

## Article

# Towards Circular Economy for More Sustainable Apparel Consumption: Testing the Value-Belief-Norm Theory in Brazil and in The Netherlands

Giovana Monteiro Gomes <sup>1,\*</sup>, Natalia Moreira <sup>2</sup>, Thijs Bouman <sup>3</sup>, Aldo Roberto Ometto <sup>1</sup> and Ellen van der Werff <sup>3</sup>

<sup>1</sup> Department of Production Engineering, São Carlos School of Engineering, University of São Paulo, São Carlos 13566-590, Brazil; aometto@sc.usp.br

<sup>2</sup> Department of Design, School of Arts, Design and Architecture, Aalto University, 02150 Espoo, Finland; natalia.moreira@aalto.fi

<sup>3</sup> Department of Psychology, Faculty of Behavioural and Social Sciences, University of Groningen, 9712 TS Groningen, The Netherlands; t.bouman@rug.nl (T.B.); ellen.van.der.werff@rug.nl (E.v.d.W.)

\* Correspondence: giovana.gomes@usp.br

**Abstract:** The apparel industry causes environmental problems, particularly due to the shortening life cycle of garments and fast-fashion's throw-away culture. The circular economy provides solutions to minimise and prevent these problems through innovative circular business models, which require changes in consumer behaviours. With the lens of environmental psychology, we analyse consumers' willingness to acquire circular apparel considering four approaches on clothing life-cycle extension. We conducted an online questionnaire among Brazilian and Dutch consumers and tested if the Value-Belief-Norm (VBN) theory can explain the willingness of consumers to purchase circular apparel. Our results indicate that, overall, the variables from the VBN theory explain circular behaviour in the apparel industry and that the paths suggested by the model are supported by our analyses. Additionally, we tested and found that when all of the variables from the VBN theory were controlled for, materialistic values did not explain circular behaviours in the apparel industry among Brazilian respondents. However, they had a positive influence on some circular apparel behaviours among Dutch consumers. Overall, materialistic values did not play an important role in predicting willingness to consume circular clothing. Furthermore, the results suggest that the VBN theory predicts willingness to consume circular apparel better in the Netherlands compared to Brazil, suggesting that this behaviour may be perceived as more effortful for the Brazilian population. However, we highlight the need for future research.

**Keywords:** circular economy; environmental psychology; consumer behaviour; life-cycle extension; Value-Belief-Norm theory; circular clothing



**Citation:** Gomes, G.M.; Moreira, N.; Bouman, T.; Ometto, A.R.; van der Werff, E. Towards Circular Economy for More Sustainable Apparel Consumption: Testing the Value-Belief-Norm Theory in Brazil and in The Netherlands. *Sustainability* **2022**, *14*, 618. <https://doi.org/10.3390/su14020618>

Academic Editor: Helena Carvalho

Received: 29 November 2021

Accepted: 3 January 2022

Published: 6 January 2022

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

The apparel industry is one of the oldest and largest industries worldwide [1], being responsible for transforming diverse materials into clothing, footwear, and accessories. The apparel industry is of economic, social, and cultural importance [2] but also has a substantial environmental footprint [3]. The environmental impacts associated with the fashion industry are the result of the intensive use of resources, e.g., energy and water, the toxicity of solvents, dyes, and finishes employed, and pollutant processes, e.g., textile treatment [3–6]. Moreover, the overflow of new trends, the enlarged production by fast-fashion brands, the substantial increase in clothing consumption, and the premature disposal of apparel items increase the amount of textile waste and consequently the expansion of landfills [6,7]. The transition to a circular economy (CE) can decrease this environmental footprint and promote positive effects, namely, economic, social, and environmental benefits [8,9].

The idea of a cyclical ecological system is dated from Boulding [10], which highlights an important circular principle: the considerations of resources' limits and exhaustibility. Spiral (closed) loop systems were then suggested by Stahel [11] as part of a self-replenishing economy, minimising the flow of energy and matter and the environmental deterioration without restraining social and economic growth. However, the Circular Economy terminology came later and can be traced to the work of Pearce and Turner [12] and based on the law of Energy and Matter Degradation (Thermodynamics), advocating that circular systems patterns are essential to sustain human life.

There are different CE definitions across the literature [13–16]. However, the majority of them share some important features: the CE is related to the minimisation of resource demand and the optimisation of resource and energy recirculation; it is a multi-level approach, it is driven towards sustainable development; and, it is closely related to how society innovates [17]. For this research, we consider the circular economy as a new economic system that aims to prevent the depletion of resources by proposing a change of paradigm in how human society and nature interrelate [17].

Shifting to a circular economy entails shifting to nature-inspired cyclical processes that minimise resource demand [3,17,18] and mitigate excessive consumption [19]. This transition is only possible through innovative circular business models (CBMs). CBMs outline how an organisation operates circularly, by creating, delivering, and capturing value with and within closed material loops [20–22]. Specifically, circular business models (CBMs) propose to extend products' life-cycle in four ways [18]: (1) **durability**, new products are designed to be durable for a long lifetime; (2) **facilitated reuse**, with or without repair/upgrade; (3) **modular design**, products are designed to be modular so that parts can be replaced to update/upgrade a product without the need to replace the whole item; and (4) **refurbish, repair, remanufacture and recondition**, the product gets a next life by restoring the product's functionality to "as-new" quality.

Circular business models, such as extending products' life cycle, imply consumer behavioural changes [23]. Therefore, consumers are key stakeholders in the CE [24], and individual behaviour is critical to the success of circular business models [25]. The challenges embedded in the circular transition involve engaging consumers in circular systems [19,24], and, to promote the circular behaviours of apparel consumers, we first need to understand which factors influence them.

A theory that has been used to explain many pro-environmental behaviours is the Value-Belief-Norm theory (VBN) [26]. The VBN theory explains pro-environmental behaviour by focusing on normative considerations [26–28]. Specifically, it focuses on how values, via awareness of consequences, outcome efficacy, and personal norms, affect people's willingness to engage in pro-environmental behaviour, such as circular behaviour (see Figure 1).

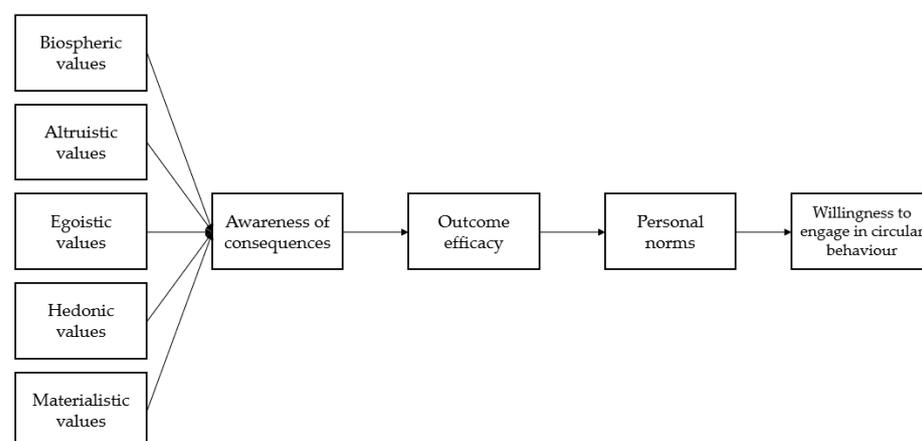


Figure 1. The Value-Belief-Norm theory.

The VBN theory has been found to explain many pro-environmental behaviours, including the adoption of alternative fuel vehicles [29], interest in smart energy systems [30], biodiversity conservation [31], and sustainable water consumption [32]. However, to the best of our knowledge, it has not yet been tested if the VBN theory applies to circular apparel consumption behaviour. Hence, this research aims to test if the VBN theory can explain the willingness of apparel consumers to engage in circular behaviours, focusing on those that extend the clothing life-cycle.

Furthermore, we test the VBN theory, including materialistic values, among Brazilian and Dutch consumers. These two countries were chosen because apparel life-cycle extension strategies were reported both in Brazil [33,34] and in the Netherlands [35]; however, they are quite diverse in terms of the availability of circular apparel products and income levels.

