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Using Self- and Direct Persuasion to Reduce Food Waste: Consumer Food Waste and Values

A thesis

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Jasmine Lee Nel



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Abstract

With a growing population and an increase in food waste, research is needed to examine consumer behaviour and the effectiveness of marketing strategies to reduce household food waste. I examined the effectiveness of persuasion on participants' intentions to reduce their food waste, controlling for the influence of environmental values. Based on the sample of food waste from 481 United States MTurk participants, I experimentally manipulated message framing using self-persuasion ($n = 181$), direct persuasion ($n = 150$), and no persuasion ($n = 150$). With the results showing ceiling effects across conditions, I was unable to confirm the effectiveness of self-persuasion ($M = 96.42$), direct persuasion ($M = 96.12$), or no persuasion ($M = 96.18$) on intentions to reduce food waste. Further analysis revealed that self-persuasion significantly and positively predicted the intent to reduce food waste for participants who reported strongly endorsing self-transcendence (altruistic and biospheric) values, but not for those who endorsed self-enhancement (egoistic) values. Direct persuasion significantly and negatively predicted intentions to reduce food waste for participants who reported strongly endorsing self-enhancement values. My study contributes towards sustainable marketing research. The results provide marketers with information about adapting marketing approaches to suit the behavioural preferences of consumers. In addressing the limitations of this research, I advised that future researchers follow the recommendations in this study to contribute to achieving sustainable behaviour change.

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Using Self- and Direct Persuasion to Reduce Food Waste Intentions: Consumer Food Waste and Values

Food is an essential part of life. Not only does food supply energy and nutrients, but it is also highly symbolic of love, security, stress reduction, pleasure, and power (Schneeman & Oria, 2020). Although these ideas stress the importance of food, people contribute to an ever-increasing rate of food waste (Schneeman & Oria, 2020). Globally, nearly 1.3 billion tons of edible food are lost or wasted yearly (Ahmed et al., 2021). Some people accuse the food industry of overproducing food and assume they are the leading cause of food waste (Ahmed et al., 2021). However, consumer households contribute the highest proportion of food waste (Bell & Ulhas, 2020; Boulet et al., 2021; Buzby et al., 2014). The large amount of food waste produced by consumers makes it essential to diminish food waste behaviours to elevate environmental, economic, and social impacts (Ahmed et al., 2021; Buzby et al., 2014). However, researchers have found it challenging to establish interventions that reduce food waste behaviour (Ahmed et al., 2021; Buzby et al., 2014; Schneeman & Oria, 2020). Like all human behaviours, behaviours related to food waste are complex and diverse (Davison et al., 2020). Food choice and eating behaviours often develop from childhood and are strongly tied to social norms and cultural traditions (Schneeman & Oria, 2020). For example, eating behaviours are shaped by social consequences that accept and reinforce behaviours that commonly contribute to wasteful behaviours (Coleman 1988; de Groot et al., 2021). Therefore, it is necessary to understand the variables that encourage pro-environmental behaviours and discourage food waste amongst households

Self-persuasion and direct-persuasion techniques commonly used in marketing have shown promising insight into interventions that encourage pro-environmental behaviours. However, persuasion interventions are still largely under-researched despite their promising potential for reducing consumer food waste behaviour. As such, in my research, I have

investigated the association between intent to reduce food waste and environmental values under persuasion conditions.

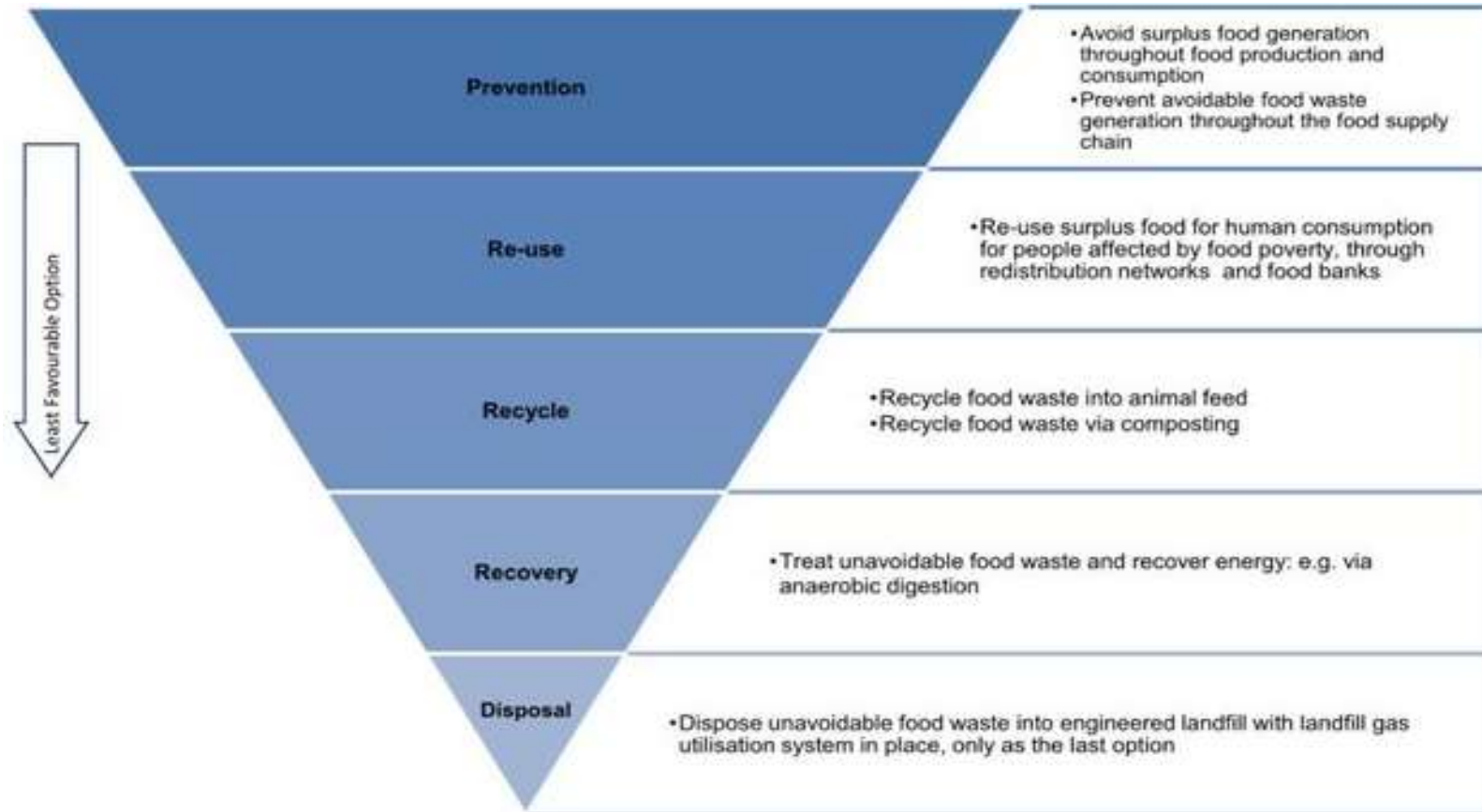
Measures and directives of household food waste

Quantitative data on food waste serve as a baseline for informing food industries and policymakers of future goals and policies that minimise food-waste behaviour (Ammann et al., 2021). Therefore, an insight into the quantity of food consumers waste is essential when attempting to understand the effectiveness of persuasion strategies on consumers due to the potential variation in reported food waste quantities. Self-report methods are a cost-effective and time-saving way to measure food waste as they simply ask participants to report how much food they have wasted in a given period (Ammann et al., 2021). However, this method assumes that people can recall how much their household has wasted (Ammann et al., 2021). Although self-report measures have slight underreporting of food waste amounts, Ammann et al. (2021) found that overall underestimations only differ by 20% compared to more demanding and time-consuming measures such as food waste diaries and rubbish checks. Importantly, Ammann et al. (2021) found high correlations between self-reported measures and challenging and time-consuming measures. Overall, self-report measures are a reliable measure that will likely serve as a valid baseline for assessing the quantity of food waste (Ammann et al., 2021).

In addition to understanding food waste quantities, appropriate waste management is vital for sustainable development (Aschemann-Witzel et al., 2015). More specifically, it is unrealistic to assume that food waste will cease to exist and that everyone will immediately stop wasting food; however, food waste will have a lessened environmental impact if disposed of sustainably. The Food Waste Hierarchy (Figure 1) provides structured guidance of food waste stages (Aschemann-Witzel et al., 2015). This hierarchy guides legislation and policy to prioritise food waste prevention and management (Giordano et al., 2020). Shaped

like a pyramid, the Food Waste Hierarchy begins with prevention as the most preferred option and ends with landfill disposal as the last and least preferred option (Giordano et al., 2020). The Food Waste Hierarchy reflects similar goals set by the United Nation's Goal 12.5 of "Substantially reduce waste generation through prevention, reduction, recycling, and reuse by 2030" (United Nations, n.d., p. 3).

In Figure 1, *re-use*, *recycle*, and *recover* are sequentially placed, starting from the most- to the least-desirable options (Giordano et al., 2020). More specifically, people *re-use* when they dispose of their food by giving it to people affected by food poverty (Giordano et al., 2020). People *recycle* when they dispose of their food waste by recycling it into animal feed or compost (Giordano et al., 2020). *Recover* occurs when people dispose of food waste into food-waste-specific trashcans (Giordano et al., 2020). Finally, *disposal* occurs when people dispose of food into a general trashcan that then finds its way to landfills (Giordano et al., 2020). *Disposal* is the last and the least preferred option of food waste management (Giordano et al., 2020). Overall, the hierarchy presents information about the disposal methods consumers commonly use, which gives researchers an understanding of pre-existing sustainable behaviours and a possible effect size of interventions needed for sustainable behaviour change.

Figure 1*The Food Waste Hierarchy*

Note. The Food Waste Hierarchy is a graphical representation of food waste and surplus prevention and management. Adapted from European Parliament Council, 2008, by Papargyropoulou, et al., 2014. In the public domain.

Social, economic, and environmental impacts of food waste amongst United States consumers

With a growing population and an increasing demand for food, current trends show that by the year 2050, there will be a 70% increase in global food production (Hickey & Ozbay, 2014). This increase cannot be maintained, and many people will not afford the associated increase in food prices (Hickey & Ozbay, 2014). Statistically, the United States consumes the most calories per person, making them the Organisation for Economic Co-operation and Development's (OECD's) most obese country, with approximately US\$166 billion of edible food going to waste per year (Hickey & Ozbay, 2014; OECD, 2017). Fruit and vegetables are the most wasted food products followed by fish and poultry and dairy products (Hickey & Ozbay, 2014). Overall, when consumers waste edible food, the resources used to grow, harvest, and transport the food go to waste (Hickey & Ozbay, 2014). These factors, amongst others, contribute to negative consequences that impact the environment, which then contributes to worsened social and economic outcomes.

Environmental impact of food waste and persuasive techniques

When edible food is disposed of, finding its way to landfills, it breaks down into a methane gas which has 28 times the warming potential of carbon dioxide (Ahmed et al., 2021). These methane gas emissions contribute to global warming. Gas from food dumps currently accounts for 7% of greenhouse gas emissions worldwide (Seberini, 2020). In addition to food dumps, food delivery over long distances and the eventual disposal of food has contributed to fuel consumption that emits large amounts of exhaust emissions (Hickey & Ozbay, 2014). Globally, the United States contribute 34% of human-related methane emissions and nearly 4% of the annual fuel consumption (Hickey & Ozbay, 2014).

Furthermore, within the United States, approximately one-fourth per year (a 50% increase in the past three decades) of freshwater is lost during the irrigation process of growing food (Hickey & Ozbay, 2014). Therefore, it is evident that the United States' production and mismanagement of food and food waste contribute to growing environmental consequences (Hickey & Ozbay, 2014). If food waste persists, the probability of reaching a global tipping point will increase, which will risk the collapse of all conditions necessary for human life (Windsor, 2018). Furthermore, food production will likely increase without sustainable strategies (Seberini, 2020). As the intent to reduce food waste is a strong predictor of household food waste, strategies that encourage sustainable intentions by reinforcing preferences not to waste food will likely contribute towards sustainable behaviour engagement (Aschemann-Witzel et al., 2015; Visschers et al., 2016). Moreover, persuasive techniques are valid interventions for encouraging behaviour change (Comber & Thieme, 2012). Persuasive techniques often provide individuals with knowledge of their behaviour and its impact on the environment. This knowledge can encourage intent to engage in sustainable action (Comber & Thieme, 2012; Mohiuddin et al., 2018).

Economic impact of food waste and persuasive techniques

Consumer preferences play a major role in food production and waste (Seberini, 2020). The complexity and interwoven ties within the economic system means that resources used to produce food depend not only on technology but on the national consumption level that the population controls (Seberini, 2020). Consequently, food waste affects pricing policies in developed countries like the United States. Large amounts of food waste increase demand, leading to an increase in cost (Seberini, 2020). An increase in food prices puts individuals earning minimum wage at risk. Currently, there is a global economic value of US\$1000 billion per year of food waste (Seberini, 2020). Changes in economic systems often correspond with behaviour change (Vykopalova, 2014). For example, negative economic

changes such as the limited availability of natural resources can reduce wage growth (di Crosta et al., 2021). This reduction of wage growth forces the consumer to adapt their behaviour to their current environment (di Crosta et al., 2021).

