego purchasing bottled water (van der Linden, 2015) and increase their towel reuse (Terrier & Marfaing, 2015). Feedback on the group level can, for example, highlight how collective action offers possibilities for reducing environmental impacts if all cooperate, which in turn can motivate people to contribute to the shared goal (Bandura, 2015). Collective outcome efficacy refers to the belief that such joint action has the potential to remedy the problem in question, which has been found to be related to group performance (Stajkovic, Lee, & Nyberg, 2009) and to cooperation in social dilemmas (Kerr, 1989). It is the awareness Group feedback communicates a general descriptive social norm or potentially a group-specific norm to which members of the group try to adhere when salient (Abrahamse & Steg, 2013). We here include a group condition to test for the additional effects that social norms and collective outcome efficacy might have on the reduction of clothing purchases. A summary all conditions of the current study is shown in table 1, section 3.3 below.

'knowledge provision by itself can lead to changes in intentions but not in behavior.'

3. methodology

The current study was conducted from July to September 2018 with a three-month follow-up in December 2018. Based on the theoretical deliberations presented above, we developed three different types of interventions (intervention conditions) and compared them to a control group condition. The first intervention condition only provided information to participants. The second intervention condition similarly provided information but also tried to foster goal setting and commitment and provided feedback. The third intervention did the same as the second intervention condition but in a group context.

Our methodology is a multiple intervention pre-test-post-test control group design. This means that participants were divided into four conditions with some receiving intervention materials (the three above-mentioned intervention conditions) and one who did not receive any information (the control condition). Participants were randomly assigned to one of the four conditions. This allows us to test the effectiveness of the three intervention conditions in comparison to a control group. We measured the number of clothing items purchased by participants before and after the provision of the intervention material.



figure 1 Overview over the intervention timeline; SBM = short behavior measurement; INV = intervention blocks, provided at the beginning, in the middle and at the end of a two-week period; the intervention period comprised of two weeks and the complete study took place over two months and two weeks with a follow-up after three months.

3.1. participants

Participant recruitment took place via the research platform Prolific with a target population of current residents of the United Kingdom between 18-65 years. In order to identify consumers with a sufficiently high level of clothing consumption, a pre-screen survey was conducted. The pre-screen survey was used to select the consumers who purchased at least three or four items during the past three months and indicated that the purchased amount was not a little or much more than they would normally purchase during such a time frame. We invited 889 participants to the pre-screen survey and 525 qualified participants were invited for the following seven-part study. The participants were awarded a monetary compensation for each study part, as well as a bonus payment for taking part in all seven parts (adding up to a maximum £12.00 compensation payment).

The four conditions were the following:

- 1. control condition (not exposed to any intervention),
- 2. information only condition,
- 3. individual goal setting, feedback and commitment condition (individual G-F-C) and
- 4. group goal setting, feedback and commitment condition (group G-F-C).

Participants were randomly assigned to each condition with 132 participants in the control condition and 131 participants in each of the other three conditions. 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 condition, 100 participants in the 16 information only condition, 93 participants in the individual G-F-C and 94 participants in the group G-F-C. The final sample was not representative of the U.K. population with, amongst other, women being overrepresented (60% of the sample). 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 groups.

3.2. procedure

All intervention material was delivered to participants online. Participants entered specific websites with the same design but different names and content depending on the condition. Figure 1 provides an overview of the overall intervention and data collection period. It shows all points of contact, the time period between them and their purpose.

The first three parts were the pre-test measure and similar for all participants. At the intake, the number of items purchased in the previous three months was measured. The second and third pre-test measure (SBM1 & SBM2) assessed the number of items purchased one month before the intervention. For that the number of items purchased was measured retrospectively at the end of two two-week intervals before the intervention and added up to the 1-month pre-test.

The following three parts (INV I to INV III) included questionnaires and for the intervention conditions, further material, such as written text, videos, graphics and pictures in a modern and appealing design, were included. The specific content varied between the experimental conditions.

The post-test measure collected information about the number of items purchased in the same manner for one month after the intervention (SBM3 & SBM4). At the follow up, the number of items purchased in the past three months was measured again.

3.3. experimental groups and materials

table 1 provides an overview of the four conditions, which are described in more detail in the following. For all three experimental conditions, the content was introduced to them through 'Anna' and 'Peter', two characters that were depicted according to the content and tasks of each intervention point (see figure 2).