## 2. Literature Review

According to the VBN theory, pro-environmental behaviour (in this case, circular apparel behaviour) is influenced by personal norms [26]. Personal norms reflect intrinsic motivation and are experienced as feelings of moral obligation to perform pro-environmental behaviours (in this case, circular apparel behaviour) [36,37]. Personal norms are generally stronger for people with higher outcome efficacy. Outcome efficacy reflects the belief that their actions can reduce environmental problems [27]. Hence, outcome efficacy reflects the extent to which a person feels they can contribute to reducing environmental problems by purchasing circular apparel [27,37,38]. Outcome efficacy is stronger when people are aware of the environmental problems caused by a particular behaviour [27], i.e., awareness of consequences. Awareness of consequences reflects the extent to which people are aware of environmental problems caused by the fast fashion industry.

Lastly, awareness of consequences is influenced by personal values. Values can be defined as trans situational goals that are guiding principles in people's lives [39]. Specifically, research suggests that awareness of consequences is related to biospheric, altruistic, egoistic, and hedonic values. Generally, biospheric values, which reflect caring about nature and the environment [40], are positively related to awareness of consequences [41]. Altruistic values reflect the extent to which a person cares about humans' welfare [40]. Awareness of consequences is expected to be positively related to altruistic values [26]. On the contrary, egoistic values, which reflect whether people care about power and wealth [40], are commonly negatively related to awareness of consequences [42]. Hedonic values, which reflect caring about comfort and pleasure [40], are generally negatively related to awareness of consequences [30].

Additionally, we argue that, for circular consumer behaviour, another type of values could be relevant, namely, materialistic values, because they more directly focus on the acquisition of products, such as clothing, and their role in people's pursuit of happiness and success [43]. Materialistic values reflect the centrality of acquisition-related activities in a person's life and how people prioritise possessions over other things [43].

We expect that the willingness to purchase second-hand, modular, and refurbished clothing are positively related to materialistic values, as these products may be prized by people who hold strong materialistic values. On the other hand, we expect that strong materialistic values are negatively related to the willingness to consume fewer but durable products, as consuming fewer products may not be in line with materialistic values. Indeed, previous research suggests that materialistic values are positively related to the purchase of environmentally friendly products [44]. Yet, materialistic values have been found to be negatively related to environmental behaviour when the behaviour constrains the consumption of goods [45]. We will test if and how materialistic values are also related to circular apparel consumption behaviour.

The employment of circular business models, especially the ones that enhance products' life cycles, is an important strategy to minimise the environmental footprint of the apparel industry by tackling garments' superfluous production, excessive consumption, and premature disposal. However, consumer acceptance of circular clothing and their

engagement with circular consumption systems are still challenges that must be overcome by circular apparel brands. The VBN theory has been used to explain pro-environmental behaviours; therefore, this paper's goal is to test if the variables and path included in this model can explain the willingness to purchase clothing that is durable, reused, has a modular design, or is refurbished, repaired, remanufactured, or reconditioned.

### 3. Materials and Methods

#### 3.1. Participants and Procedure

This study aimed to test the VBN theory among Brazilian and Dutch apparel consumers. We developed a questionnaire using validated measures of the VBN theory (see Section 3.2). Furthermore, the different willingness to engage in circular behaviour measures were based on expert discussions. The questionnaire was developed in English (v1), and the translations to Portuguese and Dutch were carried following the instructions on Forward and Backward translation [46], that is, the authors translated it to both languages and third parties (bilinguals) translated it back to English. These versions were compared to the first one (v1), validating the translations to Portuguese and Dutch.

The two versions of the questionnaire, in Portuguese and Dutch, were digitalised and made available at online platforms, from which the questionnaire was shared after an empirical validation. This validation was carried out by a group of ten circular economy experts and non-experts who tested the survey's content, interface, ease, and difficulty of context and understanding, guaranteeing a clear and user-friendly questionnaire. In the Netherlands, the data were collected via the panel *Panelinzicht*. Participants received a small financial reimbursement for their participation. In Brazil, the questionnaire was made available via social networks (Facebook and LinkedIn) and by e-mail to graduate programmes in all 27 Brazilian federal units (26 states and the Federal District). The participation was voluntary; respondents did not receive monetary incentives.

The answers were collected between September 2019 and February 2020, combining 875 responses, of which 506 were from Brazil and 369 were from the Netherlands. Only the responses from the participants who completed the entire questionnaire were kept in the dataset, resulting in a dataset of 289 participants from Brazil and 272 participants from the Netherlands.

In Brazil, 181 females and 102 males participated in the study, six participants did not indicate their gender. Age ranged from 18 to 73 ( $M = 33.50$ ,  $SD = 11.70$ ). About 1.3% of respondents indicated that their monthly net household income was less than 1000 Brazilian reais (BRL) (225 euros), 24% between 1000 BRL (225 euros) and 2999 BRL (674 euros), 22% between 3000 BRL (675 euros) and 4999 BRL (1224 euros), while 45% of the respondents earned more than 5000 BRL (1225 euros) and more than 7% chose not to disclose their income.

In the Netherlands, the gender distribution of participants were 138 females, 132 males, and one transgender; one participant did not answer. Age ranged from 18 to 80 ( $M = 44.07$ ,  $SD = 19.66$ ). Around 24% of the sample indicated that their monthly net household income was less than 2000 euros, 43% between 2000 and 4000 euros, and 17% earned more than 4000 euros per month; about 16% did not indicate their income.

#### 3.2. Measures

##### 3.2.1. Values

To measure biospheric, altruistic, egoistic, and hedonic values, we used Steg et al.'s [40] short value questionnaire, based on Schwartz's [39] value questionnaire. Biospheric values were measured with four items (Respecting the earth: harmony with other species; Unity with nature: fitting into nature; Protecting the environment: preserving nature; Preventing pollution: protecting natural resources). We also measured altruistic values with four items (Equality: equal opportunity for all; A world at peace: free of war and conflict; Social justice: correcting injustice, care for the weak; Helpful: working for the welfare of others). Five items were used to measure egoistic values (Social power: control over others,

dominance; Wealth: material possessions, money; Authority: the right to lead or command; Influential: having an impact on people and events; Ambitious: hardworking, aspiring). Finally, hedonic values were measured with three items (Pleasure: joy, gratification of desires; Enjoying life: enjoying food, sex, leisure etc.; Self-indulgent: doing pleasant things). Participants indicated on a scale from  $-1$  (opposed to my values) and  $0$  (not important) to  $7$  (extremely important) to what extent the value is important to them as a guiding principle in their life.

In Brazil, biospheric values ( $\alpha = 0.86$ ,  $M = 5.96$ ,  $SD = 1.38$ ) and hedonic values ( $\alpha = 0.70$ ,  $M = 5.25$ ,  $SD = 1.72$ ) formed reliable scales, as Cronbach's alpha ( $\alpha$ ) falls between  $0.70$  and  $0.90$ . The reliabilities of altruistic values ( $\alpha = 0.67$ ,  $M = 6.19$ ,  $SD = 1.24$ ) and egoistic values ( $\alpha = 0.69$ ,  $M = 2.65$ ,  $SD = 2.40$ ) scales were not optimum for the Brazilian sample. Yet, we decided to keep these items in the scale, as they are based on validated measures. The value scales were reliable in the Netherlands: biospheric values ( $\alpha = 0.91$ ,  $M = 4.36$ ,  $SD = 1.97$ ), altruistic values ( $\alpha = 0.85$ ,  $M = 4.81$ ,  $SD = 1.80$ ), egoistic values ( $\alpha = 0.81$ ,  $M = 2.43$ ,  $SD = 2.08$ ), and hedonic values ( $\alpha = 0.88$ ,  $M = 4.65$ ,  $SD = 1.70$ ).

In addition, we measured materialistic values following Richins' and Dawson's [47] nine indicators scale (I admire people who own expensive homes, cars, and clothes; The things I own say a lot about how well I'm doing in life; I like to own things that impress people; I try to keep my life simple, as far as possessions are concerned; I enjoy spending money on things that aren't practical; I like a lot of luxury in my life; My life would be better if I owned certain things I don't have; I'd be happier if I could afford to buy more things; It sometimes bothers me quite a bit that I can't afford to buy all the things I'd like). Respondents rated each item on a five-point Likert-scale (from strongly disagree to strongly agree). The fourth item was measured as a reverse scale and was therefore reverse-coded. That way, for all items of the scale a higher score reflects stronger materialistic values. The mean scores and Cronbach's alpha ( $\alpha$ ) were computed for this scale for the Brazilian ( $\alpha = 0.78$ ,  $M = 2.42$ ,  $SD = 1.06$ ) and Dutch ( $\alpha = 0.82$ ,  $M = 2.76$ ,  $SD = 1.11$ ) responses.