Large initiatives such as campaigns and changes to federal laws are required to reduce food waste amongst 119 million United States households and the country's growing economy (Buzby et al., 2014). Currently, major campaigns used to raise public awareness are the United States Food Waste Challenge and the United Nations Sustainable Development Goal 12.5 (Buzby et al., 2014; Seberini, 2020). As research on food waste expands, persuasive strategies used in marketing approaches will likely provide competitive, sustainable marketing advantages for food-producing companies while reducing consumer food waste behaviour (Chamberlin & Boks, 2018; Hickey & Ozbay, 2014). However, more research is required to understand consumers and the influence of persuasive marketing strategies to inform food waste campaigns (Buzby et al., 2014).

Social impact of food waste and persuasive techniques

There is enough food produced to feed the world, yet billions of people suffer from hunger and malnutrition. Even though the United States is a developed country, people from socially and economically disadvantaged groups often lack the opportunity to purchase quality food or, in some cases, lack the money to purchase any food at all (Seberini, 2020). To make matters worse, many developed countries, like the United States, dispose of tons of edible food that can theoretically feed starving individuals in developing countries. In the United States, per capita, food waste and loss have increased by 50% since 1974 (Kim & Lee, 2020). However, in 2019, one out of 10 United States households, many with children, were considered food insecure; these people did not have enough access to food for healthy living standards (Bowen et al., 2021). Overall, negative economic impacts of food waste contribute

to poverty, deprivation, and unemployment, increasing the probability of negative social phenomena such as crime-related behaviours and homelessness (Vykopalova, 2014).

Furthermore, social variables can influence food waste behaviour. For example, social contexts such as eating with others and culturally shared understandings of hospitality contribute to food surplus (Russell et al., 2017). Conversely, food surpluses contribute to food waste influenced by poor planning routines and social relationships (e.g., cultural habits of purchasing excessive food quantities; Russell et al., 2017). Researchers who have applied persuasion techniques have shown their practical utility in facilitating social behavioural change that promotes pro-environmental behaviour (Jackson, 2005; Vaughan-Johnston et al., 2020). For example, persuasion has encouraged people to adopt a desired social agenda due to perceived social approval (Vaughan-Johnston et al., 2020). Thus, marketing research using compelling message framing as persuasion will likely encourage people to engage in environmentally friendly behaviour due to the perceived reward of social acceptance (Kinzig et al., 2013; Sutinen & Närvänen, 2021).

Factors that contribute to consumer food waste

The United States Department of Agriculture (USDA) defines food waste as a component of "food loss", which "occurs when an edible item goes unconsumed" (Buzby et al., 2014, p. 1). Buzby et al. (2014) argue that there are three primary reasons for studying food waste. Firstly, when edible food has gone to waste, a significant amount of money and resources used in food production does not meet the expected objective of feeding people. Researchers may provide insight into why people engage in wasteful behaviours and the possible effects of these behaviours. Secondly, transactional costs of resources used in food production and disposal are not calculated into marketing prices (e.g., cost of foods; Buzby et al., 2014). In turn, land and water use will put pressure on the availability of fresh water and other natural resources essential for biodiversity (Buzby et al., 2014). Therefore, researchers

need to understand how to reduce current and future food waste behaviours. Thirdly, more food is required to feed the growing population (Buzby et al., 2014). Therefore, research is essential to understand the effectiveness of strategies to reduce food waste with the intended purpose to increase food availability and lowering the cost of food.

Researchers addressing consumer food-waste behaviour have found that consumers base food edibility on visual appeals (Buzby et al., 2014; Zeigler & Floros, 2011). These visual appeals include spillage, bruising, unsatisfactory storage, and abrasions (Buzby et al., 2014; Zeigler & Floros, 2011). The biological ageing of fruit also plays a part in food waste. As such, consumers scarcely consume food with the sprouting of tubers and grains (Buzby et al., 2014; Zeigler & Floros, 2011). Retail "best-before" and "use-by" dates cause confusion which has resulted in the discarding of food while it is still safe to eat (Buzby et al., 2014; Parfitt et al., 2010). Some consumers also lack knowledge about appropriate portion sizes and preparation (Buzby et al., 2009). For example, an individual may purchase a mango but not understand when it is ripe, how to prepare it or use it as an ingredient, resulting in the discarding of the mango (Buzby et al., 2014). Consumers also have high cosmetic standards of food, leading to food waste (Buzby et al., 2014). Seasonal factors also seem to influence food waste; for example, people waste more food in summer (Buzby et al., 2014; Gallo, 1980). Sociodemographic variables have also shown associations with household food waste. For example, household size and households with children under 18 have shown to waste more food (Neff et al., 2015; Visschers et al., 2016). However, these results vary across studies, with some reporting a significant association between household size and having children under 18 while others report no significant association (Neff et al., 2015; Visschers et al., 2016). Overall, food waste is not the cause of a single behaviour but rather a combination of multiple behaviours that increase the probability of food going to waste (Aktas et al., 2018). By understanding the factors associated with food waste behaviour,

research will aid policymakers by recommending behavioural interventions that are likely to reduce household food waste (Aktas et al., 2018). With many researchers exploring why consumers waste food, few studies have assessed the effectiveness of food-waste interventions, particularly persuasive marketing strategies. Therefore, I took a solution-based approach to examine food-waste reduction intentions amongst consumers through direct and self-persuasion strategies. My approach aims to examine consumer sustainability engagement whereby individuals intend to reduce their food waste.

A Behavioural Approach to Persuasion Interventions

Much research on pro-environmental behaviour has cited issues regarding the relationship between attitude and behaviour engagement, commonly known as the attitude-behaviour gap (Jung et al., 2020; Vermeir & Verbeke, 2006;). For example, people may say they are worried about how their food waste impacts the environment (attitude); however, they do not act in ways that mitigate their food waste (behaviour). To address this issue, researchers have focused on attitudinal change as a cognitive construct (Funkhouser & Parker, 1999). This trend is also seen with studies using persuasion interventions to change behaviour. When persuasion interventions have effectively elicited behavioural change, the changes are often attributed to an attitudinal change that neglects to acknowledge that ‘attitudes’ are verbal behaviours that are shaped by an individual’s social-verbal community (Funkhouser & Parker, 1999; Schauss et al., 1997). More specifically, the expression of an individual’s attitudes is either reinforced or punished by their social-verbal community (Funkhouser & Parker, 1999; Schauss et al., 1997). For example, people may verbally express concern about the environment, as it is consistent with social-verbal statements of others and agreeing with others has been reinforced in the past; however, acting in ways to reduce environmental impacts depends on the social consequences that then reinforce their behaviour. This concept is related to the basic theories proposed by Skinner’s concept of

operant conditioning (Skinner, 1938). More specifically, providing positive feedback for pro-environmental behaviour will reinforce future sustainable behaviour.

Direct Persuasion

With research on consumer food waste expanding, marketing campaigns have started focusing on message framing to encourage consumers to use meal leftovers, food diaries, shopping lists, and meal preparations to reduce household food waste (Ammann et al., 2021; Visschers et al., 2016). However, for marketing messages to be effective, information needs to be communicated in a way that encourages people to attend to a specific idea that then becomes prioritised (Pelletier & Sharp, 2008). For an idea to become prioritised, marketing has commonly utilised persuasion techniques (Pelletier & Sharp, 2008). Ahmed et al. (2021) showed the effectiveness of persuasion interventions in eliciting behavioural and attitude changes across different domains. For example, previous research applying persuasion techniques has effectively encouraged physical activity, promoted COVID-19 social isolation (Drażkowsk et al., 2020), reduced cigarette and alcohol consumption (Loman et al., 2018), and advocated for sustainable behaviour (Li et al., 2020). The more traditional approach of direct persuasion involves directly communicating with a target audience to encourage them to engage in a particular behaviour (Aronson, 1999; Li et al., 2020). Direct persuasion attempts provide individuals with arguments or merely request that individuals change their behaviour (Bernritter et al., 2017). For example, a direct persuasion attempt might communicate that food waste is a bad idea because it sets a bad example for children. In some cases, direct persuasion messages have predicted behaviour change, however, direct persuasion attempts have limitations (Baum, 1994; Xiang et al., 2019). Direct persuasion can provoke reactance due to a perceived threat to personal freedom and autonomy (Fransen et al., 2015). This threat can increase the likelihood of people engaging in the opposite of the intended behaviour, otherwise known as a "boomerang effect" (Fransen et al., 2015, p. 5).

Researchers argue that reactance is possible even when persuasive messages align with personal ‘values’ but is especially prominent when the message opposes the ‘values’ (Bard & Goodwin, 2011; Fransen et al., 2015). Generally, direct persuasion attempts may provide verbal statements that are inconsistent with behaviour change sought by the individual (Schauss et al., 1997).

Marketing strategies often aim to persuade consumers to buy a product, which is hardly a life-changing behaviour (Saegert, 2004). However, environmentally driven behaviour usually requires more effort than merely purchasing a product, which may require stronger contingencies for behaviour engagement. With an increase in the effort need for sustainable behaviour change, individuals frequently produce self-generated arguments that focus on the difficulty or impossibility of performing pro-environmental behaviours (Poskus, 2016). For example, people are less likely to recycle if it requires more effort than simply discarding items into a general waste bin. As such, marketing strategies designed to encourage long-term behaviour change usually require that the individual transition from other-generated information (e.g., communicated by marketers) to self-generated information that is consistent with the message framing of marketers (Bernritter et al., 2017; Saegert, 2004). In society, individuals are taught to use self-descriptive verbal statements to explain their overt behaviour. These explanations suggest that individuals have a “self-awareness” (Bem, 1968, p. 199) of their values. However, as direct persuasion attempts are primarily other-directed and not self-directed, they often create further separation between behaviour engagement and the individual’s values (Saegert, 2004). Overall, direct persuasion attempts have seldom led to long-term behaviour changes (Drażkowski et al., 2020; Saegert, 2004).

However, direct attempts have predicted behaviour engagement with some individuals. Li et al. (2020) found that direct attempts were more effective in predicting change in eating intentions for individuals with collectivistic cultural backgrounds than

individualistic cultural backgrounds. To distinguish these two cultural backgrounds, collectivistic cultures have learned to prioritise group harmony (Baum, 1994; Xiang et al., 2019). As a result, people from collectivist cultures will often behave in ways that are consistent with the social expectations of maximising group goals (Baum, 1994; Xiang et al., 2019). On the other hand, people from individualistic cultures have learned to value independence, uniqueness, and personal autonomy, where personal goals are prioritised over group goals (Xiang et al., 2019). Direct attempts have been more effective in predicting behaviour change for individuals who reportedly endorse collectivistic values as they often prioritise adapting their behaviour to meet normative and social expectations of their social group (Li et al., 2020). However, as United States consumers are culturally diverse, it is expected that United States participants will report endorsing either collectivistic or individualistic values. Consequently, individuals within the United States of America who hold collectivistic values may be more likely to reduce their food waste if directly persuaded to do so.

Furthermore, research by Neff et al. (2015, p. 7) with United States participants suggested that the persuasive messages of "setting an example for children" and "saving money" are top motivators for reducing food waste. These motivators emphasize collectively driven goals and ultimately increase intent to reduce food waste if directly communicated. To my knowledge, researchers have not used these motivators as direct persuasion attempts to manipulate food waste intentions. However, much research continues to argue for the effectiveness of self-persuasion attempts (Aronson, 1999; Bernritter et al., 2017; Lemmen et al., 2020; Li et al., 2020; Saegert, 2004).

Self-Persuasion

Saegert (2004) claims that for persuasion attempts to be self-directed, individuals usually require a transition from an other-directed state to a self-directed state. Saegert (2004)

suggests that this transition usually requires self-persuasion. Self-persuasion techniques allow individuals to generate their own argument towards a desired behaviour or attitude. For example, self-persuasion techniques might ask individuals to provide reasons for purchasing a sustainable product. By asking individuals to generate their own argument for an alternative behaviour, the participant is likely to influence themselves to engage in an alternative behaviour that is consistent with their verbal behaviour (Schauss et al., 1997). Moreover, once the individual responds by behaving in ways consistent with their verbal statements, the strength of the response becomes dependent on the consequences that reinforce the behaviour. In this sense, self-persuasion statements may encourage individuals to adjust their behaviour to statements that offer greatest reward and avoids the greater losses (Fernandes, 2020). Furthermore, Bernritter et al. (2017) argue that self-generated information is viewed as more trustworthy, reliable, and convincing than the information given by a third party. In addition, self-persuasion techniques have produced longer-lasting changes in attitudes and behaviour than direct persuasion or no persuasion at all (Aronson, 1999; Lemmen et al., 2020; Li et al., 2020). Since pro-environmental practices need to occur regularly to benefit the environment, the long-lasting changes in behaviour and attitude produced by self-persuasion may offer relevant interventions to increase willingness to reduce food waste (Li et al., 2020).

Overall, self-generated arguments tend to be more consistent with reportedly endorsed values which means the individual is more likely to engage in the behaviour (Catapano et al., 2019). However, when examining the influence of values on persuasion interventions, self-persuasion attempts have been shown to effectively change behaviour for individuals with individualistic cultural backgrounds (Li et al., 2020). Consequently, asking individuals who prioritise individualistic values why they should reduce their waste might be more likely to lead to increased intent to reduce food waste than simply providing the arguments. However,

it is uncertain if persuasion techniques will effectively increase intent to reduce food waste. Furthermore, insufficient research clarifies whether self-persuasion is more effective in reducing food waste intent than direct persuasion.

Environmental Value Orientations

Researchers attempting to understand and promote pro-environmental behaviour have examined the relationship between values and decision-making values on a person's decision making. Schwartz (1994) highlighted environmental value priorities as drivers of "desirable, trans-situational goals, varying in importance, that serve as guiding principles in people's lives" (p. 21). Similar to the behavioural concepts of attitudes, people tend to behave in ways that are consistent with the social-verbal behaviour of their community. However, over time and through evolving patterns of activities, a predominant social-verbal reinforcer becomes fundamental to one's behavioural pattern, this forms one's "values". Furthermore, arguments made by Baum (1994) suggest that values become preferences. Specifically, when individuals talk about their "values", they are describing how they are likely to behave in certain situations. Values are, therefore, category labels for a variety of behaviours that a person is likely to engage in. For example, a person who says that they value their family is more likely to visit their parents, support their siblings, host family events, etc.