Condition	Intervention & website name	Content	
Control condition	'Count twice'	not presented with any intervention material; website contained only embedded surveys	
Information only condition	'Think Twice'	intervention material (videos, pictures, texts) as well as embedded surveys	
Individual G-F-C condition	'I think twice'	Same as information + individual goal setting, feedback and commitment; coping planning	
Group G-F-C condition	'We think twice'	Same as information + goal setting, feedback and commitment at group level; coping planning	

table 1 Overview of different intervention conditions

THINK TWIC F DAY 1 These are Anna and Peter.

figure 2 Introduction of Anna and Peter

Condition 1 – control

Participants in all conditions answered the same questions regarding CADM model variables (e.g. awareness of need, personal norms) and behavior. The participants in the control condition were asked additional clothing-related questions that were unrelated to environmental aspects. This ensured that participants across conditions were equally reflecting on the topic of clothing and clothing consumption.



figure 3 Logo for the control group ('count twice')

Simply thinking about a consumer good can prompt a purchase desire and behavior (Klöckner & Ofstad, 2017 and Klöckner, June 2018, personal communication during conference). Therefore, we aimed to engage all participants in thinking about clothing consumption to an equal degree. Participants were instructed that measures assessing their clothing consumption behavior would be repeated ('count twice' what you bought) during the study period and that this was part of the research.

Condition 2 – information only

For all intervention conditions, we aimed to strengthen the intention to reduce clothing consumption through increased awareness of need, outcome efficacy and action knowledge. The material provided to reach this aim was the same for the three intervention conditions. On INV I, three videos were shown to disseminate knowledge of the environmental and social impacts of clothing production, over-consumption of clothing, the business model of fast fashion and marketing principles. Furthermore, participants were encouraged to think that they can make a difference through thoughtful consumption decisions (outcome efficacy message) and to reflect on possible alternatives to purchasing new items provided to them (action knowledge, e.g. swapping). At the end of intervention day 1, participants completed a short knowledge survey that assessed whether they had watched the videos and understood the main content. For all intervention groups, INV II offered a repetition of the knowledge videos, and additionally provided written in-depth and U.K.-specific knowledge about the carbon and water footprints of households' clothing consumption in 2016. Moreover, participants learned in greater detail about possible alternatives to purchasing new items of clothing (e.g. mending, recoloring, updating or swapping). They listed up to three recent purchases and which alternative they could have applied to avoid the specific purchases. On INV III, the information only condition was not provided with any further material.



figure 4 Start page for the information only group ('think twice')

Condition 3 – individual G-F-C

Besides receiving the same information provision as condition 2, participants were encouraged, at the end of INV I, to set a personal goal for reducing their clothing consumption during the one-month period following the three intervention days. At INV II, participants were asked to state their personal goal. They could choose from the following options: a goal of a) not buying any new items, b) buying a certain number of items less or c) of buying less but without setting a goal with a fixed number of items. On INV III, participants received individual feedback on their goal and its saving potential in terms of carbon and water footprint (outcome efficacy). Subsequently, all participants who have set themselves a goal were asked to commit to their goal and were provided with advice on how to reach their goal based on self-control strategies, such as avoiding temptations, automatizing and reappraising non-consumption.





Video 3

Below you find the third video. Please watch the video carefully before moving on to the next step.



figure 5 Embedded video providing knowledge for intervention condition 2,3 & 4 $\,$

Condition 4 – group G-F-C

Participants in this condition saw the same messages as participants in condition 3, but all communication was directed towards 'we' as consumers (instead of 'you' as consumer). For example, while all information conveyed to the individual G-F-C condition emphasized personal outcome efficacy, e.g. 'you can make a difference' or 'your actions count', the wording changed for the group G-F-C group towards emphasizing group outcome efficacy, e.g. 'together, we can make a difference'. Likewise, the goal setting was set in a group context for this condition (of all members of the current study). Participants were therefore asked to commit to their goal in order to reach the group goal together and received feedback on the group goal's water and carbon saving potential (i.e. the accumulated saving of all participants who had set a goal together).



figure 6 Illustration underlining the reflection on previous purchases





figure 8 Illustration underlining goal setting

figure 7 Illustration underlining group goal setting

4. results

4.1. randomization check and descriptive results

For the pre-test period prior to the intervention, participants across all groups reported an average number of M = 3.65 (SD = 4.40, range 0-48) clothing items purchased during the four weeks. Prior to the intervention, 27% of all participants had no intention of reducing 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 other model variables to compare the conditions. No significant differences for any variable were observed between the groups. Additionally, tests for differences between the conditions in terms of 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) yielded no significant results. Hence, the randomization was assumed successful.