### 3.2.2. Awareness of Consequences

Awareness of consequences was measured, based on van der Werff and Steg [48], with three items that assessed the extent to which apparel consumers are concerned with the environmental and social issues caused by the fast-fashion (The production and consumption of fast-fashion causes important problems for society; The production and consumption of fast-fashion cause serious environmental issues; I worry about the social and environmental impacts caused by the clothing/fashion industry). Respondents indicated the extent to which they agreed to the statements using a five-point Likert scale (from strongly disagree to strongly agree). The mean scores and Cronbach's alpha ( $\alpha$ ) were computed for the Brazilian ( $\alpha = 0.70$ ,  $M = 3.48$ ,  $SD = 0.78$ ) and Dutch ( $\alpha = 0.82$ ,  $M = 3.54$ ,  $SD = 0.81$ ) responses.

### 3.2.3. Outcome Efficacy

Outcome efficacy was measured with one item (If I would reduce my consumption of fast-fashion I would contribute to reducing social and environmental problems caused by fast-fashion) on a five-point scale, from  $(1)$  strongly disagree to  $(5)$  strongly agree [27]. The mean scores were computed for the Brazilian ( $M = 3.69$ ,  $SD = 1.06$ ) and Dutch ( $M = 3.59$ ,  $SD = 0.97$ ) responses.

### 3.2.4. Personal Norms

Personal norms were measured with three items (I feel morally obligated to prevent social and environmental harm caused by the textile industry; I feel morally compelled to act to prevent social and environmental harm caused by the textile industry; I feel not obliged to do something to stop social and environmental harm in the textile industry) [26]. Participants could answer on a five-point scale (from strongly disagree to strongly agree) to what extent the statements were true for them personally. The last item was measured as a reverse scale and was therefore recoded. That way, for all items of the scale, a higher

score reflects a stronger personal norm. The mean scores and Cronbach's alpha ( $\alpha$ ) were computed for the Brazilian ( $\alpha = 0.82$ ,  $M = 3.39$ ,  $SD = 1.08$ ) and Dutch ( $\alpha = 0.78$ ,  $M = 3.12$ ,  $SD = 1.10$ ) responses.

### 3.2.5. Willingness to Acquire Circular Apparel

This study focused on four approaches to the life-cycle extension CBM. We measured, with one item each, the willingness of consumers to acquire or try products within these approaches: **durability** (I am willing to acquire less pieces of garments if they have a longer life cycle; Brazil- $M = 4.17$ ,  $SD = 0.92$ ; Netherlands- $M = 3.79$ ;  $SD = 0.89$ ), **facilitated reuse** (I am willing to use second-hand garment; Brazil- $M = 3.72$ ,  $SD = 1.09$ ; Netherlands- $M = 3.06$ ;  $SD = 1.27$ ), **modular design** (I am willing to try clothes and footwear with a modular design; Brazil- $M = 3.99$ ,  $SD = 0.77$ ; Netherlands- $M = 3.40$ ;  $SD = 0.90$ ), and **refurbished, repaired, remanufactured, or reconditioned products** (I am willing to acquire a new apparel that was refurbished/repaired/remanufactured/reconditioned; Brazil- $M = 3.97$ ,  $SD = 0.83$ ; Netherlands- $M = 3.12$ ;  $SD = 1.09$ ). The definition and examples of these CBM approaches were made available for the respondents. All items were measured on a five-point scale, from (1) strongly disagree to (5) strongly agree.

### 3.3. Analyses

The VBN theory and the casual pathways between its variables were tested with a series of regression and mediation analyses [41]. We calculated bootstrapping confidence intervals for multiple-step models to test mediation effects using the PROCESS macro model 6 [49]. To compare the predictive power of the VBN theory for the different dependent variables collected in both countries, Brazil and the Netherlands, we calculated 95% confidence intervals around the  $R^2$  values [50]. We consider  $R^2$  values of the regression model to be significantly different when the overlap of the 95% confidence intervals is less than half the distance of one side of the confidence interval [51].

## 4. Results

### 4.1. Correlations

We first tested correlations between all relevant variables for the responses collected in Brazil (grey) and the Netherlands (Table 1).

**Table 1.** Bivariate correlations between all variables among Brazilian (grey) and Dutch consumers.

	1	2	3	4	5	6	7	8	9	10	11	12
1-Biospheric values	-	0.77 *	0.18 *	0.43 *	-0.19 *	0.51 *	0.44 *	0.52 *	0.31 *	0.19 *	0.35 *	0.27 *
2-Altruistic values	0.63 *	-	0.15 *	0.59 *	-0.20 *	0.35 *	0.32 *	0.38 *	0.27 *	0.07	0.20 *	0.16 *
3-Egoistic values	0.03	0.01	-	0.32 *	0.55 *	0.01	0.05	0.04	-0.14 **	0.04	0.10 **	0.10 **
4-Hedonic values	0.24 *	0.21 *	0.30 *	-	0.12 **	0.03	0.04	-0.06	0.00	-0.07	0.02	-0.01
5-Materialistic values	-0.17 *	-0.07	0.34 *	0.22 *	-	-0.15 *	-0.11 **	-0.18 *	-0.19 *	0.09	0.06	0.08
6-Awareness of consequences	0.27 *	0.19 *	-0.06	0.05	-0.15 *	-	0.67 *	0.68 *	0.42 *	0.28 *	0.40 *	0.32 *
7-Outcome efficacy	0.23 *	0.18 *	0.00	0.07	-0.13 **	0.58 *	-	0.60 *	0.32 *	0.23 *	0.44 *	0.33 *
8-Personal norm	0.41 *	0.30 *	-0.05	0.06	-0.18 *	0.49 *	0.43 *	-	0.41 *	0.25 *	0.40 *	0.35 *
9-Willingness (durable garment)	0.06	0.05	-0.10 **	0.06	-0.13 **	0.31 *	0.24 *	0.21 *	-	0.13	0.31 *	0.24 *
10-Willingness (facilitated reuse)	0.12 **	0.14 *	-0.16 *	0.19 **	-0.03	0.21 *	0.17 *	0.24 *	0.25 *	-	0.45 *	0.70 *
11-Willingness (modular design)	0.02	0.05	-0.09	0.01	-0.09	0.26 *	0.21 *	0.28 *	0.24 *	0.47 *	-	0.54 *
12-Willingness (refurbished etc.)	0.15 *	0.10 **	-0.14 **	0.04	-0.13	0.28 *	0.24 *	0.28 *	0.19	0.66	0.50	-

\*  $p < 0.01$ . \*\*  $p < 0.05$ .

In Brazil, the willingness to acquire fewer pieces of garments if they have a longer life-cycle was positively and significantly related to awareness of consequences, outcome efficacy, and personal norms and was negatively and significantly related to egoistic and materialistic values. The willingness to acquire second-hand clothing was positively and significantly related to biospheric, altruistic, and hedonic values, as well as awareness of consequences, outcome efficacy, and personal norms, and this outcome variable was

negatively and significantly related to egoistic values. The willingness to acquire clothing with modular design was positively and significantly related to awareness of consequences, outcome efficacy, and personal norms. Lastly, the willingness to acquire apparel that was refurbished/etc. was positively and significantly related to biospheric values, altruistic values, awareness of consequences, outcome efficacy, and personal norms and negatively and significantly related to egoistic values.

In the Netherlands, the willingness to acquire fewer pieces of garments if they have a longer life cycle was positively and significantly related to biospheric and altruistic values, awareness of consequences, outcome efficacy, and personal norms, and was negatively and significantly related to egoistic and materialistic values. The willingness to acquire second-hand clothing was positively and significantly related to biospheric values and awareness of consequences, outcome efficacy, and personal norms. The willingness to acquire clothing with modular design was positively and significantly related to biospheric, altruistic, and egoistic values and awareness of consequences, outcome efficacy, and personal norms. Finally, the willingness to acquire apparel that was refurbished/etc. was positively and significantly related to biospheric values, altruistic values, egoistic values, and awareness of consequences, outcome efficacy, and personal norms.

#### 4.2. VBN Theory

We tested the VBN theory with a series of regression analyses (Table 2) [29–32]; the results are separated by country and circular business model.