Researchers (e.g., Cho, 2013; Ali et al., 2021; Marshall et al., 2019) have investigated whether there is a relationship between environmental values and consumer behaviour when manipulated by message framing. Participants who reportedly endorse individualistic and collectivistic values have been widely studied, these single bipolar traits have revealed few differences amongst individuals (Becker et al., 2014). As a result, researchers have emphasised the distinction between those who reportedly endorse self-transcendence and self-enhancement values due to their extensive validity and broader and more theoretical differences shown across cultures (Ali et al., 2021; Cho, 2013; Marshall et al., 2019).

The term self-transcendence reflects the degree to which a person reportedly values others' interests and welfare over their interests and welfare. In contrast, the term self-enhancement reflects the degree to which a person reportedly values their own interests and welfare over those of the people around them. Within these values, there are three primary value orientations commonly discussed within the environmental psychology domain: altruistic, biospheric, and egoistic (Steg & de Groot, 2012). People who report endorsing altruistic values arguably behave in a manner that often maximises the welfare of other human beings, such as pro-social behaviour (Sargisson et al., 2020; Sigurðardóttir, 2017). People who report endorsing biospheric values should behave in a manner that maximises the interests of non-human needs and the biosphere (Sargisson et al., 2020). Finally, people who report endorsing egoistic values ought to behave in a manner that maximises personal outcomes, which may take the form of self-interested behaviour (Han & Lee, 2016; Sargisson et al., 2020). People who reportedly endorse altruistic and biospheric values likely behave in ways that are consistent with the behaviours depicted by self-transcendent and collectivistic values. In contrast, people who report endorsing egoistic values likely behave in ways that are consistent with the behaviours depicted by self-enhancement and individualistic values (Wang et al., 2020). Researchers have commonly found a positive association between pro-environmental behaviour and individuals who report endorsing altruistic and biospheric values. In contrast, a negative association was found between environmental concern, pro-environmental behaviour, and participants who report endorsing egoistic values (de Dominicis et al., 2017; Schultz et al., 2005; Steg & de Groot, 2012). Similarly, researchers have found that individuals with reported collectivistic values are more likely to engage in pro-environmental behaviour than those with reported individualistic values (Wang et al., 2020; Xiang et al., 2029). Consequently, individuals who report endorsing stronger self-transcendence values will likely indicate that they intend to reduce their food waste if directly

persuaded to do so. On the other hand, individuals who report endorsing stronger self-enhancement values will likely demonstrate that they intend to reduce their food waste if self-persuaded to do so.

Furthermore, de Dominicis et al. (2017) revealed that participants who reported endorsing self-enhancement values engaged in pro-environmental behaviour when message framing outcomes were of personal benefit and not of environmental benefit. de Dominicis et al. also found that people who reported endorsing self-transcendent values engaged in pro-environmental behaviour when message framing displayed environmental. With this knowledge, researchers have argued that values represent reliable category labels that predict pro-environmental behaviours (Baum 1994; Rickaby et al., 2020; Schultz, 2001). For example, people who report holding strong biospheric values are predicted to behave in ways that benefit the environment (Rickaby et al., 2020). These findings support the idea that marketing strategies that employ persuasive message framing will likely encourage pro-environmental behaviours without explicitly stating their environmental benefits (Rickaby et al., 2020; Schultz, 2001). However, to my knowledge, research has not confirmed an association between environmental value orientations and household food waste. Nor was I able to find research that has explored the association between value orientations and persuasion techniques.

Moreover, gender and political orientation sociodemographic variables have shown significant relationships with environmental values (Sargisson et al., 2020). As such, these variables have been considered for behavioural change through a process of marketing segmentation (Sargisson et al., 2020). Based on previous research, it may be predicted that men who hold a stronger right-winged orientation have weaker biospheric and altruistic and stronger egoistic values than females who are left-winged (Sargisson et al., 2020). This

consideration may provide helpful information for behaviour-change campaigns (Sargisson et al., 2020).

Purpose of the Present Study

In the current thesis, I examined the effect of self-persuasion, direct persuasion, and no persuasion on intent to reduce household food waste. I also measured participants' environmental values. I sought to determine the relationship between environmental values, persuasion interventions, and self-reported food waste. First, I asked United States Amazon Mechanical Turk (MTurk) participants to report the amount and disposal method used for seven food categories (vegetables, fruit, seafood, dairy, bakery, and drink products). I relied on participants' abilities to recall their household food waste amount and disposal method for the week prior to partaking in the study. After participants responded to these food-related items and a set of demographic questions, Qualtrics® randomly assigned participants to one of three experimental conditions: direct persuasion, self-persuasion, and no persuasion. In the direct persuasion condition, the questionnaire gave two reasons why food waste was bad. Participants in the self-persuasion condition were asked to provide two reasons why they thought food waste was a bad idea. Participants in the no persuasion condition did not receive a persuasive message. Once participants completed the persuasion manipulations, they were asked to indicate how likely they were to make an effort to reduce their food waste. Lastly, to assess participants' value orientations, they were asked to indicate the degree to which specific values guided their life. Overall, I sought to test the following hypotheses.

H1: Participants in the self-persuasion condition will report higher intentions to reduce their food waste than those in the direct-persuasion condition. The no persuasion group will report the lowest intentions to reduce their food waste (self-persuasion > direct persuasion > no persuasion).

H2: Environmental values, specifically biospheric, altruistic, and egoistic values, will be related to the overall likelihood of reducing food waste. I predicted that biospheric and altruistic values would be positively correlated, and egoistic values negatively correlated, with intention to reduce food waste.

H3: The strength of the relationship between each value and intention to reduce food waste will depend on the persuasion condition. That is:

a) Intention to reduce food waste will be more strongly predicted by egoistic values than by biospheric and altruistic values in the self-persuasion condition than in the direct persuasion condition.

b) Intention to reduce food waste will be more strongly predicted by biospheric and altruistic values than by egoistic values in the direct persuasion condition than in the self-persuasion condition.

Methods

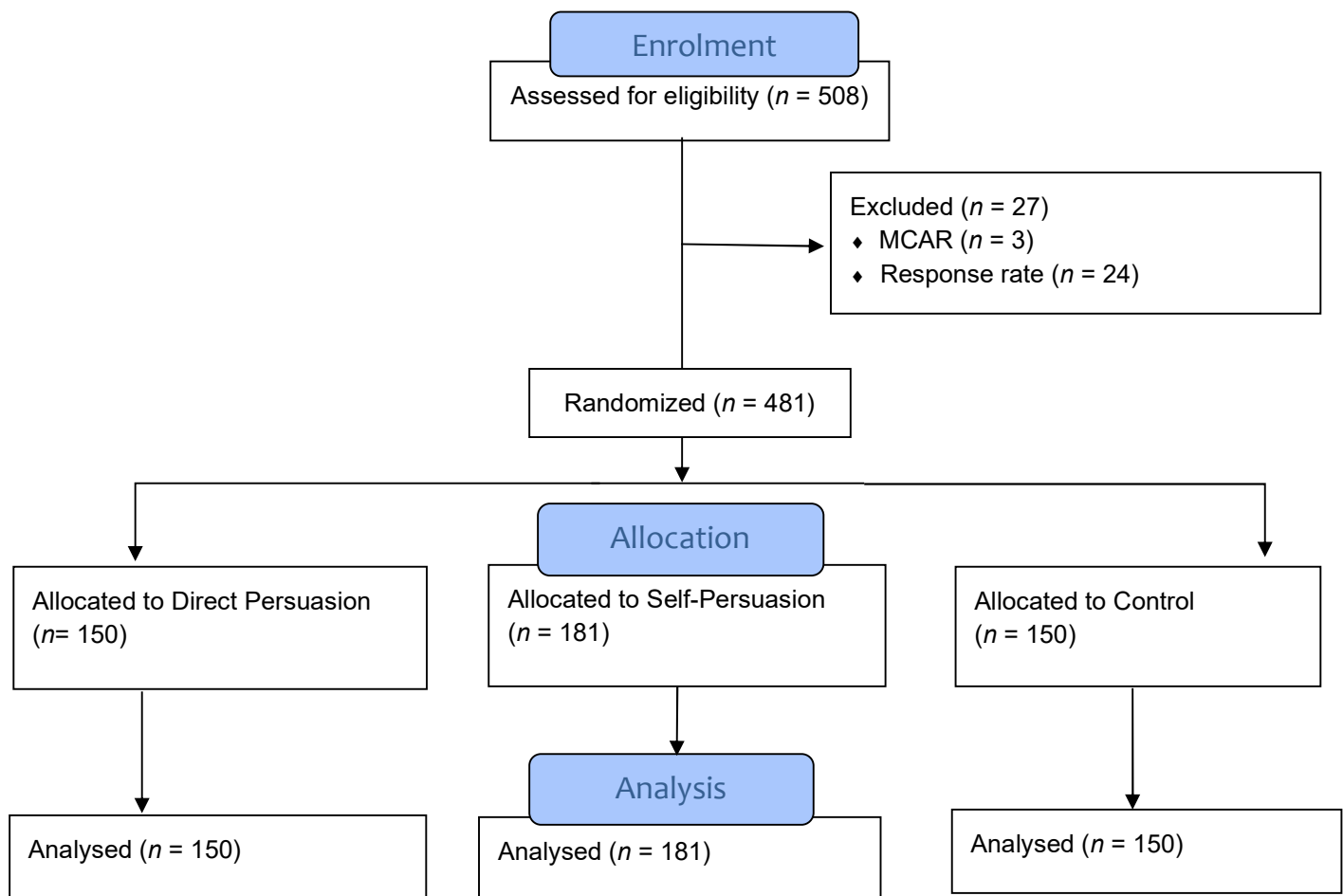
Participants

An a priori power analysis using G*Power (Faul et al., 2007; <https://g-power.apponic.com/>) to test the difference between three independent group means with a small effect size ($r = .25$) and a critical p value of .05 suggested that I required a minimum total sample size of 400 participants, split into three equally sized groups (self-persuasion, direct-persuasion, and control) to achieve a power of .95. The initial sample was 508 Amazon Mechanical Turk (MTurk) participants. Participants received .50 USD once they had completed the questionnaire. Three respondents were excluded as they did not complete the questionnaire. An additional 24 participants were removed as they answered the survey in under 200 seconds ($M = 570.22$, $SD = 387.89$) which represented 1SD from the mean response rate, with the speed of their completion suggesting that they did not take the

questionnaire seriously. Of the 24 participants removed, the majority did not show variability within the value orientations scale. The final participant count was 481. Figure 2 displays the CONSORT flow of participants through the study.

Figure 2

CONSORT Flowchart of Participants



Participants were restricted to residents of the United States of America ($M_{\text{age}} = 37.53$, 95% CI [36.58, 38.47]). A total of 299 participants were male (62.12%), 182 participants were female (37.84%). The highest degree or education level selected the most was a bachelor's degree ($n = 239$, 49.69%) and an associate degree ($n = 132$, 27.44%). A total of 353 participants had a right-winged political orientation (73.39 %), 105 participants had a left-winged political orientation (21.83%); and 24 participants indicated a centre political

orientation (4.99%). The most-frequently chosen number of people residing in a house was four (including the participant) ($n = 171$, 35.55%), and many participants indicated that their household had children under the age of 18 ($n = 371$, 77.13%). A high proportion of participants indicated that they were very concerned about the environment ($n = 441$, 91.68%, CI [76.22, 79.57]), where very few participants indicated that they had no concerns about the environment ($n = 12$). The most frequently selected dietary choice was omnivorous ($n = 187$, 38.88%), followed by vegetarian ($n = 138$, 27.24%), pescatarian ($n = 131$, 27.24%), and vegan ($n = 25$, 5.20%). Table 1 shows the sociodemographic characteristics of participants. This research was approved by the University of Waikato's Human Research Ethics Committee (School of Psychology) June 2nd, 2021 (FS2021-22).

