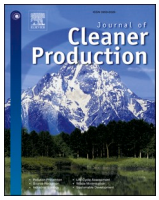
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Like grandmother, like mother, like daughter? Intergenerational influence on consumer intention to reduce food waste

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ABSTRACT

Little is known about the psychological antecedents of personal norms towards food waste reduction albeit such knowledge is key for the design of mitigation interventions at the consumer level. Personal norms to reduce food waste can be formed at an early age and transferred in a family from generation to generation. Filial piety, or the cultural trait of respect for the elderly, can reinforce personal norms and facilitate their intergenerational transfer. This study extends the norm activation model (NAM) to explore the effect of filial piety on consumer intention to reduce food waste. To this end, the study captures the effect of three family generations i.e., grandmothers, mothers, and daughters, on different NAM constructs. The results of a survey in Turkey (n = 311), a country with traditions of respect for (grand)parents, demonstrate a strong effect of filial piety and intergenerational influence on all NAM constructs except for ascription of responsibility. The intergenerational variations in this influence showcase the growing role of secularisation, urbanisation, and media in shaping personal norms of the modern consumer. The implications for theory, practice, and methodology of research on food waste behaviour are discussed.

1. Introduction

Globally, out of 1.3 billion tonnes of food which is lost or wasted annually, an estimated 0.9 billion tonnes, or over 70% of the total, occur at the consumer level (UNEP-United Nations Environment Programme, 2021). This outlines a priority area for mitigation interventions which need to target food consumption in households, foodservice, and retail (Barker et al., 2021). For mitigation interventions to be effective, their design should be informed by empirical research. This research needs to better understand various psychological factors prompting individuals to waste less food at home, when eating out, and in supermarkets (Reynolds et al., 2019).

Research has established personal norms as a key psychological factor in consumer intention to reduce food waste (FW) (see, for example, Kim et al., 2020; Principato et al., 2021; Visschers et al., 2016). Personal norms do not, however, form on their own; but their formation is underpinned by other psychological variables urging individuals to manifest specific behavioural patterns (Roos and Hahn, 2019). Although research on the antecedents of personal norms in the context of FW reduction intention is emerging, it has been limited to a handful of underpinning psychological variables, such as religiosity (Elhoushy and Jang, 2021), informal education (Filimonau et al., 2022b) and Chinese cultural values (Long et al., 2022). More empirical studies are necessitated to establish other psychological factors shaping personal norms of consumers towards intention to reduce FW (Sirieix et al., 2017).

Personal norms are formed at an early age, and as individuals mature, their personal norms evolve, being affected by various factors, such as the people they communicate with, educational institutions, and the media, to mention a few (Pinho et al., 2021). This suggests that dedicated research is required to understand the psychological variables affecting personal norms of consumers when they are young (Wiernik et al., 2013). Personal norms formed at an early age will likely to be either maintained throughout life of individuals or lay the foundation for other norms (Li et al., 2021). Studies of the antecedents of personal norms formed at an early age are, however, rare given the challenges of primary data collection (Filimonau et al., 2022b). The problem of poor

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recall can render an understanding of the early antecedents of personal norms impossible. Longitudinal studies offer a solution; however, because they require long-term observations, the administration of longitudinal investigations can be laborious.

The theory of intergenerational influence (IGI) can aid in understanding the formation of personal norms among consumers at an early age (Shah and Mittal, 1997). IGI posits that personal preferences, values, attitudes, and even behaviours are transferred from one generation to another, with a long-term effect of this transfer spanning across generations (Grønhøj and Thøgersen, 2009). When applied to the context of FW reduction intention, IGI suggests that the value of not wasting food, if it exists in a family, can be transmitted from (grand)parents to their children, and from their children (i.e., parents) to their (grand)children. The effect of IGI is pronounced in societies where (grand) children respect their (grand)parents and listen to what they say, i.e., a phenomenon described by Confucius as filial piety (Xu, 2012). Although IGI has been documented in various consumption contexts, its uptake in research on food sustainability has been limited (Eşsiz and Mandrik, 2022). In particular, no IGI studies have been found in the context of consumer intention to reduce FW. Concurrently, Karunasena et al. (2021) emphasize the need for such studies, recognizing the importance of IGI in building food management skills and acknowledging its impact on household FW generation.

In summary, limited research has considered the antecedents of personal norms towards FW reduction at a consumer level. In particular, little is known about how/if personal norms on FW reduction are formed in a family under IGI. The role of such cultural tradition as filial piety emphasising (grand) children's respect towards their (grand)parents and their advice on FW and its management in households has never been investigated empirically.

This current study will contribute to knowledge by exploring the effect of IGI on FW reduction intention. To this end, the study will analyse the representatives of three generations of food consumers i.e., grandparents (generation 1), parents (generation 2), and grandchildren (generation 3). The study will also test the effect of filial piety on the formation of personal norms among consumers to reduce FW. To this end, data will be collected in Turkey, a country whose cultural traditions prescribe (grand) children to respect their (grand)parents (Özmete and Pak, 2022). To test the effects of IGI and filial piety, the Norm Activation Model (NAM), a well-established theoretical framework for understanding the role of personal norms in forming pro-environmental behavioural intention of consumers, will be adopted and extended. The next section provides further theoretical background to this study and formulates its research hypotheses.

2. Theoretical background

2.1. Norm activation model (NAM)

To fulfil its goals, this study chose to adopt and extend the Norm Activation Model (NAM) (Schwartz, 1977). NAM was preferred to other well-established theories of consumer behaviour, such as the Theory of Planned Behaviour (TPB) by Ajzen (1991) and the Value-Belief-Norm theory (VBN) by Stern et al. (1999), due to the following reasons.

TPB does not directly incorporate the element of personal norms, which represents the cornerstone of this study's conceptualisation. Although Ajzen (1991) has pinpointed the importance of 'personal beliefs' in forming consumer attitudes, the key element of TPB, they have not explained how these beliefs are formed. Further, FW research has long recognised that consumer attitudes exert the weakest impact on FW reduction intention (Elhoushy and Jang, 2021). Hence, TPB was not deemed suitable for this study.