##### 4.2.1. Brazil

The first step of the analyses comprised of a model with awareness of consequences as the outcome variable and values as the independent variables. Biospheric values were positively and significantly related to awareness of consequences; that is, generally, the stronger one's biospheric values, the stronger one's awareness that the production and consumption of fast-fashion causes social and environmental problems is. Altruistic, egoistic, hedonic, and materialistic values were not significantly related to awareness of consequences when the other values were controlled for.

Following this, we analysed a model with outcome efficacy as the dependent variable and awareness of consequences and values as the independent variables. The results indicated that the stronger the awareness of consequences of the problems caused by the production and consumption of fast-fashion, the stronger the feeling that by reducing the consumption of these products one would contribute to reducing the social and environmental problems caused by fast-fashion. Biospheric, altruistic, egoistic, hedonic, and materialistic values were not significantly related to outcome efficacy when controlling for awareness of consequences.

At the third step of the analysis, the variance in personal norms was explained by outcome efficacy, awareness of consequences, and values. Personal norms to prevent social and environmental harm caused by the clothing industry were stronger the more one felt the social and environmental problems caused by fast-fashion can be reduced by decreasing the consumption of fast-fashion (i.e., outcome efficacy) and the more one was aware of the problems caused by the production and consumption of fast-fashion (i.e., awareness of consequences). Biospheric, altruistic, egoistic, hedonic, and materialistic values were not significantly related to personal norms when controlling for the other variables in the model.

**Table 2.** Regression of consumption intention of circular apparel on the Value-Belief-Norm theory.

	Brazil (n = 298)									The Netherlands (n = 272)								
	$\beta$	SE	t	p	Adj. R <sup>2</sup>	95% Ci R <sup>2</sup>	df	F	p	$\beta$	SE	t	p	Adj. R <sup>2</sup>	95% Ci R <sup>2</sup>	df	F	p
<i>DV: Awareness of consequences</i>					0.07	[0.02–0.14]	5.00	5.46	<0.001 *					0.30	[0.21–0.38]	5.00	23.87	<0.001
Biospheric Values	0.23	0.05	3.08	<b>0.002</b>						0.60	0.04	7.36	<0.001					
Altruistic Values	0.03	0.06	0.47	0.642						0.04	0.05	0.44	0.663					
Egoistic Values	−0.03	0.04	−0.55	0.583						−0.03	0.04	−0.47	0.641					
Hedonic Values	0.02	0.04	0.24	0.813						−0.24	0.04	−3.59	<0.001					
Materialistic Values	−0.10	0.08	−1.63	0.105						0.02	0.08	0.24	0.813					
<i>DV: Outcome Efficacy</i>					0.33	[0.25–0.41]	6.00	24.72	<0.001					0.45	[0.38–0.53]	6.00	38.59	<0.001
Awareness of consequences	0.55	0.07	10.97	<0.001						0.60	0.06	11.08	<0.001					
Biospheric Values	0.04	0.06	0.63	0.530						0.08	0.04	1.03	0.304					
Altruistic Values	0.04	0.08	0.57	0.572						0.10	0.05	1.21	0.228					
Egoistic Values	0.04	0.04	0.70	0.484						0.04	0.04	0.61	0.542					
Hedonic Values	0.03	0.04	0.51	0.611						−0.08	0.04	−1.32	0.190					
Materialistic Values	−0.05	0.09	−0.97	0.331						0.00	0.08	0.06	0.956					
<i>DV: Personal Norms</i>					0.33	[0.25–0.41]	7.00	21.59	<0.001					0.57	[0.50–0.63]	7.00	53.07	<0.001
Outcome Efficacy	0.18	0.05	3.09	<b>0.002</b>						0.20	0.05	3.65	<0.001					
Awareness of consequences	0.29	0.07	4.89	<0.001						0.38	0.06	6.64	<0.001					
Biospheric Values	0.25	0.05	3.90	<0.001						0.20	0.04	2.87	<b>0.004</b>					
Altruistic Values	0.05	0.07	0.81	0.420						0.20	0.04	2.75	<b>0.006</b>					
Egoistic Values	−0.01	0.04	−0.21	0.835						0.07	0.03	1.34	0.182					
Hedonic Values	−0.02	0.04	−0.39	0.699						−0.30	0.03	−5.65	<0.001					
Materialistic Values	−0.06	0.08	−1.04	0.301						−0.03	0.07	−0.50	0.620					

Table 2. Cont.

Product life-extension	Brazil (n = 298)									The Netherlands (n = 272)								
	$\beta$	SE	t	p	Adj. R <sup>2</sup>	95% Ci R <sup>2</sup>	df	F	p	$\beta$	SE	t	p	Adj. R <sup>2</sup>	95% Ci R <sup>2</sup>	df	F	p
<i>DV: Willingness to acquire less pieces of garments (clothes and footwear) if they have a longer life cycle</i>					0.10	[0.04–0.18]	8.00	5.02	<0.001					0.22	[0.14–0.31]	8.00	1.69	<0.001
Personal Norms	0.07	0.07	1.03	0.306						0.17	0.08	2.04	<b>0.043</b>					
Outcome Efficacy	0.07	0.06	1.02	0.308						0.01	0.07	0.18	0.854					
Awareness of consequences	0.24	0.09	3.26	<b>0.001</b>						0.24	0.09	2.81	<b>0.005</b>					
Biospheric Values	−0.09	0.06	−1.15	0.253						0.02	0.05	0.20	0.845					
Altruistic Values	0.00	0.08	−0.03	0.979						0.17	0.06	1.73	0.085					
Egoistic Values	−0.08	0.04	−1.32	0.188						−0.17	0.04	−2.38	<b>0.018</b>					
Hedonic Values	0.10	0.09	1.62	0.106						−0.06	0.04	−0.73	0.465					
Materialistic Values	−0.09	0.09	−1.39	0.166						0.02	0.09	0.21	0.836					
<b>Facilitated reuse</b>																		
<i>DV: Willingness to use second-hand garment</i>					0.09	[0.03–0.16]	8.00	4.45	<0.001					0.11	[0.04–0.18]	8.00	4.99	<0.001
Personal Norms	0.16	0.08	2.28	<b>0.024</b>						0.06	0.12	0.64	0.525					
Outcome Efficacy	0.04	0.07	0.50	0.615						0.05	0.10	0.63	0.533					
Awareness of consequences	0.10	0.10	1.34	0.182						0.15	0.14	1.67	0.097					
Biospheric Values	−0.03	0.08	−0.39	0.695						0.21	0.08	2.03	<b>0.043</b>					
Altruistic Values	0.06	0.09	0.87	0.387						−0.04	0.09	−0.35	0.725					
Egoistic Values	−0.21	0.05	−3.34	<0.001						−0.08	0.06	−1.12	0.264					
Hedonic Values	0.13	0.05	2.02	<b>0.044</b>						−0.14	0.07	−1.73	0.085					
Materialistic Values	0.06	0.11	0.93	0.356						0.23	0.14	3.02	<b>0.003</b>					

Table 2. Cont.