Table 1
Sociodemographic Characteristics of Participants at Baseline

Baseline characteristic	Self-persuasion		Direct Persuasion		No Persuasion		Full sample	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender								
Female	70	38.67	53	35.33	59	39.33	182	37.84
Male	111	61.33	97	64.67	91	60.67	299	62.12
Education level								
Less than a high school diploma	4	2.21	1	0.67	0	0	5	1.04
High school degree or equivalent (e.g., GED)	6	3.32	2	1.33	4	2.67	12	2.50
Some college, no degree	6	3.32	7	4.67	3	2	16	3.33
Associate degree (e.g., AA, AS)	128	70.72	1	0.67	3	2	132	27.44
Bachelor's degree (e.g., BA, BS)	37	20.45	102	68	100	66.67	239	49.69
Master's degree (e.g., MA, MS, MEd)	0	0	37	24.67	39	26	76	15.80
Doctorate or professional degree (e.g., MD, DDS, PhD)	0	0	0	0	1	0.67	1	0.21
Number of People in Household								
1 person (yourself)	15	8.52	13	8.97	8	5.48	36	7.48
2 people	8	4.55	5	3.45	10	6.85	23	4.78
3 people	34	19.32	23	15.86	27	18.49	87	18.09
4 people	61	38.07	50	34.48	60	41.10	171	35.55
5 people	18	10.23	23	15.86	15	10.27	56	11.64
6 people	16	9.09	10	6.90	8	5.48	34	7.07
7 people	15	8.53	15	10.34	8	5.48	38	7.90
More than 8 people	9	5.11	6	4.14	10	6.85	25	5.20
Are there any children (under the age of 18) living with you?								
Yes	137	83.54	118	86.13	116	82.27	371	83.93

No	27	16.46	19	57.66	25	17.73	71	16.06
Political Orientation								
Left-winged	41	23.76	34	22.67	30	20	105	21.83
Centre	8	4.42	7	4.67	9	6	24	4.99
Right winged	133	73.48	109	72.67	111	74	352	73.20
Environmental Concern								
Not at all concerned	9	4.97	9	6.00	10	6.67	28	5.82
Neither concerned nor not concerned	2	1.10	4	2.67	6	4.00	12	2.50
Very concerned	170	93.92	137	91.33	134	89.33	441	91.68
Dietary Choice								
Omnivorous	79	43.65	55	36.67	53	35.33	187	38.88
Pescatarian	31	17.13	30	20	70	46.67	131	27.24
Vegetarian	63	34.81	53	35.33	22	14.67	138	28.69
Vegan	8	4.42	12	8	5	3.33	25	5.2
Other	0	0	0	0	0	0	0	0

Note. $N = 481$ ($n = 181$ for self-persuasion, $n = 150$ for direct persuasion, and $n = 150$ for no persuasion/control). Participants were on average 37.54 years old ($SD = 10.54$), and participant age did not differ by condition ($M = 37.93$ for self-persuasion, $M = 37.77$ for direct persuasion, and $M = 37.09$ for no persuasion)

Design and Procedure

I used Qualtrics® to design the questionnaire and collect data (<https://www.qualtrics.com>). I used the online system Amazon's Mechanical Turk (MTurk) to gain access to participants. The study was launched on MTurk on the 24th of August 2021, all results were attained by the 25th of August 2021. Once participants provided informed consent to participate in the study, they began the first block of the questionnaire. In this block, I asked participants to answer a set of demographic questions regarding their gender, age, state of residence, level of education, estimated annual household income, number of people residing in their household, and whether they had children (under the age of 18) living with them. Participants then rated their political orientation on a slider scale ranging from 0 to 100, where scores ranging from 0 to 49 indicated a “left-winged” orientation, a score of 50 indicated centre and scores above 50 indicated a “right-winged” orientation. An additional slider scale ranging from 0 to 100 asked participants how concerned they were about the environment, where scores ranging from 0 to 49 indicated “not at all concerned”, 50 indicated “neither concerned nor not concerned”, and scores above 50 indicated “very concerned”. The default position of these two sliders was 50 “centre” and “neither concerned nor not concerned”. To conclude the block, participants were asked to select a dietary choice that closely aligned with their current diet.

In the next block, I asked participants to answer questions regarding their household food waste which was an exploratory measure. After this block, participants were then randomized into one of three experimental manipulation conditions: self-persuasion, direct-persuasion, and no persuasion. The final block in my questionnaire included an adapted value orientation scale to measure pro-environmental value orientations.

Measures

Household food waste

I used the general introduction developed by van Herpen et al. (2019) to begin the questionnaire on household food waste. The introduction read:

The following section will ask you about your average food use. Please answer every question. YOU CAN PROCEED BY SELECTING THE APPROPRIATE ANSWER.

This questionnaire will be about:

- *All edible food and drink products you have bought in the (online) (super) market or have home-grown that are **thrown away**.*
- *This also includes products that are spoiled or past their expiration date.*
- *It does not matter if you have thrown the food away in the general trashcan, food waste container, compost heap or gave it to an animal (pet, birds, et cetera), or otherwise. It is all included.*

It will not be about:

- *Bones, peels, seeds, or stumps.*
- *Food and drink products that are thrown away when eating in a restaurant or canteen.*

After participants read the introduction, the questionnaire proceeded by asking participants how much of a specific food category was disposed of in the past week. If participants indicated that they had disposed of a food item, they were asked to select the appropriate disposal methods.

Household Food Waste Amount

Food-waste categories were vegetables, fruits, meats, seafoods, dairy, bakery, and drinks, where examples of food items were given for each food category. The categories were influenced by previous food-waste measures (Ammann et al., 2021; Beretta et al., 2013; Tonini et al., 2018). Within these food-waste categories, participants were asked to select the

amount of food disposed of within the past week (i.e., more than 3 portions; 2 to 3 portions; one portion; half a portion; none; and I/we did not have this product in our house). I included the category “I/I did not have this product in our house” which was not originally used in the method characterized by Ammann et al., (2021). For example, the question read:

In the past week, how much vegetables (fresh, frozen, or canned green, red, orange vegetables as well as beans, peas, lentils etc.) were disposed of in your household?’

1 portion = 1 fist size (1 cup)

I used Ammann et al.’s (2021) food waste quantities as they were appropriate measures for United States households. For the current study, Cronbach’s alpha reliability analysis of the amount of food wasted for all 7-food categories produced a high internal consistency for food waste amounts ($\alpha = .80$, $M = 2.06$) and for disposal method ($\alpha = .95$, $M = 2.86$).

Food Waste Disposal Method

After participants indicated disposal of a food category, a statement read, “how were these X disposed of?”, where participants were asked to select all disposal methods that applied. The disposal methods included the categories of; surplus food given to people affected by poverty (e.g., redistribution networks and food banks); food waste given to animals (e.g., pet, bird, et cetera); food waste used for home composting; placing food waste into food waste specific trashcan (e.g., used for anaerobic digestion); disposed of unavoidable food waste into general trashcan; and food disposed of in sink (e.g., InSinkErator). The food waste categories were based on Papargyropoulou et al.’s (2014, p. 106) food-waste hierarchy (Figure 1), where the additional disposal method of ‘food disposed in sink (e.g., InSinkErator)’ was inspired by Parr (2013) and Niles (2020). Papargyropoulou et al. (2014) adapted the European Parliament Council’s (1989) waste hierarchy to fit the context of food

waste to argue for “minimization of food surplus and avoidable food waste” (p. 106). For the current study, the average disposal method across all food waste categories gave a high reliability ($\alpha = .811$, $M = 19.89$, $SD = 4.74$).

Persuasion conditions

All participants were given a brief description of food waste and the impact it has on the environment. The scenario read:

What is Food waste? How does it impact our environment?

Food waste: Food that is discarded either before or after it has spoiled. This food is considered an avoidable waste as it is still suitable for human consumption and holds nutritional value.

The impact of food waste on our environment:

The global ecological equilibrium is influenced by human-caused CO₂ emissions that increase global temperatures. The Intergovernmental Panel on Climate Change (IPCC) states that the global equilibrium will be disturbed if global warming of 2 degrees occurs, creating devastating effects after this global tipping point is reached. Once this global tipping point is reached, it will be impossible to reverse the negative effects of increasing global temperatures.

In terms of food wastage, the United States of America contributes to 61 million tonnes of food waste per year. Once wasted food is in a landfill, it begins to decompose, emitting methane gas (CH₄). Methane gas has a high carbon footprint, which means that it traps heat in the atmosphere at a high rate thereby, contributing to climate change. This contribution towards climate change increases the probability of a global tipping point.

Participants were then randomized into one of three conditions, namely, self-persuasion ($n = 181$), direct-persuasion ($n = 150$), and no persuasion ($n = 150$) conditions.

Self-Persuasion

Once participants in the self-persuasion condition had read the scenario, the questionnaire asked participants to provide two reasons why they believed food waste is a bad idea. Participants were then asked to rate, on a 4-point scale, how convincing they felt their statements were from ‘not at all convincing’ (0) to ‘very convincing’ (3). After participants indicated how convincing the statements were, they were asked to indicate on a scale from ‘extremely unlikely’ (0) to ‘extremely likely’ (100), ‘How likely are you to make an effort to reduce your food waste?’ Regardless of the persuasion condition, all participants were asked to indicate how likely they were to reduce their food waste.

Direct Persuasion

Once participants in the direct-persuasion condition read the scenario, they were given two reasons why food waste is a bad idea. They read:

Additional reasons why you might think food waste is a bad idea:

1. *By wasting food, you waste money.*
2. *Wasting food does not set a good example for children.*

After participants read each reason, they were asked how convincing they found the reasons to be from ‘not at all convincing’ (0) to ‘very convincing’ (3). These participants were then asked to indicate how likely they are to reduce their food waste.

No Persuasion

Participants in the control/no persuasion condition were not given any reason why food waste was a bad idea. After participants in the no persuasion condition read the scenario, they were asked to indicate how likely they are to reduce their food waste.

Value Orientation Scale

The original value orientation scale was developed by Schwartz (1992). As per de Groot and Steg's (2008) study, I used the five value items for the egoistic values ('social power', 'wealth', 'authority', 'influential', and 'ambitious') as a measure of self-enhancement. Four value items were used to assess altruistic values ('equality', 'a world at peace', 'social justice', and 'helpful') and four values to assess biospheric values ('respecting earth', 'unity with nature', 'protecting the environment', 'preventing pollution') as a measure self-transcendence (Appendix 1).

Using a rank order scale ranging from -1 to 7, participants were asked to indicate how important each value was as a guiding principle in their life. Participants were told what each scale number indicated where -1 meant that the value was "opposed to the principles that guide you" and 7 suggested that the value was of "supreme importance as a guiding principle in your life. Generally, there are no more than two such values".

Results

Data analysis

The analysis of quantitative data was done using IBM SPSS Statistics (Version 27) predictive software. The data results were analysed through a descriptive approach and displayed in figures and tables.

Food Waste Amount

Of the participants who indicated that they wasted food during the previous week, vegetables represented the greatest overall mean weekly food waste (80.04%), followed by fruit (73.39%), meat (71.73%), bakery (71.31%), dairy (68.82%), and lastly, seafood and drinks (63%). Table 2 displays the mean food waste amounts per food category. The most frequently disposed of amount was *half a cup* of vegetables (33.26%), fruit (29.11%), meat (26.30%), dairy (25.57%), and bakery (26.20%) food categories. For food categories seafood

(26.40%) and drinks (28.69%), participants reported that they frequently disposed *none*, however, when participants had disposed of these items, *half a cup* was frequently chosen for seafood (24.74%) and *one cup* for drinks (23.08%). The least chosen food waste amount was *more than three cups* for food categories fruit (4.57%), meat (4.38%), seafood (3.33%), dairy (4.37%) and drinks (3.74%). The least chosen food waste amount was *I/we did not have this product in our house* for vegetables (5.61%) and bakery categories (4.37%). However, when participants did indicate that they had disposed of these foods, the least chosen food waste amount was *more than three cups* for vegetables (5.82%) and bakery (5.20%)

Food Waste Disposal Method

Of the participants who indicated that they had wasted a food item, 81.89% indicated that they had disposed of food through multiple disposal methods. Table 3 shows that across all food categories, the most frequently chosen means of disposal was *recycle for animal feed* (54.75%), followed by *recycle for composting* (52.98%), *re-use for poverty* (45.75%), *recovery via waste specific trashcan* (39.70%), *disposal via general trashcan* (33.31%), and lastly, *recovery via sink* (15.74%). For participants who indicated disposal of food per food waste category, the most frequently chosen disposal method of food waste was *recycle for animal feed* for categories seafood (61.06%), fruit (60.90%), vegetables (60%), dairy (51.06%), and *recycle for composting* for bakery (49.27%) and drinks (49.51%). The least frequently chosen disposal method per food category was *recovery via sink* for all food groups which included fruit (11.62%), meat (12.75%), seafood (14.19%), bakery (14.28%), vegetables (15.58%), dairy (20.85%), and drinks (21.78%).

Table 2*Amount of Food Waste per Food Category*

Food Waste Amount	Vegetables	Fruit	Meat	Seafood	Dairy	Bakery	Drinks
	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>
Food product not in house	27	25	37	51	35	21	40
None	69	103	97	127	115	117	138
Half a cup	160	140	126	119	123	126	92
One cup	116	127	122	107	107	115	111
Two to three cups	81	64	76	61	80	77	82
More than three cups	28	22	21	16	21	25	18

Note. $N = 481$ ($n = 481$ for vegetables, fruit, seafood, dairy, bakery, drinks; $n = 479$ for meat.)