Unlike TPB, VBN directly incorporates personal norms which affect consumer behaviour and are, in turn, affected by personal beliefs in the need to conserve the environment (Stern et al., 1999). Further, in contrast to TPB, VBN posits that these personal beliefs are influenced by three types of personal values i.e., biospheric, altruistic, and egoistic (Stern, 2000). However, VBN has originally been designed to explain the drivers of pro-environmental behaviour. Hence, it is sometimes referred to as the *VBN theory of environmentalism* postulating that pro-environmental values shape pro-environmental beliefs, which then affect pro-environmental personal norms (Stern et al., 1999). This background conceptualisation and analytical sequence were not deemed suitable for this study which set out to measure how FW reduction intention could have been formed by IGI. Further, Stern (2000) admits that VBN is grounded in NAM but assumes that numerous anthropogenic activities across the globe with their negative environmental impacts must have shaped consumer pro-environmental beliefs (Al Mamun et al., 2022). For these reasons, VBN was not adopted in the current study.

NAM has originally been developed to understand how behavioural intention is formed by personal moral obligations (Schwartz, 1977). Hence, NAM incorporates personal norms as a cornerstone element of analysis because empirical studies have demonstrated that normative considerations represent important drivers of pro-environmental consumer behaviour (Van der Werff and Steg, 2015). Normative considerations prompt consumers to prioritise common interests over their self-interests, thus activating a pattern of altruistic behaviour (Wang et al., 2021) or behaviour which strives to achieve wider societal benefits, such as environmental conservation (Teng et al., 2022).

NAM postulates that a personal norm of consumers to, for example, conserve the environment is formed by various factors, whereby two have been proposed as the most significant ones i.e., awareness of consequences and ascription of responsibility (Wang et al., 2021). NAM suggests that an individual should be aware of the (negative) result of their action (for instance, food wasted when eating out) and accept responsibility for this result (Wang et al., 2022). This should prompt individuals to feel morally obliged to rectify the result of their action if it is negative (Kim et al., 2022). For example, in the case of FW, seeing how much food they waste and feeling morally obliged to reduce this wastage, an individual can develop an intention towards FW reduction.

NAM has been extensively examined and proven valid in numerous studies of the antecedents of individual actions in the context of various environmental impacts, including FW (Qi and Roe, 2016). Given that NAM prioritises interests of a group, such as a family, over self-interests (Wang et al., 2021), it offers a suitable background theory to study IGI on FW. This is because one generation of consumers (for example, children) can act on FW in line with how they think the other generations of their family (for instance, parents or grandparents) will expect them to act (Matthies et al., 2012). This implies that a personal norm (for example, to reduce FW) can be transmitted from generation to generation and reinforced or, in contrast, weakened during this transmission (Grønhøj and Thøgersen, 2009).

NAM can operationalise the factors affecting personal norms either sequentially i.e., assuming a mediating effect between awareness of consequences and ascription of responsibility (see, for example, Wang et al., 2021), or by considering these factors as moderators (see, for instance, Kim et al., 2022). Empirical evidence shows that sequential NAM has more predictive power, and it therefore prevails in studies on pro-environmental consumer behaviour (Han and Hwang, 2016). Hence, the current study chose to employ the original, sequential version of NAM and, in line with this choice, the following research hypotheses were formulated.

H1. Awareness of consequences has a positive impact on ascription of responsibility.

H2. Ascription of responsibility has a positive impact on personal norms.

H3. Personal norms have a positive impact on intention to reduce FW.

The critique of NAM is that it does not incorporate other factors which can influence personal norms (Steg and Vlek, 2009). However, NAM offers the opportunity to add new factors to the model, thus

modifying or extending it; see, for example, Kim et al. (2022) and Wang et al. (2022). In the current study, the factor of filial piety is integrated into NAM, and the moderating effect of IGI is captured by the analysis of three generations of consumers, as explained next.

2.2. Filial piety

NAM has been criticised for ignoring the potentially significant effect of social norms on pro-environmental behavioural intention (Olsson et al., 2018). Social norms can prompt individuals to waste less food (Stancu et al., 2016) although their influence is not always strong (Coşkun and Yetkin Özbük, 2020) and can even be negative in certain food consumption contexts. For example, the cultural trait of face saving in China contributes considerably to FW generation in restaurants because consumers are bound to order more food than necessary to showcase their hospitality (Long et al., 2022).

Studies have attempted to examine the combined effect of social and personal norms on pro-environmental behavioural intention (Liu et al., 2017). However, the results indicate that the correlation between social norms and behavioural intention weakens when personal norms are added to the analysis (Thogersen, 2006). This can be explained by the (better) internalisation of personal norms by consumers as social norms are considered (more) externalised (Jansson and Dorrepaal, 2015).

However, social norms can be (better) internalised if they become culturally embedded and transmitted from one generation to another (Wang and Zhang, 2020). Filial piety may represent one of such norms that have been 'internalised' throughout time. Filial piety sets the extent of (grand) child responsibility for their (grand)parents and prescribes treatment of (grand)parents by their (grand)children (Yeh and Bedford, 2003). For instance, filial piety requires (grand) children to support and care for their (grand)parents when they are in need; (grand) children should also respect their (grad)parents and account for their opinion (Sung, 1998).

Filial piety is explicitly underpinned by the notions of reciprocity and authority (Özmete and Pak, 2022). Reciprocity implies trusting family relationships and the expression of gratitude; authority suggests that (grand) children should obey family hierarchy, be considerate of their (grand)parents and meet their demands or expectations (Yeh and Bedford, 2003). Knowledge transfer is one of the elements of reciprocity and authority in the context of filial piety, whereby (grand)parents expect their (grand)children to listen to and learn from them (Sung, 1998).

Accordingly, this current study operationalises filial piety and integrates it in NAM as a form of social norms which have become so deeply embedded in society with time that they are often considered as the 'internalised' norms. Although it was originally proposed to describe the Confucian society of China, filial piety has since been detected in other nations, such as Russia, Kazakhstan, and Turkey (Özmete and Pak, 2022). In these societies, it has become normative for (grand) children to pay tribute and respect to their (grand)parents. This has prompted Bedford and Yeh (2019) to call for reconceptualization of filial piety from its traditional definition as a set of Chinese, culture-specific norms to a contextualized, personality construct which is considered normative in societies outside China. According to Bedford and Yeh (2019), this construct is represented by a pair of complex, culturally-sensitive, psychological schemas of parent–child interactions transmitted from one generation to another. During this transmission, the psychological schemas of intergenerational interaction have become a norm.

