



# ARTICLES

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## THE ROLE OF EMOTIONS IN REDUCING FOOD WASTE

*O papel das emoções na redução do desperdício de alimentos*

*El papel de las emociones en la reducción del desperdicio de alimentos*

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### ABSTRACT

*This study analyzes the role of emotions in the food waste reduction behavior of Brazilian consumers. Based on a survey with 235 respondents and employing PLS-SEM as the analysis technique, it was found that consumers who feel more guilty about waste have more favorable attitudes toward mitigating food disposal in domestic environments. Similarly, anticipated pride directly impacted attitudes toward reducing food waste. These emotions also had indirect effects on waste reduction intention and behavior. In this study, psychological distance moderated the intention-behavior relationship, demonstrating that consumers are more likely to engage in sustainable practices when they perceive waste as a problem close to them. This study offers insights into strategies that can be used to mitigate wasteful behaviors.*

**Keywords:** sustainable food consumption, reducing household food waste, psychological distance, food waste, sustainable consumption.

### RESUMO

*Este estudo teve como objetivo analisar o papel das emoções no comportamento de redução do desperdício de alimentos dos consumidores brasileiros. A partir de uma pesquisa com 235 respondentes e empregando-se a PLS-SEM como técnica de análise, verificou-se que os consumidores que se sentem mais culpados em relação ao desperdício apresentam atitudes mais favoráveis às ações de mitigação do descarte de alimentos em ambientes domésticos. Igualmente, o orgulho antecipado impactou diretamente a atitude em relação à redução do desperdício alimentar. Essas emoções também apresentaram efeitos indiretos sobre a intenção e o comportamento de redução do desperdício. Neste estudo, a distância psicológica moderou a relação entre intenção e comportamento, demonstrando que é mais provável que os consumidores se envolvam em práticas sustentáveis quando percebem o desperdício como uma problemática próxima a eles mesmos. Esta pesquisa oferece insights sobre estratégias que podem ser utilizadas para mitigar os comportamentos de desperdício.*

**Palavras-chave:** consumo alimentar sustentável, redução do desperdício alimentar doméstico, distância psicológica, desperdício alimentar, consumo sustentável.

### RESUMEN

*Este estudio tuvo como objetivo analizar el papel de las emociones en el comportamiento de reducción del desperdicio de alimentos de los consumidores brasileños. A partir de una encuesta realizada a 235 encuestados y utilizando PLS-SEM como técnica de análisis, se encontró que los consumidores que se sienten más culpables por el desperdicio tienen actitudes más favorables hacia las acciones para mitigar el descarte de alimentos en los ambientes domésticos. Asimismo, el orgullo anticipado influyó directamente en las actitudes hacia la reducción del desperdicio de alimentos. Estas emociones también tuvieron efectos indirectos sobre la intención y el comportamiento de reducción del desperdicio. En este estudio, la distancia psicológica moderó la relación intención-comportamiento, lo que demuestra que es más probable que los consumidores adopten prácticas sostenibles cuando perciben el desperdicio como un problema cercano a ellos. Esta investigación ofrece información sobre estrategias que pueden utilizarse para mitigar los comportamientos de desperdicio.*

**Palabras clave:** consumo sustentable de alimentos, reducción del desperdicio de alimentos en los hogares, distancia psicológica, desperdicio de alimentos, consumo sostenible.

## INTRODUCTION

Food waste is a complex phenomenon, which stands as one of the main contemporary environmental and social problems, negatively interfering with food systems' sustainability (Casonato et al., 2023). Within the food supply chain, final consumption is the stage that concentrates the bulk of waste. In 2019, about 931 million tons of food were wasted in the world, of which 61% came from family households (Programa das Nações Unidas para o Ambiente [PNUA], 2021), which highlights consumers' role in dealing with waste-related issues.

Reducing food waste in households can significantly contribute to mitigating environmental impacts caused by pollution, enhancing social sustainability, and reducing the impact of poverty, thus making discussions on how to mitigate waste increasingly frequent (Khalil et al., 2022). Thus, several factors and barriers to reducing and preventing food waste in the consumption phase were mapped (for example, Chia et al., 2023).

These studies focused mainly on cognitive factors, often disregarding the affective factors that can influence individuals' attitudes and intentions toward waste (Attiq et al., 2021; Jabeen et al., 2023). Emotions are a fundamental part of human existence, determining thoughts and the decision-making process (Volz & Hertwig, 2016). For this reason, positive and negative emotions have been explored with regard to their impacts on consumer behavior (Sharma et al., 2023).

The effects of emotions have been examined in various contexts, including studies on consumption and the purchase of sustainable products. Pleeging et al. (2021), for example, predicted that hope plays an important role in consumers' willingness to pay for sustainable energy, while Zheng et al. (2022) found that positive emotions can influence organic food consumption intention and behavior.

Even on a small scale, current research indicates that positive emotions, such as gratitude (Septianto et al., 2020) and hope (Khalil et al., 2022), can be determinant in reducing food waste. From another perspective, other studies focused on negative emotions, showing that frustration, embarrassment (Graham-Rowe et al., 2014) and concern (McCarthy & Liu, 2017) lead consumers to decrease the amount of food that is thrown away in household aggregates.