Product modular design	Brazil (n = 298)									The Netherlands (n = 272)								
	$\beta$	SE	t	p	Adj. R <sup>2</sup>	95% Ci R <sup>2</sup>	df	F	p	$\beta$	SE	t	p	Adj. R <sup>2</sup>	95% Ci R <sup>2</sup>	df	F	p
<i>DV: Willingness to try clothes and footwear with a modular design</i>					0.10	[0.04–0.17]	8.00	4.92	<b>&lt;0.001</b>					0.25	[0.17–0.34]	8.00	12.40	<b>&lt;0.001</b>
Personal Norms	0.23	0.06	3.32	<b>0.001</b>						0.13	0.08	1.57	0.118					
Outcome Efficacy	0.06	0.05	0.81	0.421						0.26	0.07	3.56	<b>&lt;0.001</b>					
Awareness of consequences	0.15	0.07	2.00	<b>0.047</b>						0.06	0.09	0.74	0.460					
Biospheric Values	−0.17	0.05	−2.23	<b>0.027</b>						0.26	0.05	2.79	<b>0.006</b>					
Altruistic Values	0.04	0.06	0.57	0.566						−0.08	0.06	−0.79	0.433					
Egoistic Values	−0.07	0.03	−1.13	0.261						−0.03	0.04	−0.41	0.680					
Hedonic Values	0.04	0.04	0.71	0.479						−0.06	0.04	−0.82	0.416					
Materialistic Values	−0.03	0.08	−0.52	0.605						0.17	0.09	2.53	<b>0.012</b>					
<b>Refurbished, repaired, remanufactured and reconditioned products</b>																		
<i>DV: Willingness to acquire a new apparel that was refurbished/repaired/remanufactured/reconditioned</i>					0.10	[0.04–0.18]	8.00	5.06	<b>&lt;0.001</b>					0.16	[0.09–0.24]	8.00	7.42	<b>&lt;0.001</b>
Personal Norms	0.15	0.06	2.22	<b>0.027</b>						0.16	0.10	1.90	0.058					
Outcome Efficacy	0.09	0.06	1.26	0.207						0.16	0.09	2.05	<b>0.041</b>					
Awareness of consequences	0.13	0.08	1.79	0.075						0.04	0.12	0.43	0.671					
Biospheric Values	0.02	0.06	0.22	0.823						0.19	0.06	1.96	<b>0.052</b>					
Altruistic Values	−0.01	0.07	−0.14	0.889						−0.03	0.07	−0.27	0.790					
Egoistic Values	−0.13	0.04	−2.09	<b>0.038</b>						−0.02	0.05	−0.30	0.767					
Hedonic Values	0.07	0.04	1.10	0.274						−0.09	0.06	−1.11	0.267					
Materialistic Values	−0.04	0.08	−0.60	0.550						0.19	0.12	2.62	<b>0.009</b>					

\* Statistically significant *p*-values were highlighted in bold text.

Step four encompassed a model that explained the variance in the willingness to consume circular apparel. Firstly, we tested the variance in the willingness to consume **durable** garments through personal norms, outcome efficacy, awareness of consequences, and values. We found that the more one is aware of the social and environmental problems caused by the production and consumption of fast-fashion, the stronger the willingness is to acquire fewer pieces of apparel if they have a longer life cycle. None of the other variables was significantly related to the intention to consume durable garments when all variables were included in the model.

Next, the variance of **facilitated reuse** was explained by personal norms, outcome efficacy, awareness of consequences, and values. Personal norms were positively related to the intention to use second-hand garments, and egoistic values were negatively significantly related to this willingness. That is, the analysis suggested that the stronger one's feeling of moral obligation to prevent social and environmental harm caused by the textile industry and the weaker one's egoistic values, the stronger the willingness to use second-hand apparel is. Outcome efficacy, awareness of consequences, and biospheric, altruistic, and materialistic values were not significantly related to the willingness to facilitate reuse when all variables were included in the model.

Then, we investigated the willingness to consume products with a **modular design** as the outcome variable and personal norms, outcome efficacy, awareness of consequences, and values as independent variables. In general, the stronger one's personal norms and awareness of consequences regarding the fast-fashion industry, and the weaker one's biospheric values, the stronger the intention to try clothes and footwear with a modular design is. Outcome efficacy, altruistic values, egoistic values, hedonic values, and materialistic values were not significantly related to the willingness to use modular design when all variables were included in the model.

Lastly, we analysed the variance in willingness to acquire **refurbished, repaired, remanufactured, and/or reconditioned** apparel explained by personal norms, outcome efficacy, awareness of consequences, and values. Our results indicate that the stronger one's moral obligation to prevent social and environmental harm caused by the textile industry (i.e., personal norms) and the weaker one's egoistic values, the stronger the willingness to acquire new apparel that has been refurbished, repaired, remanufactured, and/or reconditioned is. Outcome efficacy, awareness of consequences, and biospheric, altruistic, hedonic, and materialistic values were not significantly related to the willingness to acquire refurbished, repaired, remanufactured, and/or reconditioned apparel when all variables were included in the model.

We rerun our analyses including age and gender as covariates. When all variables were included in the model, gender was not significantly related to any of the dependent variables, and age was only significantly related to the willingness to acquire second-hand and refurbished/etc. clothing. The older people are, the more willing they are to acquire second-hand and refurbished/etc. clothing. However, the results regarding the relationship between the variables from the VBN theory and the circular behaviours remained similar.

#### 4.2.2. The Netherlands

The same steps of the analyses were carried out with the data collected in the Netherlands. In the first step, we considered a model in which the variance in awareness of consequences was explained by values. Biospheric values were positively and egoistic values were negatively significantly related to the awareness that the production and consumption of fast-fashion causes social and environmental problems. Altruistic, hedonic, and materialistic values were not significantly related to awareness of consequences.

The second step comprised a model with outcome efficacy as the dependent variable and awareness of consequences and values as the independent ones. The results indicate that, the more one is aware of the problems caused by fast-fashion, the stronger the feeling that by decreasing the consumption of these products one would contribute to reducing the

social and environmental problems caused by fast-fashion is. Values were not significantly related to outcome efficacy when awareness of consequences was included in the model.

Following this, we analysed the variance in personal norms explained by outcome efficacy, awareness of consequences, and values. Outcome efficacy, awareness of consequences, and biospheric and altruistic values were positively and significantly related to one's feeling of moral obligation to prevent social and environmental harm caused by the textile industry, while hedonic values were negatively and significantly related to this feeling of moral obligation. Egoistic and materialistic values were not significantly related to personal norms when the other variables were controlled for.

Step four comprised a model in which the willingness to acquire circular apparel was tested. First, the willingness to acquire **durable** apparel was the outcome variable, predicted by personal norms, outcome efficacy, awareness of consequences, and values. Generally, the stronger one's feeling of moral obligation to prevent social and environmental harm caused by the textile industry, the stronger one's awareness of the problems caused by fast-fashion, and the weaker one's egoistic values, the stronger one's willingness to acquire fewer pieces of garments if they have a longer life cycle. Outcome efficacy, biospheric values, altruistic values, hedonic values, and materialistic values were not significantly related to the willingness to consume durable garments when awareness of consequences was included in the model.

Then, the model considered **facilitated reuse** as the dependent variable and personal norms, outcome efficacy, awareness of consequences, and values as the independent variables. Biospheric and materialistic values were positively and significantly related to the willingness to consume second-hand clothes and footwear; that is, generally, the stronger one's biospheric and materialistic values, the stronger one's willingness to use second-hand garments. Personal norms, outcome efficacy, awareness of consequences, and altruistic, egoistic, and hedonic values were not significantly related to the willingness to facilitate reuse when all variables were included in the model.

Next, we analysed the willingness to consume products with **modular design** as the outcome of personal norms, outcome efficacy, awareness of consequences, and values. The willingness to try clothes and footwear with modular design was stronger the more one felt the social and environmental problems caused by fast-fashion can be reduced by decreasing the consumption of fast-fashion and the stronger one's biospheric and materialistic values. Personal norms, awareness of consequences, altruistic values, egoistic values, and hedonic values were not significantly related to the willingness to use modular design when all variables were included in the model.

Finally, we analysed the variance in the willingness to acquire **refurbished, repaired, remanufactured, and/or reconditioned** apparel explained by personal norms, outcome efficacy, awareness of consequences, and values. Generally, the stronger one's feeling of moral obligation to prevent the social and environmental harm caused by the textile industry (i.e., personal norms), the stronger the feeling that by reducing the consumption of fast-fashion one would contribute to reducing the social and environmental problems caused by fast-fashion (i.e., outcome efficacy), and the stronger one's biospheric and materialistic values, the stronger the willingness to acquire new apparel that has been refurbished, repaired, remanufactured, and/or reconditioned. Awareness of consequences and altruistic, egoistic, and hedonic values were not significantly related to the willingness to acquire refurbished, repaired, remanufactured, and/or reconditioned apparel when all variables were included in the model.

When age and gender were included as covariates in the model, gender was significantly related to the willingness to acquire second-hand clothing, and age was significantly related to the willingness to acquire second-hand and refurbished/etc. clothing. Specifically, women were more willing than men to acquire second-hand clothing. Furthermore, the older people are more willing to acquire second-hand and refurbished/etc. clothing. Yet, similarly to the Brazilian results, the findings regarding the relationship between the variables from the VBN theory and the circular behaviours remained similar.