Although filial piety has never been studied in the context of NAM, it is well aligned with the key constructs of this theory when considering the challenge of FW at a consumer level. According to NAM, consumers should first develop an awareness towards the need to reduce FW i.e., the awareness of consequences construct of this theory. As Filimonau et al. (2022b) demonstrate, this awareness can emerge in a family and be transmitted from one generation to another. For example, if a conscious effort is made in a family to save food from going to waste, then a representative of younger generation (i.e., a child) can remember this effort and apply it when they grow up, potentially transmitting it to the next generation. This is aligned with the concept of filial piety whereby a (grand) child respects what they have learnt from their (grand)parents (Sorokowska et al., 2020). The same argument applies to the other NAM constructs i.e., ascription of responsibility, personal norm, and intention to reduce FW. If a child learns from their parents about the need to save food from going to waste, then there is high probability that a child will develop a feeling of responsibility for the food which they consume (and waste). Consequently, a child can nourish a norm towards FW reduction and act upon this norm when they grow up. Further, they may transmit this norm to next generations, thus showcasing filial piety in the form of respect paid to what they have learnt from their (grand)parents. Hence, the following research hypotheses are formulated.

H4. Filial piety has a positive impact on awareness of consequences.

H5. Filial piety has a positive impact on ascription of responsibility.

H6. Filial piety has a positive impact on personal norms.

H7. Filial piety has a positive impact on intention to reduce FW.

2.3. Intergenerational influence (IGI)

Intergenerational influence (IGI) in pro-environmental learning has long been recognised given that family members spend most of their time together and can, therefore, influence each other (Maddox et al., 2011). This influence can occur in two directions: parents can affect the outlook of their children through such processes as at-home education and family upbringing (Filimonau et al., 2022b). Children can also impact the viewpoints of their parents, especially as they mature and get access to new information sources such as via educational institutions, peers, and the media (Eşsiz and Mandrik, 2022). Research has showcased family as key to intergenerational transmission of pro-environmental values, beliefs, and practices, such as energy and water conservation (Grønhøj and Thøgersen, 2009) and recycling (Katz-Gerro et al., 2020).

IGI has demonstrated its role in shaping food management practices in households. Muhialdin et al. (2021) highlight how traditional foodstuffs have retained their societal significance through the centuries due to knowledge on their preparation and cooking being transferred through generations. Sorokowska et al. (2020) indicate how family eating habits can affect FW behaviour among both children and adults. Lastly, Filimonau et al. (2022a) discuss how FW perceptions of (grand) children are shaped in response to how food is purchased, stored, prepared, cooked, and consumed by their (grand)parents.

IGI in food management practices is facilitated by familial food socialization processes (Block et al., 2011). These are the processes by which children gain relevant skills, knowledge, norms, and attitudes related to food and its management (Kharuhayothin and Kerrane, 2018). For example, parents can prompt children to purchase organic produce or cook food in a specific way (Visser et al., 2016). Familial food socialization commences in early childhood, shaping consumption practices which often sustain throughout life (Ekstrom, 2006). This identifies (grand)parents as the key agents of change who can influence the future consumption habits of their (grand)children (Birch and Fisher, 1998).

IGI on pro-environmental norms, attitudes, behavioural intention and behaviour is usually examined by collecting and analysing data from two generations of consumers, such as fathers/mothers and sons/daughters (Grønhøj and Thøgersen, 2009). These datapoints are referred to as the 'dyads', and the method of data collection and analysis is described as the 'nominal dyad method' (Mandrik et al., 2005). When applying this method, it is important to ensure that data are collected from the individuals of the same gender. This is because same-gender generational dyads have been found to be more similar in the development of consumption preferences, norms, and attitudes (Mandrik et al., 2018). Gender has been shown important in research on IGI on pro-environmental behaviour (Kharuhayothin and Kerrane, 2018).

Stronger IGI correlations have been established between daughters and mothers (Eşsiz and Mandrik, 2022), and girls have been found to be more concerned about environmental conservation than boys (Casaló and Escario, 2016).

This current study adds to the body of knowledge on IGI and its role in food management practices in households by extending the scope of analysis towards three generations of consumers. Goodman (2003) was first to highlight the strong affective bonds formed among grandparents, parents and grandchildren defining these as the intergenerational triads. In the current study, data are collected and analysed from the representatives of three generations i.e., grandparents (generation 1), parents (generation 2), and grandchildren (generation 3). By integrating the third generation in analysis, as originally suggested by Goodman (2003), this current study anticipates to not only reinforce the analysis, but also to advance research on FW reduction intention methodologically. Given the considerable role of gender in IGI, a study of three generations, such as this one, is grounded on same-gender datapoints, i.e., grandmothers, mothers, and granddaughters.

Drawing upon the above, the current study sets out to answer the following research question: To what extent do the relationships hypothesized in the extended version of NAM (H_1–H_7) differ across the three generations? Importantly, given the conceptual novelty of IGI when applied in the context of FW research, its potential influence is not hypothesized in the current, exploratory study. Fig. 1 presents the research model. The next section explains the research methodology.

3. Methodology

3.1. Study context

Turkey was chosen as the study context because of several reasons. First, its society has a long-established cultural tradition of filial piety, as explained earlier. Second, it is estimated that, annually, circa 18 million tonnes of food are either lost or wasted in Turkey (United Nations, 2021). This implies that Turkey accounts for almost 1.5% of global food loss and waste, thus calling for urgent mitigation. Third, research has showcased the importance of females in shopping for food and household cooking in Turkey (İlhan and İşçioğlu, 2015; Özbük et al., 2022). Studies have also highlighted the critical role of females in FW generation and management at a household level in Turkey given their prime responsibility for food preparation tasks at home (Aka and Buyukdag, 2021; Bölükbaş et al., 2021; Bozdağ and Çakiroğlu, 2021). This justifies the focus of the current study on females in Turkey given the significance of their (more active) engagement in FW reduction to enable the nation's progress towards environmental sustainability goals.

3.2. Instrument design

Data were collected by the survey method. The survey questionnaire consisted of three sections. The first section included the screening question *'Which generation do you represent?'* to identify the generation to which study respondents belonged i.e., grandmothers, mothers, or daughters. Emojis were used here as these were found to improve public engagement with quantitative studies in the domain of food consumption (Jaeger et al., 2018). The second section incorporated questions measuring the research model's constructs. Intention to reduce FW was measured with three items (for example, "I intend to reduce food waste in my household in the following months") from Russell et al. (2017). Personal norms were measured with three items (for instance, "Wasting food is unacceptable") from Stancu et al. (2016). Awareness of consequences was measured with three items (for example, "Food waste causes significant problems for society"); ascription of responsibility was measured with three items (for instance, "I, as an individual citizen, can do a lot to reduce food waste"); all items were taken from Milfont et al. (2010) and Thogersen (1999). Filial piety was measured with three items adapted from Yeh and Bedford (2003) (for example, "I am grateful for what my parents taught me about food"). All constructs were operationalized using a five-point Likert-style scale (1 = strongly disagree to 5 = strongly agree). The third section collected the socio-demographic characteristics of the sample. Similar to the first section of the questionnaire, emojis were used here for better engagement.