Discussions on the effects of emotions on household food waste are recent, and while the importance of existing knowledge is recognized, a sound base of evidence on the relationship between emotional factors and household food waste is still lacking (Boulet et al., 2021). To help fill this gap, this study analyzes the role of emotions in the food waste reduction behavior of Brazilian consumers.

The "guilt" and "anticipated pride" emotions are analyzed in this investigation. Guilt is one of the most common negative emotions, arising in view of negative outcomes and generating unpleasant feelings that can lead one to abandon one's problematic behavior (Soorani & Ahmadvand, 2019). Anticipated pride concerns a positive self-regulating emotion that an individual can experience when performing a beneficial conduct that generates a sense of achievement and confidence (Talwar et al., 2022).

These emotions are known to influence sustainable behaviors (Antonetti & Maklan, 2014), and in studies on waste, they are associated with its reduction (Deliberador et al., 2023; Quedest et al., 2013; Russell et al., 2017; Talwar et al., 2022). However, few studies have evaluated their joint effects and how they shape individuals' intentions against food waste (Jabeen et al., 2023).

In addition, these studies disregard the fact that human emotions emerge from individuals' interaction with their environment, so that a perception of closeness to a particular phenomenon tends to strengthen an individual's emotional responses toward a behavior (Mühlberger et al., 2008). The measure that clarifies someone's closeness to a certain event and inclines them to engage in it is recognized as psychological distance (Trope & Liberman, 2010). This construct is considered essential for understanding the emotion-based behavioral process that explains the adoption of pro-sustainable actions (McDonald et al., 2015). Thus, psychological distance is examined as a variable that affects the strength of the relationship between food waste reduction intention, triggered by guilt and pride emotions, and behavior.

Therefore, this study contributes to the literature by jointly examining the influential role of positive and negative emotions, as it provides a comprehensive analysis of food waste reduction behaviors, and by analyzing how the intention-behavior relationship can vary based on psychological distance.

Furthermore, given the increase in the high waste levels that are seen in developing countries and the scarcity of research analyzing consumers' behavior in this scenario (Deliberador et al., 2023), this study provides contributions by exploring the determinants of waste reduction behavior in a scarcely studied emerging population. It is expected that analyzing food waste in Brazil can provide information that may guide the design of specific and more effective policies and strategies for this public.

Besides offering theoretical contributions, the study provides a methodological contribution by using partial least squares structural equation modeling (PLS-SEM) as the analysis technique to investigate the multiple relationships existing in the studied phenomenon. Jointly analyzing emotions and the moderating effect of psychological distance allows deepening knowledge of the multiple relationships involved in the behavioral process of waste reduction.

## THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESES

### Relationship between food waste and emotions

Affective responses are observed as a source of motivation for people's actions (Volz & Hertwig, 2016), and every type of behavior is not only motivated by personal goals, but also depends on the emotions that accompany these actions (Kals & Müller, 2012). In addition, it is necessary to consider that, because it has unique characteristics, each emotion can exert different impacts on people's intentions and behaviors (Chadwick, 2015).

In the context of household food waste, few studies have analyzed how emotional factors can help explain food disposal (Attiq et al., 2021; Jabeen et al., 2023), which constitutes a limitation to be overcome by new studies (Septianto et al., 2020). Analyzing the relationship between emotions and waste could provide information about people's stances on the actions necessary to mitigate this problem, while also enabling the design of strategies that use emotional pathways to address food waste.

Though fewer in number, studies examining the relationship between emotions and food disposal in a domestic environment can bring interesting findings, as shown in Table 1.

**Table 1.** Relationships between emotions and food waste

Author	Emotion	Discoveries
Attiq et al. (2021)	Guilt	Consumers with a higher level of anticipated guilt are more likely to avoid food waste.
Begho and Fadare (2023)	Guilt and regret	Negative emotions arise from memories of past situations where waste occurred and positively impact the desire to reduce food disposal in the future.
Jabeen et al. (2023)	Optimism, pride, guilt, and frustration	Negative emotions are positively associated with attitude and intentions. Positive emotions negatively impact attitude only.
Khalil et al. (2022)	Hope	Once people understand the gains they can have by not wasting, they experience a state of hope. This positive emotion leads to intentions and behaviors favorable to waste reduction.
Barbera et al. (2022)	Anger, sadness, dislike, shame, and disappointment	Negative emotions increase intentions to reduce household food waste.
McCarthy and Liu (2017)	Guilt and anxiety	People who feel guilty and anxious about food waste make greater efforts not to discard food.
Russel et al. (2017)	Frustration, anxiety, optimism, pride, joy, and relaxation	Negative emotions were positively related with food waste intention and behavior. Positive emotions were not significantly related with intention and behavior.
Septianto et al. (2020)	Gratitude	Gratitude led to increased intentions to reduce food waste.
Soorani e Ahmadvand (2019)	Guilt	Guilt drives food consumption management and waste prevention.
Talwar et al. (2022)	Anticipated pride	Anticipated pride positively impacts food waste avoidance intentions, but does not show any relation with leftover reuse routines and/or excessive food purchase reduction.