#### 4.3. The Indirect Effect of Biospheric Values on Willingness to Acquire Circular Apparel via the VBN Path

Following this, we conducted mediation analyses to test the relationships in the VBN theory, considering awareness of consequences, outcome efficacy, and personal norms as the mediators [30]. Biospheric values were considered to be the predictor variable, as it was the main value significantly related to the other variables further down the causal chain of the VBN theory [41]. The four DVs, willingness to acquire durable, second-hand, modular, and refurbished/repaired/remanufactured/reconditioned garments, were tested as the outcome variables. This test was conducted for the data collected in Brazil and the Netherlands as well as the dependent variables (willingness items) separately.

For the Brazilian responses, the mediation effect proposed by the VBN theory was supported only for modular and remanufactured garments. The mean indirect effect of biospheric values on the willingness to try clothes and footwear with a modular design, via awareness of consequences, outcome efficacy, and personal norms (expected path), was positive and significant ( $a_1 \times d_{21} \times d_{32} \times b_3 = 0.005$  with a 95% confidence interval ranging from 0.001 to 0.012). With the same predictor and mediators, the mean indirect effect on the willingness to acquire a new apparel that was refurbished/etc. was also positive and significant ( $a_1 \times d_{21} \times d_{32} \times b_3 = 0.003$  with a 95% confidence interval ranging from 0.000 to 0.009). Willingness to acquire durable garments was related to by biospheric values (predictor) only via awareness of consequences (mediator) ( $a_1 \times b_1 = 0.054$  with a 95% confidence interval ranging from 0.014 to 0.109); the expected path ( $a_1 \times d_{21} \times d_{32} \times b_3 = 0.002$ ) was not significant, with a 95% confidence interval ranging from  $-0.002$  to 0.008. Additionally, we did not find support, for any of the expected mediators, that biospheric values are related to the willingness to acquire second-hand apparel; thus, the expected path ( $a_1 \times d_{21} \times d_{32} \times b_3 = 0.004$ ) was not significant, with a 95% confidence interval ranging from 0.000 to 0.013.

Regarding the Dutch responses, the mediation effect proposed by the VBN theory was supported only for durable garments. Considering the same predictor and mediators (expected path), the mean indirect effect of biospheric values on the willingness to acquire fewer garments if they are more durable was positive and significant ( $a_1 \times d_{21} \times d_{32} \times b_3 = 0.007$ –95% CI from 0.001 to 0.016). Willingness to try clothes and footwear with a modular design was influenced by biospheric values (predictor) via awareness of consequences and outcome efficacy (mediators) ( $a_1 \times d_{21} \times b_2 = 0.043$  with a 95% confidence interval ranging from 0.018 to 0.074); the expected path ( $a_1 \times d_{21} \times d_{32} \times b_3 = 0.005$ ) was not significant, with a 95% confidence interval ranging from  $-0.002$  to 0.014. We did not find support, for any of the expected mediators, that biospheric values influence one's willingness to acquire second-hand ( $a_1 \times d_{21} \times d_{32} \times b_3 = 0.004$ –95% CI from  $-0.006$  to 0.016) and refurbished/etc. ( $a_1 \times d_{21} \times d_{32} \times b_3 = 0.008$ –95% CI from  $-0.001$  to 0.020) garments.

## 5. Discussion

This study aimed to test if the VBN theory could explain the willingness of Brazilian and Dutch apparel consumers to engage in circular behaviours that promote the extension of clothing life-cycles. By extending garments' usability and use, the requirement for new apparel diminishes and resources are optimised. That way, environmental problems caused by the apparel industry can be reduced. We also included materialistic values in the VBN theory, as materialistic values may be particularly relevant for choices in the apparel domain.

Overall, our results show that the variables included in the VBN theory are relevant for explaining circular behaviour in the apparel industry. The correlational analyses indicate that most variables from the VBN theory are associated with the willingness to consume circular clothing. Moreover, we found that, in general, stronger biospheric values were related to a stronger awareness of problems caused by fast-fashion. A stronger awareness of consequences was in turn related to stronger feelings that reducing one's fast-fashion consumption reduces problems caused by fast-fashion (i.e., outcome efficacy). Outcome

efficacy was related to stronger personal norms. That is, the stronger one's outcome efficacy, the more one felt morally obliged to prevent harm caused by the textile industry. Personal norms were in turn related to a stronger willingness to engage in circular apparel behaviours in Brazil and the Netherlands. Additionally, the mediation analyses showed that there is support for the path suggested by the VBN theory. That is, biospheric values are related to consumer behaviours towards circular apparel via awareness of consequences, outcome efficacy, and personal norms. Our findings are in line with the literature on the VBN theory [26,41]. Previous research has found support for the VBN theory in explaining pro-environmental actions, such as the interest in smart energy systems [40] and the acceptability of energy policies [41]. However, to our knowledge, this is the first time the VBN theory has been applied to circular apparel consumption.

Yet, in some cases, we did not find that biospheric values are related to circular consumption via all the variables from the VBN theory. This result differs from the literature [40,41] on the VBN theory [26,28], suggesting that further investigation should be carried out to confirm these results and their implication for circular behaviour research. For example, future research could include larger sample sizes to test the full VBN theory path.

Importantly, we found support for the VBN theory in explaining circular apparel behaviour in Brazil as well as in the Netherlands. However, interestingly, we found that the VBN theory explained all four circular behaviours better among Dutch consumers than among Brazilians. The VBN theory includes normative factors to explain behaviour [28]. That is, the model includes factors that focus on engaging in circular apparel behaviour because it is the right thing to do. Generally, normative factors are more strongly related to behaviours that are not too easy, nor too difficult [26]. Therefore, our findings could potentially be explained by differences in how easy or difficult it is for Brazilian versus Dutch consumers to purchase circular apparel in their country. Specifically, circular apparel brands in Brazil are still niches and have not reached the mainstream level [34], while the Dutch apparel industry is known for its innovative features and efforts in exploring circular strategies and business models [35]. Therefore, it may be a bit easier to purchase circular apparel in the Netherlands, while it may be relatively difficult to purchase circular apparel in Brazil. Furthermore, socio-economic indicators, such as the gross domestic product per capita (Brazil, 2020–US\$6796.84; Netherlands, 2020–US\$52,304.06) [52] and the Gini index (Brazil, 2018–0.539; Netherlands, 2018–0.281) [53], show there are significant differences between Brazil and the Netherlands concerning to the extent to which people may be able to afford circular apparel. Given both countries' backgrounds on circular economy initiatives and socio-demographic contexts, circular apparel is probably more available and affordable to an average Dutch consumer than for an average Brazilian consumer, which would mean that consuming circular apparel is perceived as more effortful for the Brazilian population. Future research is needed to systematically test if the VBN theory indeed better predicts circular apparel behaviour when the behaviour is somewhat easier compared to when the behaviour is rather difficult. For example, future research could explicitly test how easy or difficult it is for consumers in different countries to acquire circular apparel and whether this explains differences in the extent to which the VBN model explains circular apparel behaviour.

In contrast to our expectations, materialistic values were not, in general, important predictors of the willingness to engage in circular apparel behaviours. Although materialistic values have been found to influence other consumer behaviours, such as energy/water consumption and purchase of environmentally friendly products [44,45], they were also reported to not influence slow-fashion consumption [54], which matches our results. We expected that materialistic values would be positively related to the willingness to purchase second-hand, modular, and refurbished clothing because these products may be seen as luxury products. People with strong materialistic values generally like to own luxury products. However, we found that materialistic values were not significantly related to the willingness to consume these products, neither in Brazil nor in the Netherlands. Perhaps people do not evaluate second-hand, modular, and refurbished clothing as luxury prod-

ucts. Future research is needed to test this. We expected that materialistic values would be negatively related to the willingness to purchase fewer but durable products because people with strong materialistic values care about acquiring products. We indeed found that materialistic values were negatively and significantly related to this behaviour in both countries, yet this result was no longer supported when the other VBN variables were included in the model as well. Therefore, materialistic values do not seem to play a very important role in explaining engagement in circular apparel behaviour. However, future research is needed to replicate our findings.

### *5.1. Limitations and Future Research*

Although we generally found support for the VBN theory in explaining circular apparel behaviour, the explained variance was rather low. Specifically, the model explained 10% to 25% of the variance in circular apparel behaviours. Circular consumer apparel behaviour is likely to be influenced by other factors as well, such as costs and convenience. Future research is needed to evaluate the influence of these other variables in explaining circular apparel behaviour.