The survey was administered in Turkish. To this end, all survey items were back translated from English by a certified translator to ensure adequate semantic equivalency and linguistic functionality. The content and face validity of the questionnaire was evaluated by an academic expert in consumer behavior and FW. Lastly, the questionnaire was piloted with a group of 30 volunteers consisting of daughters, mothers, and grandmothers. Minor changes were made to the wording of some questions following the pilot study. Appendix A provides an English copy of the final version of the questionnaire.

3.3. Sample selection and survey administration

The current study employed daughters, mothers, and grandmothers as sampling units. Several grounds were used to explain this selection. First, although these generations may not be living in the same household, they continue to influence each other throughout their lives (Goodman, 2003). Second, same-gender generations have similar consumption patterns and preferences (Mandrik et al., 2018; Moore-Shay and Lutz, 1988). Third, mothers play the most influential role in food decisions and affect FW in households directly due to their food procurement and cooking skills (Graham-Rowe et al., 2014; Porpino et al., 2015). Thus, the relationship between the same-gender representatives of the three generations of Turkish families provided the scope to

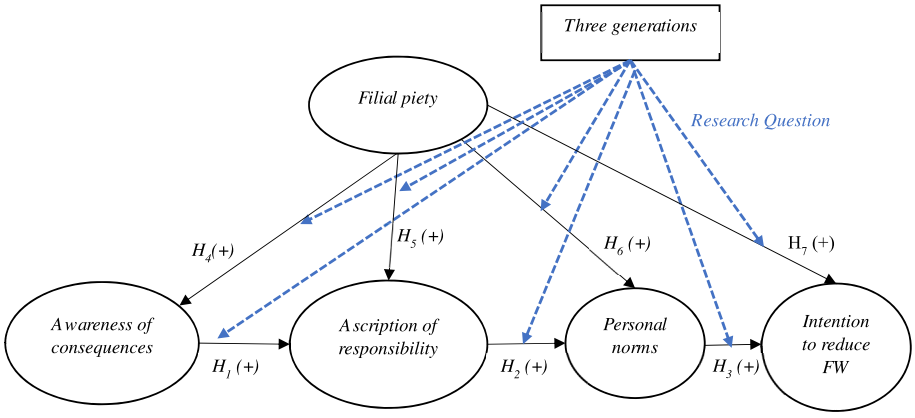


Fig. 1. Research model.

achieve the goal of the current study with maximum effectiveness.

Data were collected via an online survey targeting daughters, mothers, and grandmothers. Snowball sampling was used to reach prospective study respondents, whereby female students and employees from a public university in Turkey were requested to share a survey link with their daughters older than 16, mothers, and grandmothers. No financial incentive and no extra course credit were given to the students in exchange for participating in the study and distributing a survey link. Snowball sampling is often used in research targeting multiple generations of consumers (see, for example, King and Elder, 1997; Werner et al., 1998, 2007); hence, it was considered appropriate for the current study.

The survey was administered between April and June 2022. 318 responses were initially collected; after data cleaning, the final sample consisted of 311 useable cases. The sample was composed of 127 daughters (40.8%), 93 mothers (29.9%), and 91 grandmothers (29.3%). The daughters' ages ranged from 16 to 44, and the mothers' ages ranged from 16 to 64. The grandmothers' ages were 53 and above. Table 1 presents the sample's characteristics.

4. Results

4.1. Common method variance

Harman's one-factor test was used to assess the common method bias. All items measuring the constructs were fixed to extract one factor in the principal component factor analysis. The total variance extracted by one factor was 39.957% i.e., less than the recommended threshold of 50%, indicating no problem with the common method bias.

4.2. Validity and reliability check

First, the measurement model was evaluated to determine whether the indicators were a good representation of latent variables. Although there is no universal threshold for what the standardised factor loadings should be, one item in the personal norms was removed from the model because its factor loading was less than 0.70 ($\lambda = 0.563$). The measurement model was re-tested, and the results of the confirmatory factor analysis indicated that the model had adequate goodness-of-fit ($\chi 2/df = 3.798$, $p < .001$, RMSEA = 0.095, SRMR = 0.047, CFI = 0.944, IFI = 0.944, TLI = 0.924). All factor loadings were found to be significant (p.001) and greater than 0.70, indicating that they met the convergent validity criteria (Kline, 2015). Furthermore, average variance extracted (AVE) values ranged between 0.593 and 0.863, indicating adequate convergent validity (Fornell and Larcker, 1981). Discriminant validity was evidenced by the square root of AVE being greater than its highest correlation with other constructs (Table 2).

Next, the composite reliability (CR) values of constructs were checked. The values ranged from 0.813 to 0.950, thus being greater than the suggested threshold of 0.70 (Bagozzi and Yi, 1988). The validity and reliability of the constructs were, therefore, supported. A detailed summary of the measurement model is provided in Table 3.

4.3. Structural equation modelling

The structural equation modelling assessed the hypothesized

Table 1
Sample characteristics.