The intimate relationship between emotions and waste can be explained by how information on the subject is processed by individuals. Luo and Yan (2023) explain that, faced with anti-food waste information, people process such clarifications mainly through intuition. Consequently, this processing without deep abstraction allows individuals to make decisions based on their emotional system, making it effective to persuade consumers against certain behaviors through emotional aspects related to waste (Luo & Ya, 2023).

Thus, in order to understand how emotional factors are determinant for waste reduction behaviors and, based on this, to consider ways of persuading consumers to be more sustainable, this study analyzes the effects of guilt and anticipated pride.

Pride and guilt are self-conscious emotions; this means that they are experienced when individuals are aware of having performed actions that may be in line with personal and social norms (Lewis, 2000). Self-conscious emotions are said to be important predictors to understand behaviors related to sustainable consumption (Wang & Wu, 2016). Therefore, in considering that behaviors which reduce household food waste require a certain degree of awareness of the problems involved, self-conscious emotions (guilt and pride) were found to be the most appropriate for this study.

## Development of hypotheses

Guilt is understood as the negative emotion experienced by individuals at the moment they feel responsible for a certain negative outcome of a previous behavior (Baumeister et al., 1995). This emotion is said to be an important determinant of sustainable intentions and behaviors (Antonetti & Maklan, 2014). This is due to the fact that guilt activates a coping impulse focused on the problem, in which individuals recognize that they have control over the outcomes caused by their unsustainable choices and seek to correct their behavior in the future (Antonetti & Maklan, 2014; White et al., 2019).

In relation to food waste, studies carried out with the populations of the United States (Attiq et al., 2021), United Kingdom (Quested et al., 2013; Russell et al., 2017), and Iran (Soorani & Ahmadvand, 2019) show that by taking responsibility for unsustainable outcomes from poor food management, individuals tend to increase anti-waste behaviors.

Given the inequality in access to food throughout the planet, food waste is a moral problem that induces discomforting feelings in people. Thus, Bretter et al. (2023) argue that guilt may be the consequence of a threat to individuals' moral self-image, considerably affecting their future motivations to mitigate waste. Moreover, knowing that individuals avoid activities that result in negative emotions (Schneider et al., 2017), it is inferred that, when experiencing a guilt feeling, people decrease their wasteful actions to reduce that emotion.

In this study, guilt is understood as the negative emotion experienced by an individual in assessing their responsibility for food waste behaviors (Attiq et al., 2021; Soorani & Ahmadvand, 2019), and it is proposed that people who feel most guilty about incorrect food disposal may assess more favorably the actions necessary to reduce food waste.

The measure of relevance of a particular behavior is determined as attitude and indicates the individual's judgement about performing a particular conduct (Ajzen, 1991). Thus, it is proposed that guilt is directly related to attitudes that favor actions aimed at reducing food waste, suggesting that:

H1: Guilt positively impacts one's attitude toward reducing household food waste.

Pride is an essential emotion to determining sustainable consumer behaviors, since it increases individuals' sense of efficacy regarding a particular action and represents a sense of responsibility for a positive outcome (White et al., 2019). In addition, the pride feeling is associated with social concerns and moral issues, which can justify its potential to predict activities to mitigate and prevent unsustainable actions (Schneider et al., 2017).

Individuals usually want to perform activities that may result in positive emotional states (Schneider et al., 2017), and the actions that offer such affirmative reinforcements tend to be judged more favorably and are therefore more likely to be performed. Therefore, it is admitted that pride plays a self-regulating role in improving a variety of pro-environmental behaviors (Onwezen et al., 2014), an effect that is also seen in relation to waste (Kim & Hall, 2019; Talwar et al., 2022).

In this context, pride is understood as an anticipated positive emotion the consumer experiences when they perform or feel confident about performing actions to reduce food waste (Kim & Hall, 2019; Talwar et al., 2022). However, while the literature points out that anticipated pride prompts consumers' intentions to avoid throwing food away, it is not possible to confirm its influence on behaviors such as adopting routines of reusing leftovers and reducing excessive grocery purchasing, thus indicating that the interaction between this emotion and anti-waste actions is not fully understood (Talwar et al., 2022).

The inconsistent findings on how pride impacts different waste mitigation behaviors may stem from the lack of investigations on other important behavioral process variables. It is known that human behavior cannot be explained simply by the direct linear relationship between the analyzed variable and an intention and/or behavior, but is also elucidated by how individuals interpret and judge a particular conduct (Ajzen, 1991). Therefore, evaluating the effects of pride on attitude can provide an alternative path for understanding the effects of this emotion.

This study establishes attitude as the psychological factor that can prompt reactions to provocations for more sustainable behavior regarding food management. Moreover, we consider that as consumers experience positive emotions resulting from their confidence in performing waste reduction behaviors, their attitude toward these actions will be more favorable. Hence the hypothesis:

H2: Anticipated pride positively impacts one's attitude toward reducing household food waste.

The degree to which someone views favorably or unfavorably a given behavior is directly related to their intentions (Ajzen, 1991), recognizing that the more positively an individual views

a given conduct, the stronger their intention to execute it (Ajzen, 1991). This proposition has also been highlighted in research on food waste, since intentions to adopt anti-waste behaviors were predicted by attitudes favorable to reducing food disposal in domestic environments (Graham-Rowe et al., 2015; Soorani & Ahmadvand, 2019).