4.2. changes in the number of items purchased and intentions

table 2 lists the means and standard deviations of the number of items purchased in the past one-month periods and past three-month periods for each condition. Unequal subscripts indicate a significant difference between means.

One-month periods

Comparing the one-month pre-test and one-month post-test, we find that both G-F-C conditions reduced the number of items purchased by $M_{individual} = 2.47$ (60.24%) and $M_{group} = 1.62$ (47.08%) items, respectively. It should be noted that the individual G-F-C condition had descriptively purchased more items in the pre-month and therefore had more room for reduction; however, this difference at the pre-test was not statistically significant. By comparison, participants in the control condition reduced their clothing purchases by 8.45% and the information only condition by 10.14%.

At the follow-up measure, a different picture emerged. Comparing the one-month pre-test with the past one-month period at the follow-up, we found the following reduction in the number of items purchased: 44.79% for the control condition, 37.18% for the information only condition, 56.83% for the individual G-F-C condition and 38.95% for the group G-F-C condition.

Three-month periods

We compared the number of items purchased in the past three months between pre and followup. The results showed a reduction of 54.50% for the control condition, 47.78% for the information only condition, 56.95% for the individual G-F-C condition and 55.86% for the group G-F-C condition.

	Condition	1-month pre	1-month post	Follow-up
Purchases past 1- month	Control group	3.55° (3.72)	3.25° (4.31)	1.96 ^{ь*} (1.67)
	Information only	3.55° (3.89)	3.19° (3.39)	2.23 ^{b*} (2.16)
	Individual G-F-C	4.10° (6.01)	1.63 ^b (2.35)	1.77 ^b (2.10)
	Group G-F-C	3.44° (3.74)	1.82 ^b (3.09)	2.10 ^{b*} (3.02)
	n	397	397	341
		1-month pre		Follow-up
Purchases past 3- months	Control group	9.23ª (7.63)		4.20 ^b (3.43)
	Information only	9.25° (6.08)		4.83 ^b (5.16)
	Individual G-F-C	8.85° (5.77)		3.81 ^b (3.48)
	Group G-F-C	8.11° (4.86)		3.58 ^b (4.39)
	n	397		341
		1-month pre	1-month post	Follow-up
Intentions	Control group	2.45° (2.03)	3.09 ^{ь*} (2.17)	3.10 ^{b*} (2.12)
	Information only	2.67ª (2.14)	3.98 ^b (2.18)	3.64 ^b (2.24)
	Individual G-F-C	2.32° (2.03)	4.60 ^b (1.88)	4.01 ^{c*} (2.07)
	Group G-F-C	2.61° (2.20)	4.56 ^b (2.05)	3.86 ^{c*} (2.13)
	n	397	397	341

table 2 Means of dependent variables for each group across time

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

Intention

Equally, we observed changes in the intentions to reduce clothing consumption, which increased from the pre to the post measurement for all groups albeit more strongly for the three intervention conditions as compared to the control group. Between the post measurement and the follow-up we observed a significant decrease in intentions for the individual and the group G-F-C condition. The other two groups kept a stable level of intentions between post-test and follow up. Still, at the follow-up there was a difference in intentions between the groups, with the two G-F-C conditions still expressing higher intentions than the control group.

4.3. testing the reduction in the number of clothing items purchased

A repeated measures mixed regression model was conducted in Stata 15.1 with repeated data over participants to test for significant changes in the number of items purchased during the different one-month periods across time points and conditions. figure 9 depicts predictive margins of the average number of items purchased in the past month by the different conditions across all three measurement points.



figure 9 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 had significantly reduced the number of items purchased independent of the condition. Additionally, we found that the interaction effect between time x group was significant ($X^2(6, N = 397) = 21.03, p < .001$). This means that across time-points, there were significant differences between conditions in the reduction of purchased clothing items. In the following, we will examine how the simple effects can help explain this significant interaction effect.

There was no significant difference between the control condition and information only condition at any of the three time points. Likewise, the two G-F-C intervention conditions did not differ at any time. However, at the one-month post-test, the latter two conditions purchased significantly fewer items than the control and information only conditions ($\beta_{individual} = -2.17$, p < .001 and $\beta_{group} = -1.33$, p < .01).