		Daughters	Mothers	Grandmothers	Total
Sample size		n1 = 127 (40.8%)	n2 = 93 (29.9%)	n3 = 91 (29.3%)	n = 311 (100%)
Age	16–24	104(81.9%)	6(6.5%)	0	110 (35.4%)
	25–34	15(11.8%)	11(11.8%)	0	26(8.4%)
	35–44	8(6.3%)	41(44.1%)	0	49(15.8%)
	45–54	0	33(35.5%)	4(4.4%)	37(11.9%)
	55–64	0	2(2.2%)	24(26.4%)	26(8.4%)
	65–74	0	0	53(58.2%)	53(17%)
	75–84	0	0	9(9.9%)	9(2.9%)
	85 and above	0	0	1(1.1%)	1(0.3%)
Education	No official diploma	0	2(2.2%)	24(26.4%)	26(8.4%)
	High school or lower	101(79.6%)	58(62.3%)	64(70.4%)	223 (71.8%)
	4-years degree	21(16.5%)	22(23.7%)	3(3.3%)	46(14.8%)
	Master's and PhD	5(3.9%)	11(11.8%)	0	16(5.1%)
Employment	Student	90(70.9%)	5(5.4%)	0	95(30.5%)
	Full-time paid	20(15.7%)	30 (32.3%)	0	50(16.1%)
	Part-time paid	6(4.7%)	3 (3.2%)	0	9(2.9%)
	Retired	0	8(8.6%)	31(34.1%)	42(13.5%)
	Business owner	2(1.6%)	7(7.5%)	1(1.1%)	10(3.2%)
	Housewife	2(1.6%)	39(41.9%)	59(64.8%)	100 (32.2%)
	Student and full-time/part time paid	7(5.5%)	1(1.1%)	0	8(2.6%)
Household income	Less than net minimum wage	64(50.4%)	28(30.1%)	45(49.5%)	137(44.1%)
	Higher than net minimum wage	31(24.4%)	43(46.2%)	17(18.7%)	91(29.3%)
	Rather not to say	32(25.2%)	22(23.7%)	29(31.9%)	83(26.7%)
Number of generations in a household	One generation	50(39.4%)	15(16.1%)	61(67%)	126 (40.5%)
	Two generations	70(55.1%)	73(78.5%)	23(25.3%)	166 (53.4%)
	Three generations	7(5.5%)	5(5.4%)	7(7.7%)	19(6.1%)
Responsible person for food related decisions in childhood	Mother	116(91.3%)	84(90.3%)	81(89%)	281 (90.4%)
	Father	3(2.4%)	2(2.2%)	3(3.3%)	8(2.6%)
	Me	1(0.8%)	0	0	1(0.3%)
	Grandparents	6(4.7%)	6(6.5%)	6(6.6%)	18(5.8%)
	Siblings	1(0.8%)	1(1.1%)	0	2(0.6%)
	Relatives	0	0	1(1.1%)	1(0.3%)
Person responsible for upbringing of children in a household	Parents	96(75.6%)	77(82.8%)	63(69.2%)	236 (75.9%)
	Grandparents	7(5.5%)	5(5.4%)	10(11%)	22(7.1%)
	Parents and grandparents	21(16.5%)	10(10.8%)	13(14.8%)	44(14.1%)
	Siblings	2(1.6%)	0	4(4.4%)	6(1.9%)
	Relatives	0	0	1(1.1%)	1(0.3%)
	Other (a baby sitter, friends, etc.)	1(0.8%)	1(1.1%)	0	2(0.6%)

Table 2
Discriminant validity assessment.

Variables	(1)	(2)	(3)	(4)	(5)
(1) AWR	.770[a]				
(2) RESP	.561[b]	.793			
(3) NORM	.493	.454	.925		
(4) FILIAL	.367	.232	.422	.889	
(5) INT	.652	.659	.558	.358	.929

[a] The square root of AVE of the construct is on the diagonal.
[b] Correlations between variables are below the diagonal.

Table 3
Measurement model results.

Variables	λ	t-value	CR	AVE
Awareness of consequences (AWR) (M = 4.549, SD = .559)			.813	.593
Food waste causes significant problems for society	.724	12.220		
I worry about unconscious consumption of food	.792	13.190		
I believe that food waste cause serious environmental problems	.792	†		
Ascription of responsibility (RESP) (M = 4.121, SD = .685)			.836	.630
I, as an individual citizen, can do a lot to reduce food waste	.744	13.804		
It is my responsibility to reduce food waste	.767	14.270		
Personally, I can do a lot to reduce food waste	.865	†		
Personal norm (NORM) (M = 4.420, SD = .638)			.923	.857
Wasting food is unacceptable	*	*		
Wasting food would make me feel guilty	.940	18.746		
Wasting food would make me feel bad	.911	†		
Filial piety (FILIAL) (M = 4.235, SD = .754)			.919	.791
I am grateful for what my parents taught me about food	.880	21.980		
I respect what my parents taught me about food	.881	22.046		
I will always owe my parents for what they taught me about food	.907	†		
Intention to reduce FW (INT) (M = 4.525, SD = .566)			.950	.863
I intend to reduce food waste in my household in the following months	.903	25.449		
I am willing to save food from waste in my household in the following months	.982	31.253		
I plan to waste less food in my household in the following months	.900	†		

Note: λ = Standardized coefficients, CR=Composite reliability, AVE = Average variance extracted'.
*Items removed in CFA, † Items fixed to 1 in CFA.

relationships between the original NAM variables. The results indicated that the model had an acceptable fit ($\chi2 = 315.428$, df = 41, $\chi2/df = 7.693$, $p < .001$, RMSEA = 0.147, SRMR = 0.178, CFI = 0.893, IFI = 0.893, TLI = 0.856). Moreover, 32.6% of the variance in the intention to reduce FW was explained by the original NAM predictors.

Next, the extended NAM, including the filial piety construct, was tested. The result indicated that the model retained an acceptable fit ($\chi2 = 377.124$, df = 70, $\chi2/df = 5.387$, $p < .001$, RMSEA = 0.119, SRMR = 0.130, CFI = 0.908, IFI = 0.909, TLI = 0.881) while the explained variance increased to 34.5%. Although the value of RMSEA did not meet the recommended threshold of 0.08–0.1, this may have been attributed to the small sample size examined in the current study. Further, high RMSEA values can be observed in the datasets with separated data points (Arnold and Fletcher, 2015), such as in the case of three generations of consumers. Hence, the model was considered to be acceptable for analysis.

When the hypothesized relationships were examined, it was discovered that awareness of consequences had a positive influence on ascription of responsibility, supporting H_1 ($\beta = 0.558$, $p < .05$). Ascription of responsibility positively affected personal norms ($\beta = 0.428$, $p < .05$), thereby supporting H_2. Personal norms positively influenced intention to reduce FW ($\beta = 0.510$, $p < .05$). Therefore, H_3 was supported. Although the effect of filial piety on ascription of responsibility was not found to be significant ($\beta = 0.030$, $p = .638$), thereby rejecting H_4, filial piety significantly affected personal norms ($\beta = 0.322$, $p < .05$), and intention to reduce FW ($\beta = 0.146$, $p < .05$), which supported H_5 and H_6. Table 4 reports the results of the structural equation modelling.

4.4. Moderation effect – a multi-group analysis

Drawing upon Yoo (2002), a multi-group analysis was conducted to examine the moderating effect of generations in the extended NAM. The multi-group analysis consisted of two steps, including measurement and a structural invariance test. Measurement invariance ensures that the items and constructs share the same meaning in different groups i.e., daughters, mothers, and grandmothers for the current study. To test measurement invariance between three groups, first, a non-restricted model was tested using confirmatory factor analysis, and the $\chi2$ value of the non-restricted model was then compared to the $\chi2$ value of the full-metric invariance model in which factor loadings were fixed to be equal across three groups (Yoo, 2002). The $\chi2$ difference test revealed that two models were significantly different ($\Delta\ \chi2_{(14)} = 24.714$, $p = .037$) highlighting the lack of support for the full metric invariance assumption. However, this process was iterative i.e., relaxing one path at a time, and other models were tested until partial metric invariance was achieved.