In turn, intention is the factor that can directly influence the occurrence of a behavior (Ajzen, 1991), and it is recognized as a significant predictor of behaviors of food reuse, proper food planning and storage, and fruit and vegetable waste reduction (Graham-Rowe et al., 2015; Soorani & Ahmadvand, 2019).

However, while intention is identified as a determinant of behavior, it is observed that even if most people have positive attitudes and intentions about making pro-environmental choices, these do not always amount to sustainable behaviors (Vermeir et al., 2020). This incongruence is recognized by the literature as an intention-behavior gap.

Among other factors, this gap can result from the way individuals perceive the effects of unsustainable actions. Their lack of knowledge of the consequences that unsustainable actions bring to their own life can lead to changes in individuals' decision-making process, which results in changing or abandoning certain behaviors (Sheng et al., 2022). Likewise, the social and environmental consequences of human actions are sometimes seen as abstract and distant motivations, which can lead to behavioral barriers and reduce the possibility of engaging individuals in sustainable actions (White et al., 2019).

The extent to which an individual assesses their own closeness to a given event and is therefore willing to engage in it is recognized as psychological distance. This construct assumes that an individual's mental representation of an event is affected by how they perceive their temporal or spatial distance from the phenomenon, and when an event is psychologically perceived to be close to the individual, it is interpreted in a more concrete and palpable way, thereby influencing people's behaviors (Trope & Liberman, 2010).

McDonald et al. (2015) argue that when people perceive the effects of unsustainable actions as being close, they tend to interpret them more concretely and increase their willingness to take measures that can minimize such threats. Similar results are also observed regarding the effects of psychological distance on food waste reduction intentions (Hatab et al., 2022).

Based on these arguments, it is inferred that an individual's intention may not be enough for them to perform waste reduction behaviors, and that their perceived psychological distance from food waste can be a useful mechanism to drive variations in the effect of intention on behavior. Therefore, it is proposed that:

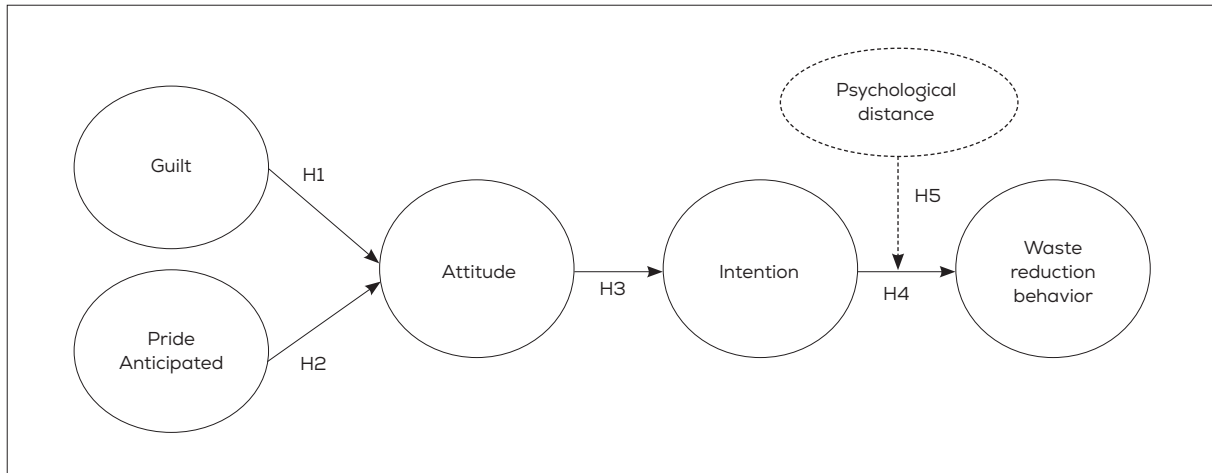
H3: Attitude positively impacts one's intention to reduce household food waste.

H4: Intention positively impacts one's household food waste reduction behavior.

H5: Psychological distance moderates the effect of intention on one's household food waste reduction behavior, and the effect of this relationship is more evident in consumers who perceive food waste to be psychologically closer to them.

The proposed relations constitute the conceptual model of the study (Figure 1).

**Figure 1.** Conceptual model



## METHODOLOGY

### Population and data collection process

This study uses a quantitative approach and is carried out through the survey method (Hair et al., 2014). The study respondents were Brazilian consumers over 18 years old who were responsible for their families' food management. Surveying consumers who are responsible for food purchasing decisions and food preparation in households is recurrent in studies on the subject (e.g., Begho & Fadare [2023] and Hatab et al. [2022]). We therefore find it appropriate to use this parameter to determine the study's target population.

Data collection used convenience sampling (Hair et al., 2014), and the public was reached by administering an online questionnaire. While in non-probabilistic studies it is not necessary to define an exact number of respondents, in order to avoid model estimation errors, a minimum number of observations to be collected was defined. First, G\*Power software was used to perform the sample calculation. By adopting a mean effect size ( $f^2 = 0,20$ ), a 95% statistical power, and a 5% significance level, we obtained a minimum sample size of 111. Additionally, to confirm the minimum sample size, a practical rule was used which suggests that the number of observations should be 10 times the maximum number of paths aiming at any construct in the measurement model (Hair et al., 2012). Therefore, the minimum sample size determined for the study was 200 respondents. This value was set as the minimum limit for data collection.