Table 3*Disposal Method per Food Category*

Food Waste Disposal	Vegetables ($N = 385$)	Fruit ($N = 353$)	Meat ($N = 345$)	Seafood ($N = 303$)	Dairy ($N = 331$)	Bakery ($N = 343$)	Drinks ($N = 303$)
	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>
Re-use for poverty	186	155	164	137	145	148	146
Recycle for animal feed	231	215	194	185	169	166	122
Recycle for composting	221	200	177	176	159	169	150
Recovery via waste specific trashcan	136	140	128	122	160	123	129
Recovery via sink	60	41	44	43	69	49	66
Disposal via general trashcan	122	114	116	94	112	122	107

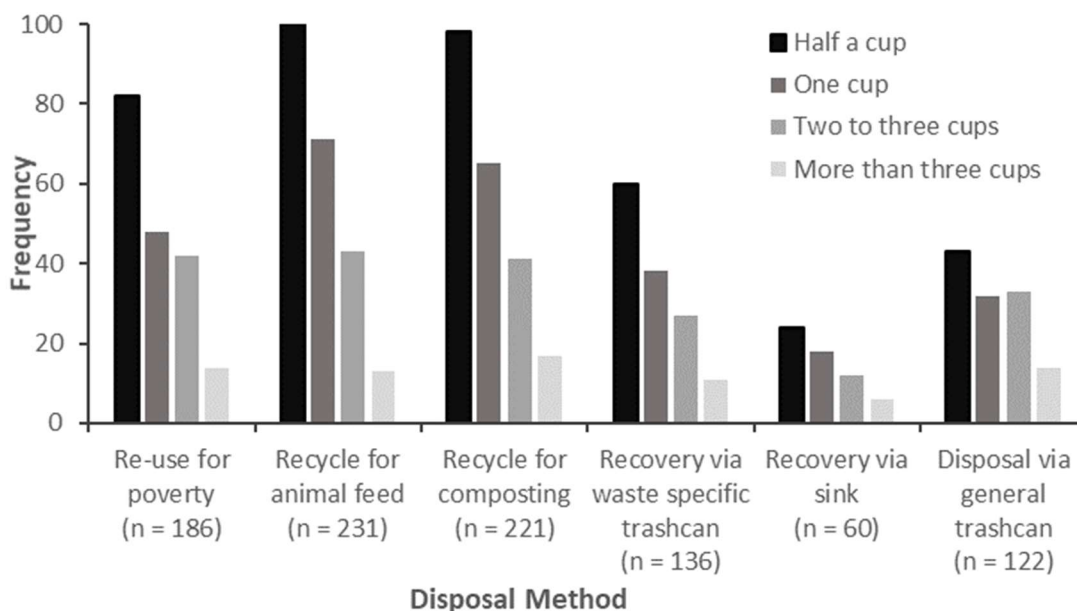
Note. N = The number of participants who indicated a disposal amount. As participants could select more than one disposal method, the total number of participant responses was $n = 2363$. Of that, $n = 1081$ of participants indicated Re-use for poverty, $n = 1282$ indicated Recycle for animal feed, $n = 1252$ indicated Recycle for compost, $n = 938$ indicated Recovery via waste specific trashcan, $n = 372$ indicated Recovery via sink, and $n = 787$ indicated Disposal via general trashcan.

Disposal Amount and Method Per Food Category

Figures 3 to 9 display the frequencies of food waste amount and disposal methods per food waste category. Participants could indicate more than one disposal method. For the purpose of the figures, disposal methods have been rephrased to match titles given in the Food Waste Hierarchy. Figure 3 shows a noticeable decrease in the most frequently chosen and more preferable disposal methods of *recycle for animal feed*, *recycle for composting*, *re-use for poverty*, *recovery via waste specific trashcan*, and *recovery via sink* as disposal amount increases. There is also a decrease in the frequency of the least preferred disposal method, *disposal via general trashcan* as vegetable disposal amount increased from *half a cup* to *more than three cups*. Overall, the frequency distribution suggests that many participants disposed of their vegetable waste sustainably.

Figure 3

Frequency Distribution of Participants Vegetable Wasted per Disposal Method

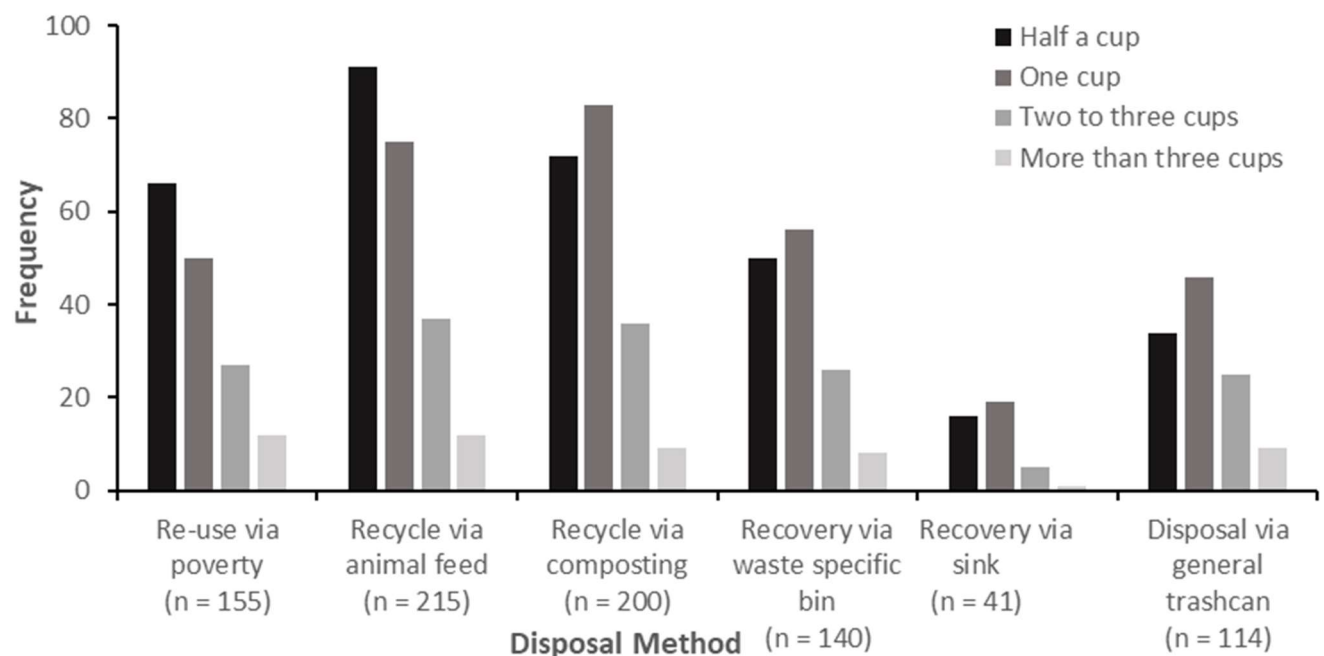


Note. $N = 385$. Disposal methods and amounts are restricted to participants who indicated that they had disposed of vegetable produce.

Figure 4 shows a noticeable decrease in the most frequently chosen and preferable disposal methods of *re-use via poverty* and *recycle via animal feed* as fruit waste increased. There is also a noticeable increase in the frequency of the least preferred disposal method, *disposal via general trashcan* for participants who dispose of *one cup* of fruit; however, this trend then decreased as fruit waste increased. Overall, participants less frequently disposed of *more than three cups* of fruit and more frequently disposed of *half a cup* and *one cup* of fruit.

Figure 4

Frequency Distribution of Participants Fruit Wasted per Disposal Method

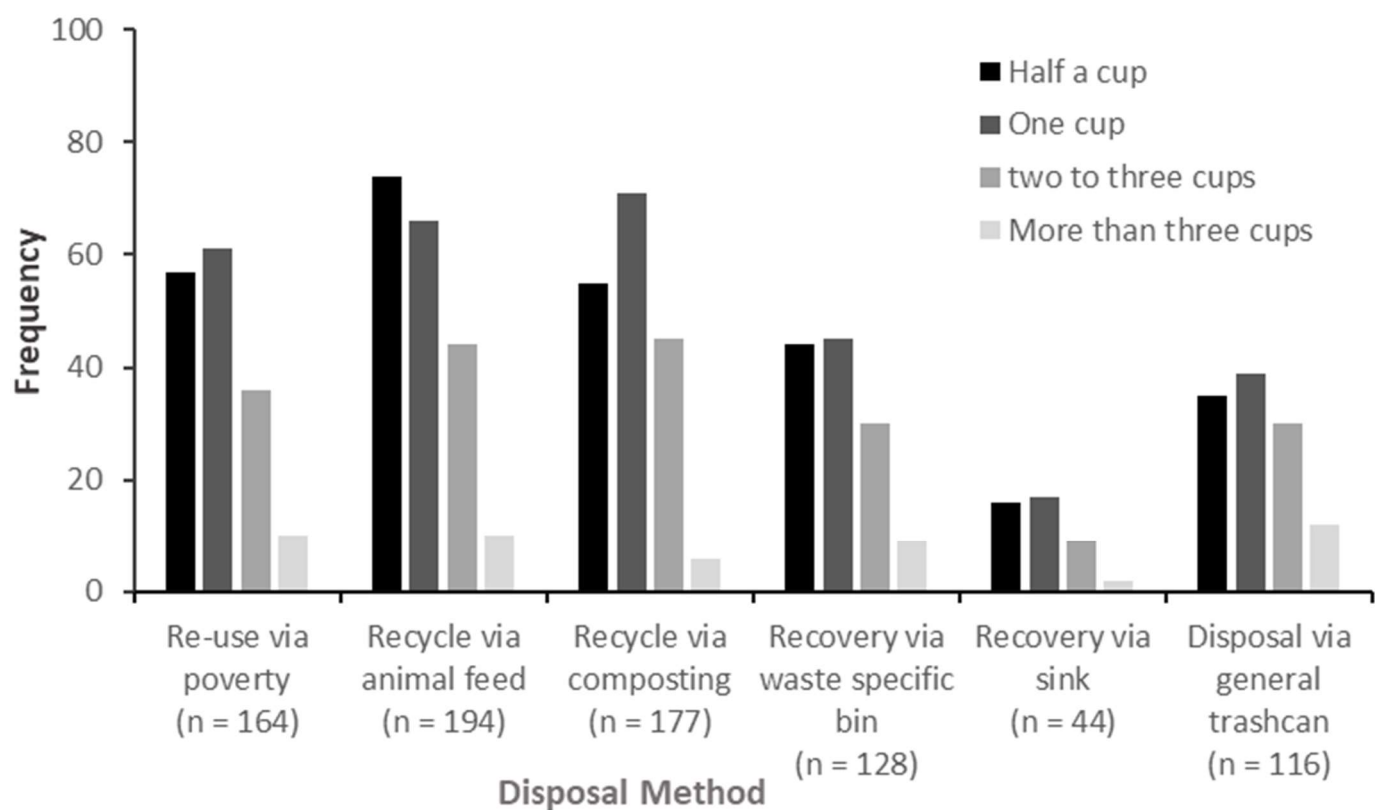


Note. $N = 353$. Disposal methods and amounts are restricted to participants who indicated that they had disposed of fruit produce.

Figure 5 shows a noticeable decrease in the disposal method, *recycle via animal feed* as meat waste increases. Participants frequently disposed of *half-* to *one cup* of meat. Across all disposal methods, but that of *recycle via animal feed*, participants frequently disposed of *one cup* of meat. Overall, participants less frequently chose the disposal method recovery via sink.

Figure 5

Frequency Distribution of Participants Meat Wasted per Disposal Method

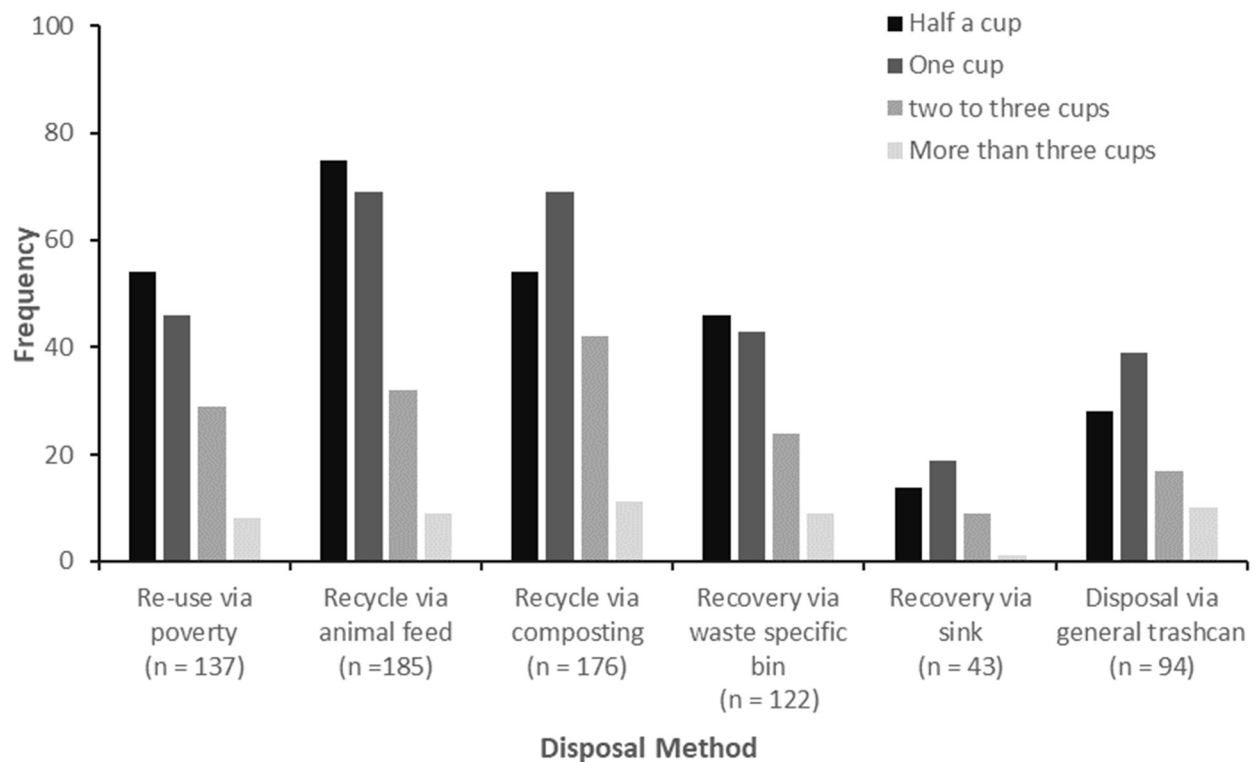


Note. $N = 345$. Disposal methods and amounts are restricted to participants who indicated that they had disposed of meat produce.

Figure 6 shows noticeable decrease across disposal methods *re-use via poverty*, *recycle via animal feed*, *recovery via waste specific bin*. There is a visible increase in *disposal via general trashcan*, *recovery via sink*, and *recycle via composting* as participants dispose of *one cup* of seafood.