As explained above, we found that the VBN theory explained circular apparel behaviour better in the Netherlands than in Brazil. These differences could be due to differences in the ease or difficulty to consume circular apparel in these two countries. Yet, our sampling method also differed in the two countries. Specifically, in the Netherlands, participants were invited to participate in the study via a panel and received a small financial reward. In Brazil, we used a snowballing technique. The different sampling methods could have led to differences between the samples. Our goal was to test and replicate the generalisability of the VBN theory for circular behaviour in both countries; therefore, we did not use representative samples. Yet, it is important to note that the differences between our samples could be due to country differences or due to differences caused by the different sampling strategies. Therefore, conclusions at a national level should be analysed carefully. Furthermore, we recognise that there is an opportunity to extend this research by expanding the sample representativeness and minimising the differences in data collection among countries.

Finally, we highlight that actual consumption behaviour was not measured, but the willingness to acquire circular apparel was. Although the willingness to acquire circular apparel is likely to be related to the actual acquisition of circular apparel, it is not the same. Future research should test if long term interventions addressing the VBN variables result in changes in consumer engagement with circular clothing, measuring, for example, consumers' gradual substitution of traditional apparel for circular ones (in the number of pieces replaced) or changes in the clothing's overall durability.

### *5.2. Practical Implications*

Overall, we found that the VBN theory is related to circular consumer apparel. Therefore, brands and decision-makers could target the factors from the VBN theory through interventions, campaigns, and policies to increase circular apparel consumption. Specifically, they could make consumers aware of the problems caused by the textile industry and indicate what consumers can do to reduce these environmental problems. For example, informational campaigns could be set up through which people are informed about these problems via social media. Furthermore, shops that sell circular apparel could inform consumers that by purchasing circular apparel they contribute to reducing environmental problems caused by fast-fashion. That way, environmental awareness of the problems caused by the linear apparel industry and outcome efficacy can be strengthened, which can, in turn, strengthen the personal norm and thereby promote circular clothing consumption. Future research is needed to test whether such interventions can indeed promote actual circular apparel consumption.

## 6. Conclusions

Our research investigated, in Brazil and the Netherlands, the extent to which the VBN theory explains the willingness to consume apparel with an extended life-cycle.

The suggested VBN path, i.e., biospheric values are related to a stronger awareness of consequences, which positively influences outcome efficacy and thereby enhances personal norms and further circular consumption behaviour, was supported in both countries. We found support for the VBN theory in explaining different types of circular apparel behaviour, focusing on the approaches of clothing life-cycle extension. However, in contrast to our expectations, we did not find that materialistic values are important predictors of consumer behaviour towards circular apparel.

Our findings suggest that the variables from the VBN theory should be targeted by organisations when designing strategies and interventions to enhance consumer engagement in circular consumption systems. For example, campaigns could promote the awareness of apparel consumers regarding the environmental and social impacts caused by fast-fashion production and consumption. Furthermore, these campaigns could specify what consumers can do to reduce these problems e.g., consuming circular clothing.

Overall, that consumer engagement and behaviour are of extreme importance in the acceptance, transition, and success of the circular economy. Consequently, knowing and measuring the factors that influence these behaviours is crucial to circular economy researchers and practitioners, hence the relevance of the VBN theory for this field.

**Author Contributions:** Conceptualisation, G.M.G., A.R.O. and E.v.d.W.; methodology, E.v.d.W. and T.B.; software, G.M.G., E.v.d.W. and T.B.; validation, A.R.O., E.v.d.W. and T.B.; formal analysis, G.M.G., E.v.d.W. and T.B.; investigation, G.M.G. and E.v.d.W.; data curation, G.M.G.; writing—original draft preparation, G.M.G. and N.M.; writing—review and editing, A.R.O., E.v.d.W. and T.B.; supervision, E.v.d.W. and A.R.O.; project administration, E.v.d.W. and A.R.O.; funding acquisition, A.R.O., G.M.G. and N.M. All authors have read and agreed to the published version of the manuscript.

**Funding:** This work has been supported by the following Brazilian research agencies: São Paulo Research Foundation (FAPESP), grant number 2019/07874-2, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior-Brasil (CAPES)-Finance Code 001, and the National Council for Scientific and Technological Development (CNPq) process 133795/2019-5 and 306458/2019-5. One of the authors of this paper is part of the New Cotton project, which receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No [101000559].

**Institutional Review Board Statement:** The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of Psychology (ECP) (PSY-1920-S-0016, 7 November 2019).

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** The data presented in this study are available on request from the corresponding author. The data are not publicly available due to disclosure agreements with the participants.

**Acknowledgments:** The authors would like to acknowledge C&A Brasil, Cristopher Pölzl, and Thomas Harsevoort for their collaboration.

**Conflicts of Interest:** The authors declare no conflict of interest.

## References

1. Keane, J.; te Velde, D.W. *The Role of Textile and Clothing Industries in Growth and Development Strategies*; Overseas Development Institute: London, UK, 2008.
2. Fujita, R.M.L.; Jorente, M.J. A Indústria Têxtil no Brasil: Uma perspectiva histórica e cultural. *ModaPalavra e-Periódico* **2016**, *8*, 153–174.
3. Ellen MacArthur Foundation. A New Textiles Economy: Redesigning Fashion's Future. Available online: <https://www.ellenmacarthurfoundation.org/publications> (accessed on 12 December 2018).
4. Claudio, L. Waste Couture: Environmental Impact of the Clothing Industry. *Environ. Health Perspect.* **2007**, *115*, 449–454. [[CrossRef](#)] [[PubMed](#)]