The research questionnaire was publicized through a partnership between the study researcher and a Brazilian startup engaged in anti-waste actions. The invitation to participate in the survey and the link to access the questionnaire were publicized in two posts on the company's Instagram profile. Specifically using the story tool, an image was publicized inviting



the company's profile followers to participate in the study. Along with that image, a link containing the survey address (URL) was included, ensuring that those interested could directly access the questionnaire hosted by the MicrosoftForms® online platform. Participation in the study was voluntary, and no remuneration was paid. Likewise, considering that respondents might not know the answers to all items or might be afraid to answer certain questions, no item was mandatory.

Before the field research, the instrument was pretested with 30 undergraduate students in the third semester of the Management course at a Brazilian university.

## Study variables

The research instrument was formed by two filter questions, four demographic variables, and seven scales representing the theoretical model variables. The filter questions aimed to identify consumers' responsibility for the food management in their families.

The "Guilt" scale, formed by three items, was adapted from Attiq et al. (2021) and Soorani and Ahmadvand (2019), whereas the "Anticipated Pride" scale (three items) was adapted from the study by Talwar et al. (2022). The "Attitude", "Intention," and "Waste reduction behavior" scales were taken from Soorani and Ahmadvand (2019), and possessed four, five, and four items, respectively. Importantly, in this study, purchase planning, proper grocery storage, and food reuse were classified as waste reduction behaviors.

The variables of all constructs were measured through a seven-point Likert scale (1 = I totally disagree, and 7 = I totally agree). Considering that the scales chosen for the study were originally written in English, they were translated into Brazilian Portuguese through double and reverse translation. The translated instrument was used in the field research.

As in the study by Hatab et al. (2022), the psychological distance was assessed using a bipolar item with a seven-point scale, in which the consumer indicated their perception regarding food waste. Respondents were shown the following sentence: "Food waste has effects that are [...]." Respondents then indicated whether they perceived the effects as "(1) negative, immediate, and mainly on myself," or "(7) negative, in the long term, and mainly on others."

## Analysis technique

By the end of data collection, 284 responses had been obtained. A missing data analysis was performed, and no missing data was observed. Using the Mahalanobis measure, the absence of atypical observations was verified, since no observation was identified whose p-value for the probability associated with that measure was less than 0.001. Subsequently, the filter questions were analyzed. Respondents who indicated that they were not partially or totally responsible for food management in their families were removed from the sample (N = 49). The study therefore included a final sample of 235 respondents.

In order to identify the normality of data, the WebPower software was used to assess Mardia's asymmetry and multivariate kurtosis. The p-values for kurtosis and asymmetry were less than

0.05, implying that the multivariate data is not normal. Upon observing the lack of normality of data, it was deemed necessary to use a non-parametric test to ensure reliability in analyzing the proposed relations. Thus, to analyze the measurement and structural models, PLS-SEM was adopted

The PLS approach also allowed to analyze whether the effect of intention on waste reduction behavior is changed because of psychological distance (H4). To that end, the multigroup analysis technique was used. The sample was divided into two subgroups: close (1), when consumers view waste as psychologically close to them, and distant (2), when food waste is psychologically viewed by consumers as distant.

For this categorization, individuals who scored up to four were classified as being in the “close” group (N = 95), and respondents above five formed the “distant” group (N = 140). The IBM SPSS 21 software was used to create these categories and perform the descriptive analysis, while SmartPLS 4 was used for the structural model evaluation and the multigroup analysis.

## RESULTS

### Respondents' profile

The sample consists mostly of female respondents (53.19%). The age group of most participants is between 18 and 30 years old (61.70%). Of the 235 respondents, 62.97% of the sample are formed by those who are married or in a stable union. In addition, 42.55% have a monthly family income of up to six minimum wages.

### Evaluating the structural and measurement models

Since the data from the Likert scale comprises ordinal variables, which breaks one of the precepts for using SEM, a corrective measure was used, i.e., comparing the Pearson's correlation and polychoric matrices (specific for analyzing ordinal data). In analyzing the obtained values, no relevant difference was found between the correlation results for each study variable, which allowed using the dataset to perform PLS-SE.

The measurement model analysis began by identifying the loading values of items in each construct. Two variables were excluded as their factor loadings were less than the minimum limit (0.70). One variable was linked to the construct “Guilt,” and one was associated to the construct “Intention”. Later, the new values indicated that the factor loadings for all items converged to their respective latent constructs.

Reliability and convergent validity were checked using Cronbach's alpha, CR, rho\_A and AVE. All constructs had values above the critical 0.70 (Hair et al., 2019). As for the AVE, all constructs had values above the minimum threshold of 0.50. These results indicate the reliability and convergent validity of the model's variables.