Figure 6

Frequency Distribution of Participants Seafood Wasted per Disposal Method

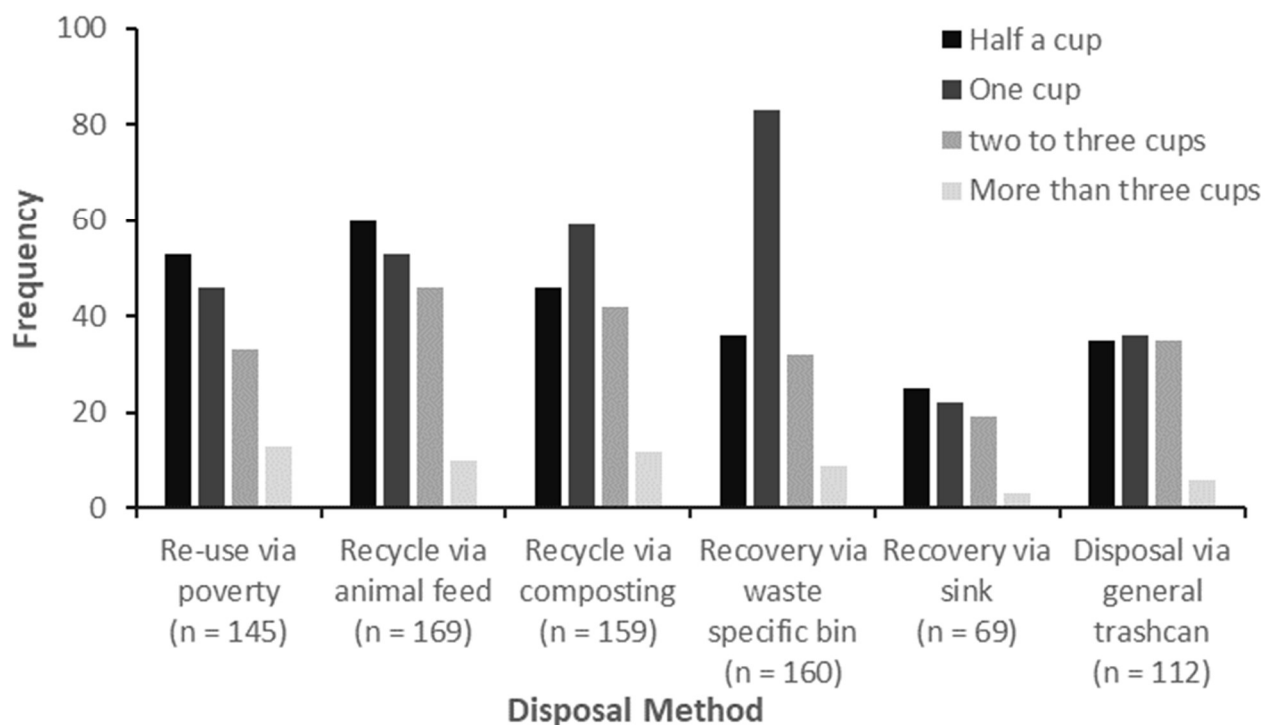


Note. $N = 303$. Disposal methods and amounts are restricted to participants who indicated that they had disposed of seafood produce.

Figure 7 shows a large increase in *recovery via waste specific bin* as participants waste *one cup* of dairy. For disposal methods *recycle via composting*, *recovery via composting*, and *disposal via general trashcan*, participants frequently disposed of *one cup* of dairy. There is a gradual decrease in disposal methods *re-use via poverty*, *recycle via animal feed* and *recovery via sink* as participants dairy waste increased.

Figure 7

Frequency Distribution of Participants Dairy Wasted per Disposal Method

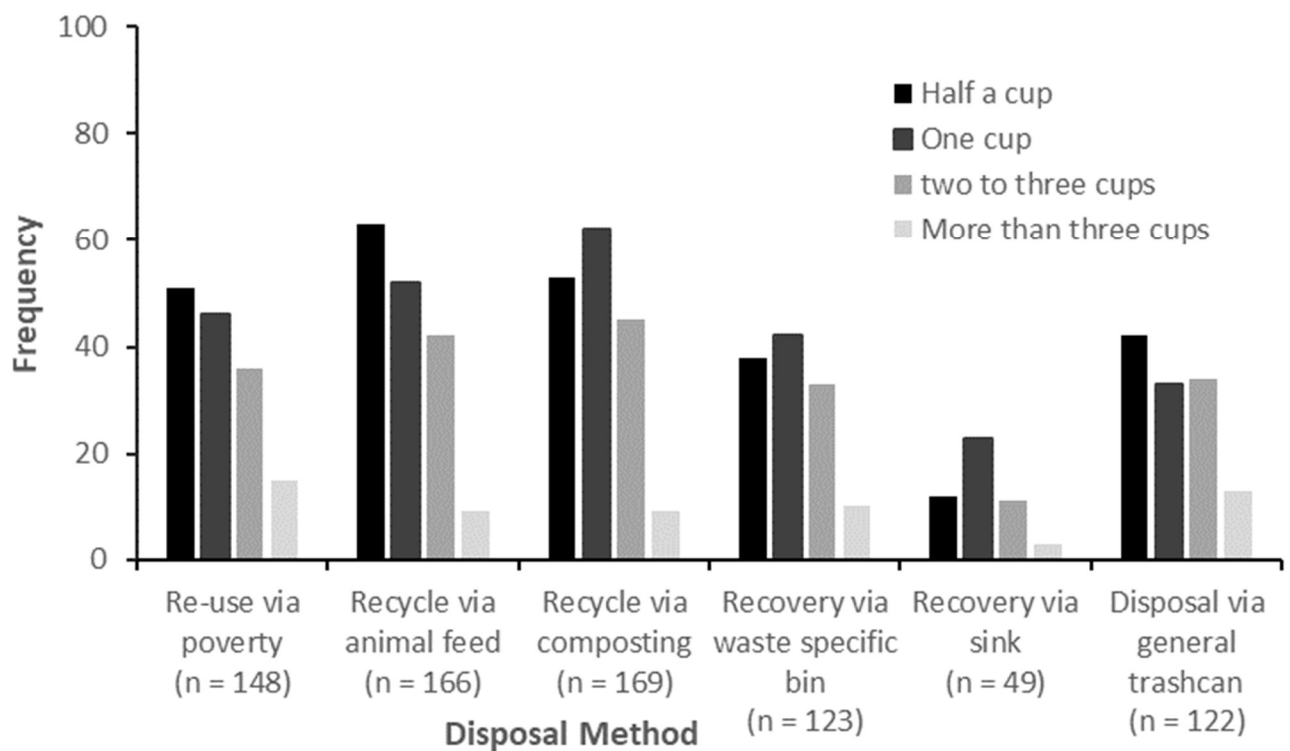


Note. $N = 331$. Disposal methods and amounts are restricted to participants who indicated that they had disposed of dairy produce.

Figure 8 shows a gradual decrease in the amount of bakery produce wasted at disposal methods *re-use via poverty* and *recycle via animal feed*. For disposal method *recovery via composting*, *recovery via waste specific bin* and *recovery via sink*, participants frequently disposed of *one cup* of bakery produce.

Figure 8

Frequency Distribution of Participants Bakery Wasted per Disposal Method

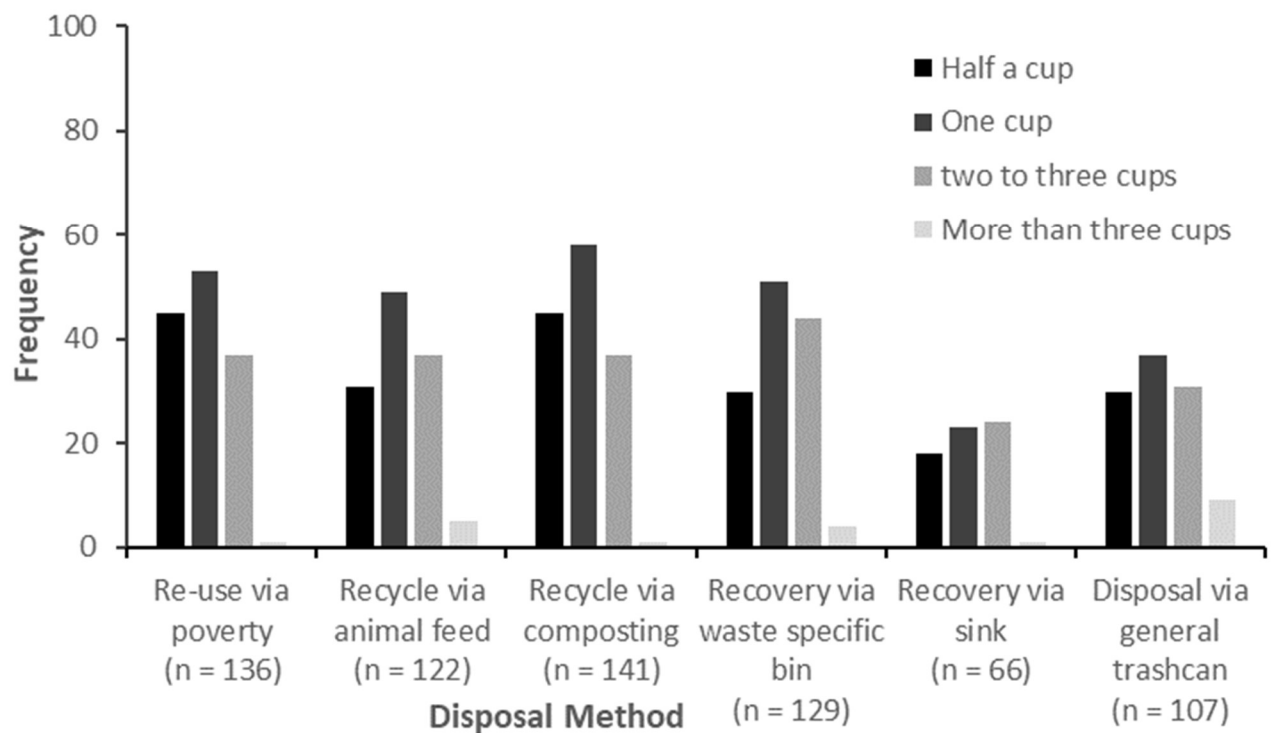


Note. $N = 343$. Disposal methods and amounts are restricted to participants who indicated that they had disposed of bakery produce.

Figure 9 shows a substantially low frequency of participants who wasted *more than three cups* of drinks across all disposal methods except for that of *disposal via general trashcan*. Across all categories but that of *recovery via sink*, participants frequently disposed of *one cup* of drink.

Figure 9

Frequency Distribution of Participants Drinks Wasted per Disposal Method



Note. $N = 303$. Disposal methods and amounts are restricted to participants who indicated that they had disposed of drink produce.

Food Waste, Household Size, and Households with Children

I ran a series of ordinal logistic regressions; one for each food-waste category. The outcome variable was the amount of food wasted (ordinal level of measurement), the presence or absence of children in the house was added as a binary predictor variable (0 = no children; 1 = children), and the size of the household was entered as a covariate (ratio level of measurement from 1 – 8 persons).

The model fit chi-square values for each ordinal regression, in which the -2 log likelihood ratios for the full models were compared to those of models containing only the intercept, indicated that the models for vegetables, $\chi^2(2) = 7.54, p = .02$, fruit, $\chi^2(2) = 7.41, p = .03$, meat, $\chi^2(2) = 6.74, p = .03$, seafood, $\chi^2(2) = 28.56, p < .001$, and drinks, $\chi^2(2) = 10.23, p = .006$, were significant, but the models for dairy, $\chi^2(2) = 4.27, p = .12$, and bakery, $\chi^2(2) = 2.51, p = .29$ were not. This means that including household size and the presence or absence of children in the models to predict the amount of food wasted for vegetables, fruit, meat, seafood, and drinks provided better fits to the data than null models for those food-waste categories. However, the Pearson's chi-square statistic for goodness-of-fit indicated that the models for fruit, $\chi^2(53) = 78.19, p = .01$, and seafood, $\chi^2(53) = 72.34, p = .04$, did not fit the data well ($p > .05$ for all other food-waste categories).

The Nagelkerke pseudo R^2 values indicated that the models accounted for relatively small proportions of the variation in the amount of food wasted; 1.9% for vegetables and fruit, 1.7% for meat, 7.1% for seafood, 1.1% for dairy, 0.6% for bakery, and 2.6% for drinks.

Table 4 contains the model parameters for the ordinal regressions. For all food-waste types, the B estimates indicated that as household size increased, so did the amount of meat and seafood waste, however, the only food-waste type for which this relationship approached significance was seafood. The presence or absence of children in a household significantly

predicted the amount of fruit, seafood, and drinks ($p < .05$), and marginally predicted the amount of vegetables and dairy ($p = .05$), wasted (Table 4). In all cases, having children predicted a higher amount of food waste compared to when no children were present. Specifically, using the complements of the odds ratios ($\text{Exp}(B)$) in Table 4, families with children were 1.59 times more likely to waste vegetables (*NS*), 1.67 times more likely to waste fruit, 1.39 times more likely to waste meat (*NS*), 3.13 times more likely to waste seafood, 1.61 times more likely to waste dairy (*NS*), 1.20 times more likely to waste bakery items (*NS*), and 1.75 times more likely to waste drinks than households without children.