After determining that there was partial metric invariance, structural invariance was tested to identify the potential moderating effect of generations in the extended NAM. First, the unconstrained model, in which all the paths were freely estimated, was tested. Then all the paths were constrained to be equal across three groups. The unconstrained model was then compared to the constrained model. The $\chi2$ difference test between models was significant showing that the assumption of full structural invariance was achieved ($\Delta\ \chi2_{(32)} = 109.264$, $p = .000$). In sum, as anticipated, generations moderated the hypothesized relationships in the extended NAM. Table 5 reports the results of the measurement and the structural invariance model for the three generational groups under review.

The research question of whether the structural paths differed among generations was checked for all hypothesized relationships in the extended NAM. The results indicated that the original NAM predictors differed among generations. For instance, the effect of awareness of responsibility on ascription of responsibility (H_1) was the strongest for daughters ($b = 0.789$), followed by grandmothers ($b = 0.484$) and mothers ($b = 0.467$). However, there was stronger predictability for mothers ($b = 0.599$) than daughters ($b = 0.446$) and grandmothers ($b = 0.213$) in the relationship between ascription of responsibility and personal norms (H_2). The strongest positive effect was also observed for mothers ($b = 0.648$) in the case of the effect of personal norms on intention to reduce FW (H_3) followed by daughters ($b = 0.498$) and then grandmothers ($b = 0.486$).

Table 4
Structural model results.

Hypothesized Paths	Coefficients	*t values*	Hypothesis
H_1: AWR→RESP (+)	.558	7.486	Supported
H_2: RESP→NORM (+)	.428	7.085	Supported
H_3: NORM→INT (+)	.510	8.661	Supported
H_4: FILIAL→ AWR (+)	.377	5.848	Supported
H_5: FILIAL→RESP (+)	.030	.470	Not Supported
H_6: FILIAL→NORM (+)	.322	5.810	Supported
H_7: FILIAL→INT (+)	.146	2.614	Supported

Table 5
Metric and structural invariance model for generations ($n_{daughter} = 127$, $n_{mother} = 9$, $n_{grandmother} = 91$).

Model description	$\chi2_{(df)}$	[c] $\chi2_{(df)}$	*p*
Unconstrained model	$520.365_{(209)}$		
Full metric invariance model	$545.079_{(223)}$	$24.714_{(14)}$	.037
Partial metric invariance model[a]	$536.335_{(221)}$	$15.970_{(12)}$	.193
Structural invariance test			
Unconstrained model	$1332.438_{(221)}$	–	
Full structural invariance model	$1413.428_{(249)}$	$80.990_{(28)}$ [b]	.000

[a] In this model, one invariance constraint of RESP was relaxed.
[b] $\chi2$ difference test $p = .000$ (significant), thus full structural invariance was supported.
[c] $\chi2$ = Difference in $\chi2$ values between models, Δdf = Difference in number of degrees of freedom between models.

The extended NAM hypotheses revealed mixed results across generations. For instance, the relationship between filial piety and awareness of consequences (H_4) was found to be the strongest for daughters ($b = 0.446$) followed by grandmothers ($b = 0.382$) and mothers ($b = 0.307$). On the other hand, the effect of filial piety on ascription of responsibility (H_5) was not significant across groups. The relationship between filial piety and personal norms (H_6) was found to be positive and significant for daughters ($b = 0.205$) and grandmothers ($b = 0.640$). The effect of filial piety on intention to reduce FW (H_7) was only significant for mothers ($b = 0.277$). In summary, the results of the multi-group analysis indicated substantial differences between generations (Table 6).

5. Discussion

This current study made several contributions to knowledge. First, it established that the original NAM variables were significant in predicting how awareness of consequences, ascription of responsibility, and personal norms could all affect FW reduction intention in the household context of Turkey. This finding provided further empirical evidence to showcase the analytical power of NAM when explaining FW behaviour, thus supporting the results of previous studies testing how NAM could aid in understanding pro-environmental consumer behaviour (Chun T'ing et al., 2021; Wang et al., 2019; Zhang et al., 2018).

More specifically, the current study demonstrated that if individuals recognised the adversity of FW, they would be more likely to accept responsibility for this FW. This, in turn, would have high probability of activating their moral obligations i.e., personal norms, to act upon FW reduction. This result was aligned with the literature which had shown a strong relationship between awareness of consequences, ascription of responsibility, and personal norms of consumers in the context of their intention to conserve the environment (Gao et al., 2017; He and Zhan, 2018; Zhang et al., 2018). Importantly, in the current study, personal norms were found to exert the strongest effect on individuals' intention to reduce FW. This supported Filimonau et al. (2022b) in their call for a dedicated line of research to identify other psychological variables which could become effective activators of personal norms towards FW reduction among consumers.

Second, by extending the original NAM, the current study demonstrated that filial piety could become one of the psychological variables effectively activating personal norms to reduce FW. Previously, filial piety was examined from the perspective of parent–child interactions (Özmete and Pak, 2022), predominantly through the lens of Chinese culture (Bedford and Yeh, 2019). This current study indicated that filial piety could also serve to explain the antecedents of consumer behaviour towards FW reduction when applied in the context of multiple family generations. More specifically, filial piety was found to exert the strongest effect on such elements of NAM as awareness of consequences and personal norms. The effect of filial piety on intention to reduce FW was weaker and yet significant. Ascription of responsibility was the only variable from the original NAM whereby filial piety exerted no influence.

This finding suggested that if FW reduction was practised in a family via, for instance, resourceful cooking (Filimonau et al., 2023), then this effect would have high probability of being transferred from one generation to another and, more specifically, from grandmother to mother and from mother to daughter. Filial piety would make younger generations more aware of the problem of FW, thus potentially prompting its reduction. Most importantly, filial piety would reinforce personal norms among the representatives of younger generations to reduce FW, which would, again, be transferred to the following generations. Little influence of filial piety on ascription of responsibility could be explained by the gradual changes in food purchasing and cooking practices in the modern societies. While in the past (grand)mothers may have had full control over what they could purchase and how they would cook purchased food, in the modern societies this control may have weakened. This is because food became more affordable and abundant while the practice of purchasing and cooking food had changed. For example, food can be purchased (and even cooked) by men given that women are expected to have full-time jobs in the modern societies. This explanation may particularly apply to Turkey, which, despite having a predominantly Muslim population, is a secular state.