**Table 2.** Validity and reliability measures

Construct	$\alpha$	rho_A	CR	AVE
Guilt	0.835	0.845	0.924	0.858
Anticipated pride	0.954	0.959	0.970	0.915
Attitude	0.790	0.790	0.865	0.616
Intention	0.878	0.900	0.916	0.731
Waste reduction behavior	0.793	0.813	0.865	0.616

Discriminant validity was analyzed using the Fornell-LARCKER and HTMT criteria. By the Fornell-LARCKER criterion, it was found that the AVE square root for each construct exceeded the correlations with the other variables. Regarding HTMT, it was observed that all latent variables are associated with values below 0.90 (Hair et al., 2019). The obtained values indicate adequate discriminant validity.

**Table 3.** Discriminant validity

Construct	Fornell-Larcker					HTMT			
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)
Guilt (1)	0.926					-			
Anticipated pride (2)	0.642	0.957				0.721	-		
Attitude (3)	0.524	0.610	0.785			0.638	0.695	-	
Intention (4)	0.610	0.819	0.742	0.855		0.701	0.888	0.873	-
Waste reduction behavior (5)	0.546	0.631	0.380	0.513	0.785	0.658	0.724	0.464	0.592

Before analyzing the structural relations, the collinearity was examined. Following Hair et al. (2019), no multicollinearity problem was found ( $VIF < 3$ ). The relationships between the variables are shown in Table 4. To analyze the structural model, bootstrapping with 5,000 resamples was used.

The model indicated that 40.2% of the attitude variance was explained by guilt and anticipated pride, while intention had 55.1% of its variance explained by attitude, and waste reduction behavior had 26.4% of its variation explained by behavioral intention. These values indicate that the predictive power of the variables is moderate (Hair et al., 2019).

The relevance of the predictive constructs was analyzed using effect size ( $f^2$ ), while the adjusted model accuracy was evaluated using the  $Q^2$  index (Hair et al., 2019). Guilt had a small effect size ( $f^2 = 0.050$ ), and anticipated pride had a medium effect ( $f^2 = 0.213$ ) in relation to attitude. Therefore, anticipated pride in this study is the variable with greatest effect on attitude. In turn, attitude had a large effect on waste reduction intention ( $f^2 = 0.900$ ). Similarly, intention had a large effect size in relation to household food waste reduction behavior ( $f^2 = 0.358$ ).

**Table 4.** Structural model results

	VIF	$\beta$	S.E.	t-value	p-value	$f^2$	$R^2$
<b>Direct effect</b>							
H1. Guilt → Attitude	1.700	0.225	0.049	4.593	0.001	0.050	0.402
H2. Anticipated pride → Attitude	1.700	0.466	0.058	7.988	0.001	0.213	
H3. Attitude → Intention	1.000	0.742	0.034	21.789	0.001	0.900	0.551
H4. Intention → Waste reduction behavior	1.000	0.513	0.048	10.758	0.001	0.358	0.264
<b>Indirect effect</b>							
Guilt → Attitude → Intention		0.167	0.038	4.423	0.001		
Guilt → Attitude → Intention Waste reduction behavior		0.086	0.022	3.861	0.001		
Anticipated pride → Attitude → Intention		0.346	0.054	6.418	0.001		
Anticipated pride → Attitude Intention → Waste reduction behavior		0.177	0.034	5.248	0.001		
Attitude → Intention → Waste reduction behavior		0.381	0.042	9.121	0.001		

In analyzing the values obtained for  $Q^2$ , it was found that all latent variables had medium predictive accuracy, since the verified indices are above 0.25 (Hair et al., 2019). The SRMR indicator was also calculated to assess model fit. The value obtained (0.08) met the threshold proposed by the literature, suggesting good model fit.

Given the path coefficient ( $\beta$ ) and the p-value found for the proposed relations, all hypotheses were found to be supported. The results showed that guilt had a positive and direct effect on attitude ( $0.225$ ;  $p = 0.001$ ), providing statistical support for H1. In addition, guilt was found to have indirect and significant effects on intention ( $\beta = 0.167$ ;  $p = 0.001$ ) and on waste reduction behavior ( $\beta = 0.086$ ;  $p = 0.001$ ).

Anticipated pride had a positive and significant effect on attitude ( $\beta = 0.466$ ;  $p = 0.001$ , supporting H2), and pride was also observed to indirectly impact intention ( $\beta = 0.346$ ;  $p = 0.001$ ) and waste reduction behavior ( $\beta = 0.177$ ;  $p = 0.001$ ).

Attitude positively and directly impacted food waste reduction intention ( $\beta = 0.742$ ;  $p = 0.001$  H3, supporting H3) and indirectly impacted waste reduction behavior ( $\beta = 0.381$ ;  $p = 0.001$ ). At the same time, H4 was supported, indicating that intention has a positive impact on household food waste reduction behavior ( $\beta = 0.513$ ;  $p = 0.001$ ).

## Multigroup Analysis

Psychological distance was considered as a moderating variable, impacting the relationship between intention and waste reduction behavior (H5). Before evaluating the proposed effect, a Mann-Whitney test was performed to compare the medians of the constructs “Intention” and “Behavior” for the groups of consumers who view food waste as psychologically close (near them) and distant (waste has no closeness to their life).

The results indicated that consumers who viewed food waste and its consequences as distant had, for the intention variable, a median of 5.567 (SD = 0.993), while the median for individuals who perceive food disposal effects as close to them was 5.919 (SD = 1.025). This difference was statistically significant ( $W = 5338.500$ ;  $p < 0.050$ ).