Table 4

Ordinal Regression Model Parameters of Association between Food Waste, Household Size, and Children in a household

Variables		<i>B</i>	<i>SE</i>	Wald	<i>df</i>	<i>p</i>	95% CI	<i>Exp(B)</i>
Vegetables								
Threshold	[NA = -1]	-3.01	0.42	51.50	1	<.001	[-3.83, -2.19]	
	[None = 0]	-1.36	0.34	15.83	1	<.001	[-2.03, -0.69]	
	[1/2 cup = 1]	-0.97	0.34	8.35	1	.004	[-1.63, -0.32]	
	[1 cup = 2]	-0.05	0.33	0.02	1	.89	[-0.70, 0.60]	
	[2-3 cups = 3]	1.01	0.34	9.15	1	.002	[0.36, 1.67]	
Location	[HH Size]	0.12	0.07	2.76	1	.10	[-0.2, 0.26]	1.13
	[Children = 0]	-0.47	0.24	3.75	1	.05	[-0.95, 0.01]	0.63
	[Children = 1]	0 ^a
Fruit								
Threshold	[NA = -1]	-3.02	0.41	53.56	1	<.001	[-3.82, -2.21]	
	[None = 0]	-0.95	0.33	8.06	1	.005	[-1.60, -0.29]	
	[1/2 cup = 1]	-0.70	0.33	4.10	1	.04	[-1.32, -0.02]	
	[1 cup = 2]	-0.04	0.33	0.02	1	.90	[-0.69, 0.60]	
	[2-3 cups = 3]	1.18	0.33	12.53	1	<.001	[0.53, 1.84]	
Location	[HH Size = 1]	0.10	0.07	2.03	1	0.15	[-0.04, 0.24]	1.11
	[Children = 0]	-0.51	0.24	4.32	1	0.04	[-0.98, -.03]	0.60
	[Children = 1]	0 ^a	.	.	0	.	.	.
Meat								
Threshold	[NA = -1]	-2.40	0.38	40.15	1	<0.001	[-3.15, -1.66]	
	[None = 0]	-0.61	0.33	3.43	1	.06	[-1.66, 0.44]	
	[1/2 cup = 1]	-0.39	0.33	1.41	1	.23	[-1.26, 0.04]	
	[1 cup = 2]	0.36	0.33	1.21	1	.27	[-1.03, 0.25]	
	[2-3 cups = 3]	1.54	0.34	21.01	1	<.001	[-0.28, 1.00]	
Location	[HH Size = 1]	1.38	0.07	3.78	1	0.05	[-0.00, 0.28]	3.97

	[Children = 0]	-0.33	0.24	1.84	1	0.18	[-0.80, 0.15]	0.72
	[Children = 1]	0 ^a	.	.	0	.	.	.
Seafood								
Threshold	[NA = -1]	-2.00	0.36	31.84	1	<.001	[-2.70, -1.31]	
	[None = 0]	-0.30	0.33	0.81	1	.37	[-0.94, 0.35]	
	[1/2 cup = 1]	-0.13	0.33	0.16	1	.69	[-0.78, 0.51]	
	[1 cup = 2]	0.45	0.33	1.92	1	.17	[-0.19, 1.10]	
	[2-3 cups = 3]	1.59	0.34	22.20	1	<.001	[0.93, 2.25]	
Location	[HH Size = 1]	0.14	0.07	3.94	1	.05	[0.00, 0.28]	1.15
	[Children = 0]	-1.14	0.25	20.83	1	<.001	[-1.62, -0.65]	0.32
	[Children = 1]	0 ^a	.	.	0	.	.	.
Dairy								
Threshold	[NA = -1]	-2.81	0.38	55.93	1	<.001	[-3.55, -2.07]	
	[None = 0]	-0.97	0.33	8.62	1	.003	[-1.61, -0.32]	
	[1/2 cup = 1]	-0.74	0.33	5.14	1	.02	[-1.39, -0.10]	
	[1 cup = 2]	-0.04	0.33	0.01	1	.91	[-0.68, 0.60]	
	[2-3 cups = 3]	0.99	0.33	9.04	1	.003	[0.35, 1.64]	
Location	[HH Size = 1]	0.01	0.07	0.03	1	.87	[-0.13, 0.15]	1.01
	[Children = 0]	-0.48	0.24	4.00	1	.05	[-0.96, -0.01]	0.62
	[Children = 1]	0 ^a	.	.	0	.	.	.
Bakery								
Threshold	[NA = -1]	-3.24	0.43	55.95	1	<.001	[-4.09, -2.39]	
	[None = 0]	-0.72	0.33	4.73	1	.03	[-1.36, -0.07]	
	[1/2 cup = 1]	-0.48	0.33	2.16	1	.14	[-1.13, 0.16]	
	[1 cup = 2]	0.22	0.33	0.46	1	.50	[-0.42, 0.86]	
	[2-3 cups = 3]	1.32	0.33	15.62	1	<.001	[0.67, 0.86]	
Location	[HH Size = 1]	0.09	0.07	1.57	1	.21	[-0.05, 0.23]	1.09
	[Children = 0]	-0.19	0.24	0.61	1	.44	[-0.66, 0.29]	0.83
	[Children = 1]	0 ^a	.	.	0	.	.	.
Drinks								
Threshold	[NA = -1]	-2.25	0.37	37.98	1	<.001	[-2.97, -1.54]	
	[None = 0]	-0.23	0.33	0.47	1	.49	[-0.87, 0.42]	
	[1/2 cup = 1]	-0.05	0.33	0.02	1	.88	[-0.69, 0.59]	
	[1 cup = 2]	0.69	0.33	4.44	1	.04	[0.05, 1.34]	
	[2-3 cups = 3]	1.82	0.34	28.65	1	<.001	[1.15, 2.48]	
Location	[HH Size = 1]	0.24	0.07	3.06	1	.08	[-0.02, 0.26]	1.27
	[Children = 0]	-0.57	0.24	5.38	1	.02	[-1.05, -0.09]	0.57
	[Children = 1]	0 ^a	.	.	0	.	.	.

Note: HH Size = Household size, $N = 480$ ($n = 36$ for one person, $n = 23$ for two people, $n = 84$ for three people, $n = 171$ for four people, $n = 56$ for five people, $n = 34$ for six people, $n = 37$ for seven people, $n = 25$ for eight people). Children, $N = 442$ ($n = 371$ for children in household, and $n = 71$ for no children in household). The predictor variables of household size and having children on the variability of participants food waste amount; CI = confidence intervals. $\text{Exp}(B)$ = exponential odds. 0^a = This parameter is set to zero because it is redundant. NA = I/we did not have this product in our house.

The tests of parallel lines for vegetables and fruit were significant ($p < .05$), suggesting that the models for these food-waste categories violated the assumption of proportional odds and should be interpreted with caution.

Sociodemographic Variables and Value Orientations

Three multiple regressions were carried out to test if sociodemographic variables significantly predicted altruistic, biospheric, and egoistic values. The significance level was set to 0.02 (0.05/3). Table 5 shows the three linear regressions for each of the values and sociodemographic variables (gender: female = 0, male = 1).

The regression model for altruistic values was significant, $F(5, 475) = 2.92, p = .013, R^2 = .03, R^2_{\text{adjusted}} = .02$. (Table 5). However, the sociodemographic variables did not significantly predict altruistic values. The regression model for biospheric values was significant, $F(5, 475) = 1.68, p = .14, R^2 = .13, R^2_{\text{adjusted}} = .01$. Specifically, a right-winged political orientation significantly predicted biospheric values (Table 5). The regression model for egoistic values was significant, $F(5, 475) = 18.68, p < .001, R^2 = .16, R^2_{\text{adjusted}} = .16$. Specifically, being male, having a higher level of education, and a right-winged political orientation significantly predicted high egoistic values (Table 5).

Table 5

Multiple Regression Model Parameters of Association Between Sociodemographic Variables and Environmental Values

Variable	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	95% CI of <i>B</i>
Altruistic						
Gender	-.24	.12	-.10	-2.09	.04	[-.47, -.02]
Age	.10	.01	.08	1.70	.09	[-.002, .02]
Education level	-.15	.08	.09	-2.002	.05	[-.30, -.003]
Income	.03	.02	.06	1.32	.19	[-.02, .08]
Political orientation	.11	.07	.07	1.54	.13	[-.03, .25]
Biospheric						
Gender	-.11	.12	-.04	-.92	.36	[-.36, .13]
Age	.01	.01	.07	1.44	.15	[-.003, .02]
Education level	.02	.08	.01	.21	.84	[-.14, .18]
Income	-.01	.03	-.02	-.41	.69	[-.14, .18]

Political orientation	.17	.8	.11	2.26	.02*	[.02, .32]
Egoistic						
Gender	-.33	.13	-.11	-2.63	.01*	[-.58, -.08]
Age	.01	.01	.04	.92	.36	[-.01, .02]
Education level	.29	.08	.15	3.50	.001**	[.13, .45]
Income	.04	.03	.06	1.47	.14	[-.01, .09]
Political orientation	.57	.08	.31	7.25	.001**	[.41, .72]

Note: Gender, $N = 481$ ($n = 299$ for male, $n = 182$ for female); Education, $N = 481$ ($n = 5$ for less than a high school diploma, $n = 12$ for high school degree or equivalent, $n = 16$ some college, no degree, $n = 132$ for associate degree, $n = 239$ for bachelor's degree, $n = 76$ for master's degree, $n = 1$ for doctorate or professional degree) Political orientation, $N = 481$ ($n = 105$ for left-winged, $n = 24$ for centre, and $n = 352$ for right-winged). The predictor variables of environmental values on the variability of participants sociodemographic; CI = confidence intervals. B = unstandardised beta. β = standardised beta.

Persuasion Conditions

An Analysis of Covariance (ANCOVA) was conducted to determine if there was a statistically significant effect of persuasion condition on the intent to reduce food waste, while controlling for the covariates of environmental values (altruistic, biospheric, and egocentric). As the dependent variable, intent to reduce food waste, violated the assumptions of normality and homogeneity and contained a considerable number of outliers, a negative square root transformation of all scores of the dependent variable was applied, after which all parametric assumptions were met. There was no significant effect of persuasion on intent to reduce food waste, $F(2, 475) = 1.44, p = .24, \eta_p^2 = .006$. Planned contrasts revealed that self-persuasion ($M = 96.42$) did not significantly increase intent to reduce food waste compared to no persuasion, $M = 96.18, t(181) = -1.38, p = .75$, nor was there a significant increase in intent to reduce food waste when compared to direct persuasion, $M = 96.12, t(150) = .31, p = .53$.

Environmental Values

The ANCOVA revealed that all environmental values were significantly related to intent to reduce food waste; altruistic: $F(1, 473) = 15.92, p < .001, \eta_p^2 = .03$, biospheric: $F(1, 473) = 12.02, p < .001, \eta_p^2 = .03$, and egoistic $F(1, 473) = 6.45, p = 0.012, \eta_p^2 = .01$. To

further explore these relationships, a simple linear regression was carried out. This analysis was used to test if altruistic, biospheric, and egoistic values significantly predicted intent to reduce food waste. For the purpose of this analysis, the significance level was set to .05. The regression model was significant, $F(3, 477) = 37.48, p < .001, R^2 = .19, R^2_{\text{adjusted}} = .19$. As shown in Table 6, stronger reported altruistic and biospheric values predicted higher food waste reduction intentions, and stronger egoistic values predicted lower food waste reduction intentions. Standardised beta values suggested that altruistic and biospheric values were more important predictors than egoistic values.

Table 6

Simple Linear Regression Model Parameters of Association Between Intent to Reduce Food Waste and Environmental Values

Variable	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	95% CI of <i>B</i>
Altruistic	.50	.12	.29	3.99	.001**	[.25, .74]
Biospheric	.43	.12	.26	3.45	.001**	[.18, .67]
Egoistic	-.21	.08	-.15	-2.57	.01*	[-.38, -.05]

Note: $N = 481$. CI = confidence intervals. *B* = unstandardised beta. β = standardised beta

Collinearity statistics revealed a strong correlation between all three of the predictor variables; altruistic, biospheric, and egoistic values ($p < .001$). Further assessment of possible multicollinearity revealed that tolerance values were greater than the value of 0.2 and VIF values were less than 10. These values suggest that the collinearity between predictor variables did not represent a serious problem (Field, 2018).

Environmental Values and Persuasion Conditions

Two separate multiple regression analyses, one for each persuasion condition, were used to test whether the strength of the relationship of environmental values with intention to reduce food waste depended on the persuasion condition. The significance level was set to .05. Assessment of possible multicollinearity revealed that tolerance values were greater than the value of 0.2 and VIF value were less than 10. Table 7 shows the result of the

regression for the self-persuasion condition. The regression model for self-persuasion was significant, $F(3, 177) = 17.44, p < .001, R^2 = .23, R^2_{\text{adjusted}} = .22$. Specifically, for the self-persuasion condition, high intent to reduce food waste was predicted for participants who reported endorsing altruistic and biospheric values but not egoistic values (Table 7). The regression model for direct persuasion was significant, $F(3, 145) = 6.6, p < .001, R^2 = .12, R^2_{\text{adjusted}} = .10$. The parameter values in Table 7 indicated that, for the direct persuasion condition, reported egoistic values negatively and significantly predicted intent to reduce food waste.

Table 7

Multiple Regression Model Parameters of Association Between Intent to Reduce Food Waste and Environmental Values per Persuasion Conditions

Variable	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	<i>B</i> 95% CI
Self-persuasion						
Altruistic	.44	.19	.26	2.32	.02*	[.07, .81]
Biospheric	.55	.19	.34	2.94	.004**	[.18, .93]
Egoistic	-.25	.13	-.16	-1.89	.06	[-.51, .01]
Direct persuasion						
Altruistic	.37	.25	.22	1.63	.11	[-.08, .82]
Biospheric	.39	.22	.25	1.81	.07	[-.04, .81]
Egoistic	-.33	.16	-.21	-2.07	.04*	[-.65, .01]

Note. N = 331 (n = 181 for self-persuasion condition and n = 150 for direct persuasion condition). CI = confidence intervals. *B* = unstandardised beta. β = standardised beta

Discussion

Exploratory analysis revealed that the most wasted food group was vegetables, followed by fruit, meat, bakery, dairy, seafood, and drinks. This finding is similar to previous research using self-reported measures to determine household food waste amounts in the United Kingdom (Quested & Luzecka, 2014), Italy (Falasconi et al., 2019), Canada (Parizeau et al., 2021), and the United States (Conrad et al., 2018). Various researchers (e.g., Conrad et al., 2018; Falasconi et al., 2019; Parizeau et al., 2021; Quested & Luzecka, 2014) reported high amounts of vegetable and fruit waste; however, amongst other food groups, my results

differed from previous research. For example, Conrad et al. (2018) found that participants wasted dairy products more than meat products. Overall, my results support previous findings that consumers waste more fruit and vegetables than other food groups.