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

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5. discussion

The present research shows that an intervention combining knowledge provision, goal setting and strategies for goal attainment can successfully reduce the number of clothing items consumers purchase. At the same time, knowledge provision by itself can lead to changes in intentions but not in behavior. Whether the behavior-change tools used in the intervention were specified in an individual or group context had no additional effect on the reduction of clothing consumption. 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. Thus, the group intervention was probably too 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).

Interestingly, we observed that consumers across conditions reduced their clothing consumption at the follow up to such an extent that there were no significant differences in the number of items purchased between conditions. The two G-F-C intervention conditions did not further reduce their level of consumption at the follow up. This can potentially be explained by the fact that they had already considerable reduced their clothing consumption (M = 1.63/1.82 per month) at the post-test, which offered little room for further reductions. The finding that both the control and information only conditions reduced their clothing consumption in the past month and the previous three months was rather surprising and in the following we can only speculate as to why this occurred.

Interestingly, participants in all conditions significantly strengthened their intentions to reduce clothing consumption from the pre- to the post-measurement, but did so more strongly in the intervention conditions than the control condition. We therefore cannot exclude the possibility that the intervention had an influence on consumers, no matter which condition they were in. The control condition was, in line with all intervention conditions, regularly reporting the number of items purchased throughout the whole intervention period. One potential explanation could thus be that simply reporting the number of items purchased made consumers reflect on how much clothing they purchase, maybe realizing that this transcends their actual needs. Such a reflection could have an impact on both intentions and in the long term also purchase behavior.

Furthermore, the extent to which the changes in the outcome variables were caused by the intervention may, however, have been influenced by internal validity threats (Abrahamse, 2016). For example, external events co-occurring with the intervention may have affected both intervention and control conditions (e.g. weather conditions or political developments). Several such potential external and cross-cutting events may have occurred during the assessment period. First, there were specific weather events that could have limited or enhanced participants' perceived need for clothes. November 2018 was comparatively mild, which may have slowed sales of winter clothes. The three-month period prior to the intervention, however, included a longer heat wave. Qualitative responses from selected participants indicated that they had purchased clothing for this precise reason. This could potentially explain why participants, independent of the intervention condition, purchased more clothing before the intervention and significantly less at the three-month follow up (Met Office, 2018). Second, during the time of study, the United Kingdom found itself in politically turbulent times, particularly during the three months prior to the follow up. As a result, consumer confidence was reported to have decreased especially since the summer of 2018 (Gfk, 2018). Albeit speculative, this could have influenced consumers' willingness to spend money and purchase clothing.

Our results may be of interest for politicians, businesses and NGOs or other campaigning institutions alike. They show that reducing clothing consumption is both possible and desirable, and that consumers have positive attitudes towards reduced clothing consumption. A strategy going above and beyond providing information is thereby needed. Encouraging consumers to set themselves goals of reducing consumption, along with further information about how to reach these goals, are promising avenues.

The results should encourage policy makers to consider all options for 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. of particularly environmentally burdensome fabrics 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 nevertheless the results point towards a potential acceptance of policies to reduce consumption among consumer that should be explored further.

Furthermore, these results are positive for clothing businesses that aim at selling less, highquality, long-lasting, if also more expensive clothing products. Clothing consumption never can nor should stop completely, and the future of clothing will hopefully favor 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 dominant fast fashion retailers to reflect on their current business model.

Other practitioners and interest groups, such as NGOs or environmental protection organizations, 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. Our conditions provide valuable insights what such communication strategies should contain. Not only should they provide information but go a step further and e.g. ask 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 believes. A comprehensive strategy like described here can be perhaps implemented in contexts were a continuous contact with consumers is ensured, e.g. at schools. Teachers looking at approaching complex topics such as globalization, sustainability and consumer responsibility in realistic and practical ways might use the results of this research to develop classroom material for interdisciplinary projects.

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Mistra Future Fashion is a research program that focuses on how to turn today's fashion industry and consumer habits toward sustainable fashion and behavior. Guided by the principles of the circular economy model, the program operates cross disciplinary and involves 60+ partners from the fashion ecosystem. Its unique system perspective combines new methods for design, production, use and recycling with relevant aspects such as new business models, policies, consumer science, lifecycle-assessments, system analysis, chemistry, engineering etc.

MISTRA is the initiator and primary funder covering the years 2011-2019. It is hosted by RISE Research Institutes of Sweden in collaboration with 15 research partners.