Regarding waste reduction behavior, people who reported perceiving food waste as distant obtained a median of 5.286 (SD = 1.698); on the other hand, consumers who perceive waste and its effects as something close to them had a median of 6.032 (SD = 1.125). As in the previous variable, this difference was considered statistically significant ( $W = 5016,00$ ;  $p < 0,001$ ).

Considering constructs’ significant differences for the two groups investigated, multigroup analysis (MGA) was performed to assess the moderating effect of psychological distance (Table 5).

**Table 5.** Multigroup comparison

Relation	Close		Distant		PLS-MGA	
	$\beta$	p-value	$\beta$	p-value	Diff. $\beta$	p-value
Intention → Behavior x (Psychological distance)	0.713	0.001	0.430	0.001	0.283	0.001

The result of PLS-MGA indicates that the difference between the two psychological distance categories is significant ( $p$ -value 0.001), and the relationship between intention and waste reduction behavior in this study is more evident for the group of consumers who perceive waste impacts as closer to them ( $\beta = 0.713$ ). This result supports H4 and confirms psychological distance’s moderating effect on the relationship between intention and waste reduction behavior.

## DISCUSSION

Consumers who feel more guilty about food waste were shown to have more favorable attitudes toward actions to mitigate food disposal in domestic environments. Moreover, guilt has indirect effects on both waste reduction intention and behavior, which corroborates previous studies (Attiq et al., 2021; Quested et al., 2013; Soorani & Ahmadvand, 2019).

It can be assumed that when consumers observe their contribution to increasing food waste, it becomes a concern that can trigger feelings of guilt. Therefore, in order to correct

their problematic behaviors and reduce negative emotions, individuals seek to adopt anti-waste behaviors (Soorani & Ahmadvand, 2019). This confirms that awakening negative emotions related to waste can prompt favorable attitudes and increase sustainable behavior intention and performance (Jabeen et al., 2023).

The second emotion investigated, i.e., anticipated pride, directly impacted attitude, while indirectly impacting food waste reduction intentions and behavior. Similar results concerning the effects of pride on anti-waste intentions and behaviors had already been observed by Kim and Hall (2019) and Talwar et al. (2022). The impact of pride on behavioral attitude was also noted by Jabeen et al. (2023), and the authors found that this effect does not extend to waste reduction intentions and behaviors, which counters the results presented.

Pride is commonly examined as a direct determinant of waste reduction intention and behaviors. However, in this study, as the importance of individuals' interpretation and judgment regarding the actions necessary to perform any type of behavior (Ajzen, 1991) is recognized, the proposition that there is an alternative way of understanding how pride affects adequate food management is confirmed.

The measures used by this study show that anticipated pride can indirectly impact, mediated by attitude, how people perform behaviors of reducing excessive food purchase and reusing food leftovers. In previous research, the influence of pride on these food waste reduction behaviors cannot be confirmed (Talwar et al., 2022). Thus, analyzing the direct relationship between anticipated pride and attitude can help overcome the inconsistency of results.

The results found in this study indicate that the investigated emotions provide opportunities for developing favorable attitudes toward reducing household food waste. In analyzing the values found for effect size and  $\beta$  coefficient, it is observed that anticipated pride concerns the emotion with greatest impact on attitude. Thus, although new studies analyzing the role of emotions are strongly encouraged, social marketing campaigns for triggering anti-waste behaviors should include messages that stimulate positive emotions.

As proposed, attitude positively impacted food waste reduction intention (H3), which in turn directly influenced household food waste reduction behavior (H4). These findings are similar to those of Graham-Rowe et al. (2015) and Soorani and Ahmadvand (2019).

This study contributes to the literature by proposing and proving the moderating effect of psychological distance on the relationship between both household food waste reduction intention and behavior (H4). This suggests that when consumers observe food waste as a result of their daily actions and that the effects caused by this phenomenon can impact their lives, these people then give more importance and attention to the cause, which can result in changing intentions and behaviors.

Therefore, as psychological distance decreases, people's concern about waste should increase. Accordingly, Hatab et al. (2022) discuss that consumers who report a greater psychological distance to food waste are about three times more likely to waste than those who present low psychological distance. This means that people who see waste in a more abstract way are less motivated to change their future behaviors and less likely to adopt actions that minimize or prevent household food waste (Hatab et al., 2022).

Thus, if the effect of intention on behavior is more evident as consumers perceive the impacts of waste as psychologically closer to them, then it can be considered that psychological distance should be worked on as a key element of behavioral interventions aimed at reducing food waste.

This is particularly true in considering that when food waste is discussed in the context of everyday life, many consumers do not see it as a real problem in their lives and end up trivializing its consequences (Geffen et al., 2020). Reducing psychological distance can be an important measure so that individuals can understand their important role in reducing food disposal and, above all, understand how personal elements of their lives are impacted by waste and its effects.

## CONCLUSION

### Theoretical and practical implications

This research presents three main implications for the literature. Initially, by simultaneously analyzing the role of positive and negative emotions of consumers, it offers a more comprehensive analysis of household food waste reduction behavior. While previous research focused mostly on analyzing emotions individually, this study broadens the debate undertaken by authors such as Jabeen et al. (2023), indicating that analyzing the joint effect of positive and negative emotions allows a better understanding of how emotional aspects shape people's choices. Examining the impacts of guilt and pride concomitantly allowed us to identify that positive emotions tend to present more assertive effects for waste reduction.