Third, drawing upon the concept of filial piety, the current study integrated the perspective of IGI in explaining how FW reduction intention of consumers could be formed. This is a novel contribution to knowledge, as previous studies have emphasised the role of IGI in food management in households (Block et al., 2011; Ekstrom, 2006; Kharuhayothin and Kerrane, 2018), but they have never examined this role in the context of FW behaviour. More specifically, the current study demonstrated how three generations differed in terms of their intention to reduce FW by using the extended NAM. Varying effect was detected for different generations in various constructs of NAM.

The effect of awareness of consequences on ascription of responsibility (H_1) was higher for daughters than for mothers and grandmothers (Table 6). This could be because different generations would have different amounts of *'cultural capital'* (Bourdieu, 1986) which represents the sum of all knowledge and skills obtained by individuals through informal (i.e., family upbringing) and formal (i.e., school and university) education. It is fair to suggest that, in the modern societies, younger generations have the highest level of cultural capital given their exposure to multiple sources of knowledge and skills,

Table 6
Structural model results.

Hypothesized Paths	Daughters (n = 127)		Mothers (n = 93)		Grandmothers (n = 91)	
	Estimate	*t-values*	Estimate	*t-values*	Estimate	*t-values*
H_1: AWR→RESP (+)	.789	5.110**	.467	3.879*	.484	3.767**
H_2: RESP→NORM (+)	.446	4.392**	.599	5.417**	.213	2.312*
H_3: NORM→INT (+)	.498	4.935**	.648	7.030**	.486	3.383**
H_4: FILIAL→AWR (+)	.446	3.770**	.307	2.776**	.382	3.483**
H_5: FILIAL→RESP (+)	−.013	−.127	−.068	−.594	−.053	−.462
H_6: FILIAL→NORM (+)	.205	2.199*	.068	.711	.640	6.841**
H_7: FILIAL→INT (+)	.121	1.266	.277	3.285**	.095	.711

including in the domain of food. This was also confirmed by the sample studied, where the educational level of daughters was higher than the educational level of mothers and grandmothers (Table 1). Furthermore, national statistics of Turkey show that while 94.1% of Turkish females aged 16–24 use the internet, only 25.9% of females aged 65–74 do (TÜİK, 2021a). This further confirms that daughters may have developed larger 'cultural capital' which improves their awareness of FW as a major societal challenge in the modern societies.

The effect of ascription of responsibility on personal norms (H_2) was found to be the strongest for mothers (Table 6). This could be attributed to the key role of mothers in guiding family food practices through planning, shopping, meal preparation, and handling leftovers (Ristovski-Slijepcevic et al., 2010). In extended, three-generation, households, it is normally the mother who holds the food-related responsibilities. The first generation (grandmothers) may no longer have the physical capabilities to take on this responsibility, while the third generation (daughters), because of their young age, may have neither capability nor the desire to assume this responsibility. For example, Namin et al. (2020) posit that younger generations of consumers prefer spending less time on at-home cooking and are happy to delegate cooking tasks. Being not directly responsible for food-related tasks hinders the assumption of responsibility for FW among grandmothers and daughters. As a result, mothers may have the greatest sense of responsibility for their intention to reduce FW.

The current study found that personal norms had the strongest effect on intention to reduce FW (H_3) among mothers (Table 6). This finding was consistent with previous research indicating that younger people had a lower tendency to demonstrate pro-environmental intentions towards FW reduction than their older counterparts (Ilakovac et al., 2020; Principato et al., 2015; Yetkin Özbük et al., 2022). It was surprising that personal norms had the least effect on intention to reduce FW for grandmothers. This rather unexpected result could be explained by the primary responsibility held by mothers for food-related tasks in households, as discussed above. Further, for grandmothers, wasteless cooking may have become habitual given that, in older days, they had to be resourceful in the kitchen because of food scarcity (Filimonau et al., 2023). Hence, grandmothers may consider FW reduction as habitual norms i.e., practices that have become so embedded in their daily routines that they are no longer perceived as something that needs to be thought about prior to acting (Wallace, 2011).

Filial piety exerted the strongest effect on awareness of consequences among daughters (H_4) (Table 6). This could be attributed to the important role of the media in emphasising FW as a major societal challenge in Turkey and beyond. The media effect is more likely to be observed among the younger generations, as these are exposed to multiple media channels and may have, therefore, become more educated on the FW topic (Teoh et al., 2022).

Filial piety showed no significant effect on ascription of responsibility (H_5) (Table 6). This could be attributed to the family composition factor. Extended families i.e., families consisting of multiple generations, continue to maintain their societal importance in Turkey (TÜİK, 2021b). In extended families, responsibilities can become 'blurred', including those for food-related tasks (Soma, 2017). For example, a grandmother may purchase food at a local market, a daughter may prepare this food for cooking, and a mother will cook and serve a meal. There is scope for FW generation as a result of such 'blurred' responsibilities. For instance, a grandmother may have purchased too much food, a daughter may have prepared this food incorrectly, or a mother may have made an error when cooking a meal. Assigning responsibilities for FW in extended families can be difficult.

Another partial explanation of the limited effect of filial piety on ascription of responsibility may rest in increasing secularisation of Turkish society. The ongoing modernization of Turkey exemplified by the growing influence of digital technology, especially social media, may be gradually re-shaping attitudes of younger generations towards cultural traditions, including respect to the elderly (Ertit, 2018). When translated to the context of FW and its management, this may imply that modern consumers, especially the younger generations, are less likely to follow what they have learnt in their childhood. Coupled with better food availability and accessibility in Turkey (Bölükbaş et al., 2021), this may partially explain why modern consumers do not stick to the advice on food preparation provided by their (grand)parents, thus showcasing limited filial piety in the context of FW reduction.

The results showcased the salient role of filial piety in shaping personal norms (H_6) towards FW reduction (Table 6). This role was the largest for grandmothers. This could be explained by the food scarcity of the past, whereby food had to be cooked from any available ingredients. Cooking resourcefully, i.e., with little FW (Filimonau et al., 2023), had become a norm, and, as time went on, this norm may have transformed into a habit, as explained earlier. Hence, filial piety transmitted to grandmothers from their mothers, i.e., great-grandmothers, exerted the strongest influence on the representatives of the 'older' generation. Ongoing secularisation, modernization, and urbanization in Turkey as well as the growing media influence may have altered the effect of filial piety on personal norms towards FW reduction among mothers and daughters.