5. Saito, Y. Consumer Aesthetics and Environmental Ethics: Problems and Possibilities. *J. Aesthet. Art Crit.* **2018**, *76*, 429–439. [[CrossRef](#)]
6. Niinimäki, K.; Peters, G.; Dahlbo, H.; Perry, P.; Rissanen, T.; Gwilt, A. The environmental price of fast fashion. *Nat. Rev. Earth Environ.* **2020**, *1*, 189–200. [[CrossRef](#)]
7. Armstrong, C.M.J.; Kang, J.; Lang, C. Clothing style confidence: The development and validation of a multidimensional scale to explore product longevity. *J. Consum. Behav.* **2018**, *17*, 553–568. [[CrossRef](#)]
8. Ghisellini, P.; Cialani, C.; Ulgiati, S. A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems. *J. Clean. Prod.* **2016**, *114*, 11–32. [[CrossRef](#)]
9. Ritzén, S.; Sandström, G.Ö. Barriers to the Circular Economy—Integration of Perspectives and Domains. In Proceedings of the 9th CIRP IPSS Conference: Circular Perspectives on Product/Service-Systems, Copenhagen, Denmark, 19–21 June 2017.
10. Boulding, K. The Economics of the Coming Spaceship Earth. In *Environmental Quality in a Growing Economy, Resources for the Future*; Jarrett, H., Ed.; Johns Hopkins University Press: Baltimore, MD, USA, 1966; pp. 3–14.
11. Stahel, W.R. The product life factor. In *An Inquiry into the Nature of Sustainable Societies: The Role of the Private Sector*; Houston Area Research Center: The Woodlands, TX, USA, 1982.
12. Pearce, D.W.; Turner, R.K. *Economics of Natural Resources and the Environment*; Harvester Wheatsheaf: Hemel Hempstead, UK, 1989.
13. Blomsma, F.; Brennan, G. The Emergence of Circular Economy: A New Framing around Prolonging Resource Productivity. *J. Ind. Ecol.* **2017**, *21*, 603–614. [[CrossRef](#)]
14. Haas, W.; Krausmann, F.; Wiedenhofer, D.; Heinz, M. How Circular is the Global Economy? An Assessment of Material Flows, Waste Production, and Recycling in the European Union and the World in 2005. *J. Ind. Ecol.* **2015**, *19*, 765–777. [[CrossRef](#)]
15. Murray, A.; Skene, K.; Haynes, K. The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context. *J. Bus. Ethics* **2017**, *140*, 369–380. [[CrossRef](#)]
16. Kirchher, J.; Reike, D.; Hekkert, M. Conceptualizing the circular economy: An analysis of 114 definitions. *Resour. Conserv. Recycl.* **2017**, *127*, 221–232. [[CrossRef](#)]
17. Prieto-Sandoval, V.; Jaca, C.; Ormazabal, M. Towards a consensus on the circular economy. *J. Clean. Prod.* **2018**, *179*, 605–615. [[CrossRef](#)]
18. BSI—British Standards Institution. *BS 8001:2017. Framework for Implementing the Principles of the Circular Economy in Organizations—Guide*; The British Standards Institution: London, UK, 2017.
19. Chamberlin, L.; Boks, C. Marketing Approaches for a Circular Economy: Using Design Frameworks to Interpret Online Communication. *Sustainability* **2018**, *10*, 2070. [[CrossRef](#)]
20. Linder, M.; Williander, M. Circular Business Model Innovation: Inherent Uncertainties. *Bus. Strategy Environ.* **2017**, *26*, 182–196. [[CrossRef](#)]
21. Mentink, B. Circular Business Model Innovation: A Process Framework and a Tool for Business Model Innovation in a Circular Economy. Master’s Thesis, TU Delft, Delft, The Netherlands, 2014.
22. Osterwalder, A.; Pigneur, Y. *Business Model Generation*; John Wiley & Sons: Hoboken, NJ, USA, 2010.
23. Quinones, A.; Augustine, A. Technology and Trust: How the Sharing Economy is Changing Consumer Behavior. Available online: [https://www.bbvaresearch.com/wp-content/uploads/2015/11/151119\\_US\\_SharingEconomy.pdf](https://www.bbvaresearch.com/wp-content/uploads/2015/11/151119_US_SharingEconomy.pdf) (accessed on 2 January 2022).
24. Botelho, A.; Dias, M.F.; Ferreira, C.; Pinto, L.M.C. The market of electrical and electronic equipment waste in Portugal: Analysis of take-back consumers’ decisions. *Waste Manag. Res.* **2016**, *34*, 1074–1080. [[CrossRef](#)]
25. Daae, J.; Chamberlin, L.; Boks, C. Dimensions of Behaviour Change in the context of Designing for a Circular Economy. *Des. J.* **2018**, *21*, 521–541. [[CrossRef](#)]
26. Stern, P.C. Toward a Coherent Theory of Environmentally Significant Behaviour. *J. Soc. Issues* **2000**, *56*, 407–424. [[CrossRef](#)]
27. Schwartz, S.H. Normative Influences on Altruism. *Adv. Exp. Soc. Psychol.* **1977**, *10*, 221–279. [[CrossRef](#)]
28. Stern, P.C.; Dietz, T.; Abel, T.D.; Guagnano, G.; Kalof, L. A Value-Belief-Norm theory of Support for Social Movements: The Case of Environmentalism. *Res. Hum. Ecol.* **1999**, *6*, 81–97.
29. Jansson, J.; Marell, A.; Nordlund, A. Exploring consumer adoption of a high involvement eco-innovation using Value-Belief-Norm theory. *J. Consum. Behav.* **2011**, *10*, 51–60. [[CrossRef](#)]
30. Van der Werff, E.; Steg, L. The psychology of participation and interest in smart energy systems: Comparing the Value-Belief-Norm theory and the value-identity-personal norm model. *Energy Res. Soc. Sci.* **2016**, *22*, 107–114. [[CrossRef](#)]
31. Johansson, M.; Rahm, J.; Gyllin, M. Landowners’ Participation in Biodiversity Conservation Examined through the Value-Belief-Norm theory. *Landsc. Res.* **2013**, *38*, 295–311. [[CrossRef](#)]
32. Yıldırım, B.Ç.; Semiz, G.K. Future Teachers’ Sustainable Water Consumption Behavior: A Test of the Value-Belief-Norm theory. *Sustainability* **2019**, *11*, 1558. [[CrossRef](#)]
33. Rossi, E.; Bertassini, A.C.; Ferreira, C.S.; Amaral, W.A.N.; Ometto, A.R. Circular economy indicators for organizations considering sustainability and business models: Plastic, textile and electro-electronic cases. *J. Clean. Prod.* **2020**, *247*, 119137. [[CrossRef](#)]
34. Gomes, G.M.; Moreira, N.; Iritani, D.R.; Amaral, W.A.; Ometo, A.R. Systemic circular innovation: Barriers, windows of opportunity and an analysis of Brazil’s apparel scenario. *Fash. Pract.* **2021**, 1–30. [[CrossRef](#)]
35. Fischer, A.; Pascucci, S. Institutional incentives in circular economy transition: The case of material use in the Dutch textile industry. *J. Clean. Prod.* **2017**, *155*, 17–32. [[CrossRef](#)]

36. Schwartz, S.H. Normative explanations of helping behavior: A critique, proposal, and empirical test. *J. Exp. Soc. Psychol.* **1973**, *9*, 349–364. [[CrossRef](#)]
37. Steg, L. Values, norms, and intrinsic motivation to act proenvironmentally. *Annu. Rev. Environ. Resour.* **2016**, *41*, 277–292. [[CrossRef](#)]
38. Bouman, T.; Steg, L.; Dietz, T. Insights from early COVID-19 responses about promoting sustainable action. *Nat. Sustain.* **2021**, *4*, 194–200. [[CrossRef](#)]
39. Schwartz, S.H. Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Adv. Exp. Soc. Psychol.* **1992**, *25*, 1–65. [[CrossRef](#)]
40. Steg, L.; Perlaviciute, G.; Van der Werff, E.; Lurvink, J. The significance of hedonic values for environmentally relevant attitudes, preferences, and actions. *Environ. Behav.* **2014**, *46*, 163–192. [[CrossRef](#)]
41. Steg, L.; Dreijerink, L.; Abrahamse, W. Factors influencing the acceptability of energy policies: A test of VBN theory. *J. Environ. Psychol.* **2005**, *25*, 415–425. [[CrossRef](#)]
42. de Groot, J.I.M.; Steg, L. Value orientations to explain beliefs related to environmental significant behavior: How to measure egoistic, altruistic, and biospheric value orientations. *Environ. Behav.* **2008**, *40*, 330–354. [[CrossRef](#)]
43. Richins, M.L. The Material Values Scale: Measurement Properties and Development of a Short Form. *J. Consum. Res.* **2004**, *31*, 209–219. [[CrossRef](#)]
44. Liobikiene, G.; JuliusLiobikas, J.; Brizga, J.; Juknys, R. Materialistic values impact on pro-environmental behavior: The case of transition country as Lithuania. *J. Clean. Prod.* **2020**, *244*, 118859. [[CrossRef](#)]
45. Banerjee, B.; McKeage, K. How Green Is My Value: Exploring the Relationship between Environmentalism and Materialism. *Adv. Consum. Res.* **1994**, *21*, 147–152.
46. World Health Organization. Process of Translation and Adaptation of Instruments. Available online: [https://www.who.int/substance\\_abuse/research\\_tools/translation/en/](https://www.who.int/substance_abuse/research_tools/translation/en/) (accessed on 30 July 2019).
47. Richins, M.L.; Dawson, S. A Consumer Values Orientation for Materialism and its Measurement: Scale Development and Validation. *J. Consum. Res.* **1992**, *19*, 303–316. [[CrossRef](#)]
48. van der Werff, E.; Steg, L. One model to predict them all: Predicting energy behaviours with the norm activation model. *Energy Res. Soc. Sci.* **2015**, *6*, 8–14. [[CrossRef](#)]
49. Hayes, A.F.; Preacher, K.J.; Myers, T.A. Mediation and the estimation of indirect effects in political communication research. In *Sourcebook for Political Communication Research*, 1st ed.; Bucy, E.P., Holbert, R.L., Eds.; Routledge: New York, NY, USA, 2010.
50. Smithson, M. Correct confidence intervals for various regression effect sizes and parameters: The importance of noncentral distributions in computing intervals. *Educ. Psychol. Meas.* **2001**, *61*, 605–632. [[CrossRef](#)]
51. Masson, M.E.J.; Loftus, G.R. Using confidence intervals for graphically based data interpretation. *Can. J. Exp. Psychol.* **2003**, *57*, 203–220. [[CrossRef](#)] [[PubMed](#)]
52. World Bank. Indicator–GDP (Current US\$). Available online: <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD> (accessed on 8 July 2021).
53. World Bank. Indicator–Gini Index (World Bank Estimate). Available online: <https://data.worldbank.org/indicator/SI.POV.GINI> (accessed on 8 July 2021).
54. Sobreira, E.M.C.; da Silva, C.R.M.; Romero, C.B.A. Do empowerment and materialism influence slow fashion consumption? *Evid. Brazil. J. Fash. Mark. Manag.* **2020**, *24*, 415–435. [[CrossRef](#)]