Secondly, the study helps to understand household food waste in developing countries by analyzing a population rarely explored in previous research. Most of the literature on household food waste comes from European and developed countries (Chia et al., 2023; Jabeen et al., 2023). The applicability of the conclusions and strategies proposed in these studies may not be appropriate for other regions with different cultures and realities (Chia et al., 2023), thus requiring research to elucidate the food waste determinants specific to each nationality (Attiq et al., 2021; Chia et al., 2023).

This study's findings may indicate some specific factors for waste reduction in Brazil, thus presenting opportunities for developing specific and appropriate actions to be implemented in the country. The importance of emotional aspects when determining more sustainable behaviors underscores the necessity for anti-waste behavioral interventions to trigger emotions, particularly positive ones.

Finally, this research offers interesting information for better understanding the intention-behavior gap. When identifying the moderating effect of psychological distance on the intention-behavior relationship, it is observed that the failure to turn attitudes and intentions

into real anti-waste behaviors can be partly explained by how individuals view and evaluate food waste.

The results obtained allow inferring that consumers are more likely to engage in sustainable practices when they perceive waste as a problem that can bring direct consequences for themselves. Therefore, psychological distance can be worked on in interventions as a reinforcement to encourage consumers to perform food waste reduction behaviors.

From the theoretical contributions listed, the following practical implications are pointed out:

1. Since guilt and pride directly impact food waste reduction attitude, and indirectly impact food waste reduction intention and behavior, it is suggested that social marketing campaigns with emotional appeal be designed and disseminated across different media. Interventions aimed at increasing negative emotions are effective for individuals who do not yet possess strategies to change their inappropriate behavior, while techniques that expand positive emotions are effective for individuals who already have knowledge and are implementing behavior changes (Geffen et al., 2020). Educational campaigns combining positive and negative emotions in their approach can be assertive when consumers' motivational stage is unknown.
2. Pride was the most active emotion in determining waste reduction attitude, intention, and behavior. Thus, knowing that positive emotions are more effective to motivate the implementation of goals for discontinuing waste (Geffen et al., 2020), awareness interventions for people with some sustainable knowledge should foster positive emotions. Materials that emphasize the pro-social aspects and benefits of waste reduction and create an atmosphere of positive emotions should be employed. An example of this are posters that indicate consumers' importance in solving this problem and use expressions/sentences that evoke positive feelings.
3. Psychological distance was found to be a potential barrier to people's involvement in waste-related issues. Therefore, public managers and other stakeholders should be constantly seeking to increase people's awareness of the effects of waste. Individuals with limited or no knowledge may perceive waste as psychologically distant from them, which could hinder their engagement in sustainable actions. Therefore, behavioral interventions should seek to increase environmental education and proximity between consumers and food waste. This can be achieved by raising awareness about the impacts of people's daily actions on the total volume of wasted food, and by presenting local data and the consequences of waste in areas close to consumers.
4. It is also important to consider that, while a perception of closer risks is assumed to imply greater personal relevance, this assumption only applies when it affects special aspects of individuals' lives (Brügger, 2020). Specifically, the author indicates that consumers



will not change their behaviors unless they view environmental/social problems as risks to their own health and interests and to people close to them. This means that interventions aimed at reducing psychological distance need to focus on the personal elements impacted by waste and its effects. For example, social marketing campaigns should focus on awareness of the financial losses, health problems, and infrastructure problems involved in household food waste.

## Limitations and future studies

Although the goal of this study has been achieved, some limitations were found. Initially, we highlight the dependence on self-reported data about food waste, which can lead to biases of socially expected responses by participants. Thus, other studies should use different ways of measuring household food waste behaviors. Food diaries and waste weighing, among other forms of auditing, are examples of useful tools to more accurately measure the amount of food wasted in domestic environments.

Although this study verified a possible emotional path to understand household food waste reduction, only two emotions were investigated. Further research should employ a larger group of emotions and personal characteristics of consumers to understand how emotional aspects can be determinant in reducing waste. Variables such as fear, empathy, and social identity are examples of elements that still need to be investigated.

In this study, the proposed relationships provided valuable information for developing behavioral interventions. However, the real impacts of emotionally appealing messages and social marketing campaigns aimed at bringing individuals psychologically closer to food waste were not tested. For this reason, future studies should examine how messages with emotional content that seek to reduce psychological distance can influence consumers' behavioral change. These investigations may consider message recipients' characteristics, analyze the long-term effects of different types of content, and improve how messages with a behavioral impact can reduce waste.

Finally, it is necessary to consider that this study measured psychological distance by a single item, which did not allow examining this construct's convergent validity and reliability. Future research can use multiple items to measure psychological distance, allowing new assessments of this variable's effects on food waste.

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## **CONFLICTS OF INTEREST**

The author have no conflicts of interest to declare.

## **AUTHOR'S CONTRIBUTION**

Mikaela Daiane Prestes Floriano: Conceptualization, data curation, formal analysis; Methodology; Software; Validation; Visualization; Writing – original draft; Writing – review and editing.