The effect of filial piety on intention to reduce FW (H_7) was significant only for mothers (Table 6). This could be attributed to the fact that mothers may have retained the strongest intergenerational tradition of wasteless/resourceful cooking (with the resultant intention to follow this tradition) because of their dominant role in food-related tasks within their respective households (Ristovski-Slijepcevic et al., 2010). Coupled with a strong effect of personal norms on the need to reduce FW, filial piety could, therefore, explain a strong intention towards FW reduction among mothers. Moreover, as discussed earlier, the role of grandmothers in cooking in extended families may have reduced due to such factors as age and illness. As a result, the influence of filial piety on grandmothers' intention to reduce FW may no longer be pronounced. Another potential explanation for the limited effect of filial piety on intention to reduce FW among grandmothers may be their inherited resourcefulness and frugality (Evans, 2011), which prompt them to avoid FW. As for daughters, numerous external factors, such as an abundance of food and food consumption choices, may have reduced their perceived ability to reduce FW. Coupled with their limited responsibility for household cooking and the information overload as a result of media exposure, this could have cumulatively diminished the effect of filial piety on intention of daughters to reduce FW.

6. Conclusion

6.1. Theoretical implications

The current study was designed to determine the effect of filial piety and IGI on consumer intention to reduce FW among daughters, mothers, and grandmothers by extending NAM. The study made three contributions to knowledge. First, it highlighted filial piety as a relevant variable to consider in future studies on the psychological determinants of FW reduction intention at the consumer level. Although the current study tested filial piety by integrating it into NAM, filial piety could also be utilized as a novel variable in other models of consumer behaviour, such as TPB or VBN. Incorporating filial piety within these theoretical frameworks can showcase the role of cultural and ethical concepts in shaping an individual's intentions and behaviour towards FW reduction. The measures of filial piety used in the current study were tested and validated in a survey; therefore, they could be employed in future research on filial piety in the FW context and beyond.

Second, the study demonstrated that intergenerational differences could be useful in explaining the strength and direction of relationships between variables in the extended NAM or any other theory/model of consumer behaviour. By testing the intergenerational effect, the models can capture potential changes in consumer behaviour imposed and sustained over time. The models can be extended accordingly to

integrate external (for example, the media or education effect) and internal (for instance, environmental knowledge or environmental concern) variables, which can aid in explaining these changes.

Third, from the methodological perspective, the study showcased the value of a three-generational analysis i.e., grandmother-mother-daughter, which could be employed in future investigations of IGI in the domain of food consumption and beyond. Previous studies have only considered two generations of consumers to examine the determinants of pro-environmental behaviour. By extending analysis to another generation of consumers, research can offer additional relevant insights into the temporal dynamics of changes in consumer behaviour and attempt to explain how/why these changes may have occurred.

6.2. Policy and managerial implications

From the policymaking and management perspective, the current study outlined the scope for implementing a range of social marketing interventions aiming to increase consumer intention to reduce FW. These interventions should target awareness of consequences of FW as this factor was identified by the current study and previous research as a cornerstone in the analytical sequence of NAM. Moreover, interventions should target personal norms of consumers by appealing to their feeling of filial piety, as these two factors were established as the significant determinants of consumer intention to reduce FW. Specifically, the largest effect of personal norms on intention to reduce FW among the second generation revealed the importance of interventions targeting (current and future) mothers. Targeting current mothers is key from the viewpoint of intergenerational knowledge transfer and filial piety given that they are most likely to pass personal norms on FW reduction onto future generations i.e., their daughters and granddaughters.

The study outlined the scope for the design of effective message framing campaigns for FW reduction. Normative messages i.e., the messages aiming to activate personal norms, are effective for raising consumer awareness of FW (Stöckli et al., 2018) which the results of this current study confirm. Therefore, the following exemplar of normative messages to be shown on TV could be used in social marketing communication: "*Remember the tasty "börek" [a traditional Turkish dish; can be substituted with any traditional dish] which your grandmother used to make? Well, she did it without wasting any food. Can you be as careful with food as your grandmother and not waste it too? Your children will appreciate your effort*". This message is framed to reinforce a norm on FW reduction by appealing to filial piety and by utilizing the power of IGI. Similar messages can be designed for implementation in various food procurement and consumption contexts, such as supermarkets and foodservices, making use of visual and emotional clues. Aside from being designed for broadcasting on traditional media platforms, such as TV, as these are effective for reaching people aged 55 and above, messages can also be developed for other media platforms, such as the internet and social media channels. These will appeal to younger people.

6.3. Limitations and future research

The study had limitations, which outlined avenues for future research. First, the study focused on intention to reduce FW rather than actual FW reduction behaviour. Self-reported FW behaviour is typical for FW research, but future studies should aim at measuring actual behavioural patterns as opposed to the self-reported ones. Second, the sample size achieved in the current study was limited while data were collected via convenience sampling using an online cross-sectional survey questionnaire distributed to consumers in Turkey. Therefore, it is important to exercise caution when attempting to generalize the results of this current study to a wider population. Future research should collect larger, more representative, samples, preferably covering several countries at once for a comparative analysis and, ideally, taking advantage of longitudinal investigations. Studies underpinned by qualitative research methods should also be considered. For example, semi-structured interviews or focus groups with the representatives of different generations can provide in-depth insights into the role of filial piety and IGI in food management in households, including their influence on FW reduction intention. Third, the three generations examined in the current study were comprised of women. Future research can be concerned with the analysis of three generations or even with the analysis of intergenerational triads consisting of men. Ethnographic research is recommended to provide an in-depth understanding of the consumer culture and evolution of FW practices among different generations. Finally, replicating this current study in other countries and comparing the results to the original study could provide insights into the generalizability of the findings. Such a replication could also highlight the potential for not only cross-generational but also cross-cultural differences in the topic under review. This replication would allow for the identification of any patterns or trends that may be specific to a particular country or culture and could inform future research in the FW context.

CRediT authorship contribution statement

Viachaslau Filimonau: Conceptualization, Data curation, Formal analysis, Writing – original draft. **Ayşen Coşkun:** Conceptualization, Data curation, Formal analysis, Writing – review & editing. **Raife Meltem Yetkin Özbük:** Conceptualization, Data curation, Formal analysis, Writing – review & editing. **Vladimir A. Ermolaev:** Conceptualization, Data curation, Writing – review & editing.

Declaration of competing interest

The authors hereby declare no conflict of interest.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jclepro.2023.137920.

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