Half a cup was the most frequently indicated food waste amount when participants indicated disposal of a food item. *More than three cups* were the least frequently chosen food waste amount in all food categories, except for drinks (*one cup*). Overall, the disposal amount indicated by participants was relatively low based on my study's categorical measures. However, as self-report measures result in underreporting of food waste, my results highlight the importance of determining actual amounts wasted. In doing so, researchers should observe associated behaviours that sustain food waste behaviour, particularly seen in disposal of fruit and vegetable waste. Specifically, De Laurentiis et al. (2018) showed a significant difference between the amount of avoidable fruit and vegetable waste across European countries predicted by wasteful behaviours (cultural and economic variables) and variations in consumption patterns. In addition to my results, these findings suggest that research is needed to determine the waste level and contributing factors of food waste amongst a United States sample.

Per disposal method, the most frequently chosen method was *recycle for animal feed*, followed by *recycle for composting*, *re-use for poverty*, *recovery via waste specific trashcan*, *disposal via general trashcan*, and lastly, *recovery via sink*. Further analysis revealed that the most frequently chosen disposal method of *recycle via animal feed* was seen amongst the food group seafood, fruit, vegetables, dairy, and *recycle via composting* for bakery and drinks. The least frequently chosen disposal method was *recovery via sink* for all seven food groups. Niles (2020) revealed similar findings that United States participants reported that they are likely to discard their food waste by feeding it to pets and using it as compost. According to the Food Waste Hierarchy, then, participants largely indicated that they

disposed of their food through more preferable methods. A limitation in the current study may be that the food waste category of *food placed into food waste specific trashcan (e.g., used for anaerobic digestion)/ recovery via waste specific bins* did not specify that food-waste bins would be collected as curbside rubbish. This lack of specification may pose a limitation as some states within the USA do not have food-waste collection services (Yepsen, 2012). Therefore, disposal via waste-specific bins for curbside collection may not have been an option for some participants and this option was possibly mistaken for at-home composting. Furthermore, using the term 'garbage disposal' may have been more appropriate than the term 'sink' for a United States sample. Niles (2020) showed that participants were more likely to dispose of their food via garbage disposal/sink than via curbside collection/waste-specific bins. These limitations may pose a contextual measurement issue, impacting the generalisability amongst United States samples.

For all food categories but drinks, the frequency of disposal method *re-use via poverty* and *recycle via animal feed* decreased as food waste amount increased from *half a cup* to *more than three cups*. For all food categories but seafood and vegetables, the most frequently chosen amount of food waste was one cup for disposal methods *recycle via composting* and *recovery via waste specific bin*. For all food categories but dairy, vegetables, and drinks, the most frequent chosen quantity was *one cup* through the disposal method *recovery via sink*, and for all food categories but vegetables and bakery, the frequently chosen waste quantity was *one cup* via disposal of *general trashcan*. The frequency results showed that most participants reported using the disposal method *re-use for poverty* and *recycle for animal feed* for *half a cup* of food waste; however, as participants used the disposal methods further down the hierarchy, they frequently disposed of *one cup*. These results suggest that when participants waste smaller amounts of food, they dispose of it through sustainable methods.

Researchers (Bagherzadeh et al., 2014; Cordova-Buiza et al., 2022; Lee et al., 2020; & Muth et al., 2019) have suggested that the food-waste hierarchy displays suitable ways to dispose of food. However, other researchers (Neff et al., 2015; Pearson et al., 2016; Porpino et al., 2015) have highlighted that giving food to animals or using it for compost may increase wasteful consumption. In this case, many of the participants in my study indicated sustainable disposal of food in relatively small quantities but high in frequency. More specifically, participants who disposed of small quantities of food through more preferred disposal methods (*recycle via animal feed* and *recycle via composting*) overall disposed of larger amounts of food than participants who discarded their food into a *general trashcan*. Researchers have suggested that this increase in waste is due to decreased experience of guilt (Schanes et al., 2018). It may be that disposing of food through sustainable methods is socially reinforced. As such, it may also be important to determine if disposal methods are impacted by social reinforcers. Future research should explore the relationship between an individual's frequency of disposal methods and the influence of others reporting different frequencies per disposal methods.

Further analysis of household food waste revealed that households with children wasted more vegetables, fruit, seafood, dairy, and drinks. Household size only seemed to influence the amount of meat and seafood wasted. That is, larger households wasted more meat and seafood than smaller households. Overall, households with children and household size accounted for a small proportion of variation in the amount of food wasted. Previous research results have not shown a homogeneous association between household size and food waste. For example, Neff et al. (2015) showed no association between food waste and household size amongst a United States sample. However, Parizeau al. (2015) showed that larger households produced more food waste in a Canadian sample. In addition, previous researchers have shown an association between an increase in food waste and having children

in a household (Neff et al., 2015; Visschers et al., 2016). However, I could not find research that has distinguished between having children under 18 and food waste amounts per food category; therefore, I was unable to confirm these findings' generalisability.

My main purpose was to determine the effect of self-persuasion, direct persuasion, and no persuasion on intent to reduce household food waste. I also sought to determine if environmental values, namely, altruistic, biospheric, and egoistic, influenced the effectiveness of these persuasion interventions. In accordance with H1, I expected that participants in the self-persuasion condition would report higher intentions to reduce their food waste than those in the direct-persuasion condition, where those in the no persuasion condition would report the lowest intentions to reduce their food waste. My results could not support H1. The results showed that the mean scores for all persuasion conditions were in the upper limit of the scale used to measure intent to reduce food waste, suggesting a ceiling effect. Consequently, I was unable to accept nor reject the hypothesis that persuasion condition affected intent to reduce food waste.

Previous researchers (Bernritter et al., 2017; Drązkowski et al., 2020) have found that self-persuasion was more effective than direct or no persuasion. Consequently, the ceiling effect in my results may have suggested either a high pre-established intent to reduce food waste prior to the study or an unexpected effect of the study. A possible effect may have been the reading of the scenario regarding the environmental effects of food waste before participants were put into a condition. As individuals are taught how to respond to external cues to describe their attitudes through socialising, the individuals may have responded in a manner that they felt was most appropriate (Bem, 1968). In addition, reading the scenario may have increased social-desirability bias. Specifically, the scenario may have provided insights into the aim of the study encouraging participants to respond in a manner that they thought would be expected.

My results supported H2 that environmental values, specifically biospheric, altruistic, and egoistic values, were related to the overall likelihood of reducing food waste. As predicted, biospheric and altruistic values were positively correlated, and egoistic values negatively correlated with intention to reduce food waste. That is, participants who reported endorsing self-transcendence (biospheric and altruistic) values were more likely to intend to reduce their food waste. In contrast, participants who reported endorsing self-enhancement (egoistic) were less likely to intend to reduce their food waste. Similarly, previous researchers (de Dominicis et al., 2017; Schultz et al., 2005; Steg & de Groot, 2012) have confirmed a relationship between environmental values and pro-environmental behaviours. These results therefore support the assumptions that people who report endorsing egoistic values are less likely to engage in pro-environmental behaviour.

H3 was that the strength of the relationship between each value and the intention to reduce food waste would depend on the persuasion condition. It was predicted that egoistic values would more strongly predict intention to reduce food waste than biospheric and altruistic values in the self-persuasion condition than in the direct-persuasion condition. Conversely, intention to reduce food waste would be more strongly predicted by biospheric and altruistic values than by egoistic values in the direct persuasion condition than in the self-persuasion condition. My results could not support the hypothesis that the relationship between each environmental value and intention to reduce food waste was dependent on the persuasion condition. Instead, intent to reduce food waste was more strongly and positively predicted by biospheric and altruistic values than egoistic values in the self-persuasion condition. In the direct-persuasion condition, intent to reduce food waste was significantly and negatively predicted by egoistic values. These results suggest that participants who reported high self-transcendence values are more likely to intend to reduce their food waste if self-persuaded to do so. Participants who report endorsing egoistic values are less likely to

intend to reduce their food waste if directly persuaded to do so. To my knowledge, researchers have not conducted an analysis on the effectiveness of persuasion techniques while accounting for environmental values. Previous research by Catapano et al. (2019) assessing the effectiveness of self-persuasion when participants took a counter-attitudinal view found that asking people to generate arguments that are not consistent with their values resulted in diminished receptiveness and attitude change. As such, it may be that the direct-persuasion and self-persuasion attempts negatively influence participants who reported high self-enhancement values as their values simply did not align with the environmental concerns presented in the current study. However, as self-transcendence values do align with environmental concerns, self-persuasion arguments may allow participants to generate their own arguments that are consistent with their verbal behaviour. Therefore, these participants may reinforce the expression of their own values and persuade themselves to intend to reduce their food waste (de Dominicis et al., 2017).

In terms of the negative association between direct persuasion and self-enhancement values, and the positive association between self-transcendence values and self-persuasion values, it becomes increasingly important for researchers to consider message framing consistent with the social-verbal behaviour of consumers. For example, consumers who strongly endorse egoistic values might be persuaded by arguments that emphasize personal benefits instead of the environmental arguments used in the current study. For example, Kis et al. (2020) found that low egoistic values and high biospheric values positively predicted pro-environmental social-influence behaviour. However, high egoistic values and low biospheric values weakly predicted attempts to influence others to behave pro-environmentally. Therefore, it was theorized that those who strongly endorse egoistic values are likely to attempt to influence others regardless of the intended goal (Kis et al., 2020). People who report endorsing egoistic values may not be motivated to engage in pro-

environmental behaviours because of the benefit to the environment. However, these individuals may be persuaded to engage in pro-environmental behaviours when arguments are framed as having personal benefits, such as influencing others or saving money (Kis et al., 2020).

My results revealed a significant and strong association between certain demographic variables and environmental values. That is, participants who were male, with lower levels of education, were more likely to report endorsing altruistic values than women with left-winged political orientations and higher education levels. In addition, participants who identified themselves as having a right-winged political orientation were more likely to report endorsing biospheric values than left-winged political orientations. Lastly, participants who were male, with a higher level of education, and who identified themselves as having a right-winged political orientation were more likely to report endorsing egoistic values than women with left-winged political orientations.

These results are not in full agreement with research by Sargisson et al. (2020) using a European sample. Similarly, strong and significant associations were found between egoistic values and men with a right-winged political orientation where weaker associations were found between political orientation, gender, and altruistic and biospheric values. However, Sargisson et al.'s (2020) results showed that participants who were older, left-wing, and female were more likely to report endorsing altruistic values than younger, right winged men. Additionally, participants who were older, left-winged, female, with lower incomes and educational level, reported strongly endorsing biospheric values (Sargisson et al., 2020). As such, my results did not reflect similar findings when compared with Sargisson et al.'s findings using a European sample. Overall, an additional limitation of my study is that I used MTurk participants. Therefore, my data may differ from data taken from different samples of the

same population, as the participants in my study were paid a small amount to participate. Therefore, my results may not be representative of all Americans (Sargisson et al. 2020).

Conclusion and Recommendations for Future Research

With an increase in food waste, research is needed to examine the trends of consumer behaviour and the effectiveness of marketing strategies on household food waste. My results did not support the effectiveness of the marketing strategies of self-persuasion or direct persuasion on intentions to reduce food waste. However, environmental values (behaviour preferences) hold crucial insight into the effectiveness of persuasion approaches that can aid future research. More specifically, self-persuasion techniques may aid behavioural change for consumers who are more likely to act in ways that benefit the environment (self-transcendence) when message framing is of environmental benefit. However, future research should explore the effectiveness persuasion interventions in aiding consumers with egoistic values to reduce their food waste. As such, future research should explore the relationship between egoistic values, social influence, and financial savings as proposed by Kis et al. (2020). These theories, paired with my finding may guide future research approaches.

Future researchers should perform a test-retest reliability analysis of the item used to measure intentions to reduce food waste. Alternatively, future researchers could develop a multiple-item scale to measure participants' intentions to reduce their food waste. A multiple-item scale will increase scale reliability, ultimately improving scale validity (Cappelleri et al., 2014). I recommend that researchers apply the Rasch model whilst developing this multiple-item scale (Cappelleri et al., 2014). The Rasch model will support researchers in assessing the extent to which an item covers the targeted range of participants' intentions to reduce their food waste whilst accounting for the alignment of an item with a given population (Cappelleri et al., 2014).

My research aligns with previous research in that my participants also wasted a large amount of fruit and vegetables. With a high frequency of participants indicating that they waste food using sustainable disposal methods, much research is needed to understand the factors that maintain food-waste behaviour (Ahmed et al., 2021). As such, the Transtheoretical Model (TTM) of consciousness raising that emphasises counter conditioning, social liberation, helping relationships, reinforcement management, and stimulus control may guide future research on persuasion interventions to reduce household food waste (Davison et al., 2020). Overall, I contributed to the sustainable marketing literature in that my results inform marketers of the effectiveness of persuasion interventions that require substantial consideration of the influence of values.

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