

Food waste reduction and taking away leftovers: Interplay of food-ordering routine, planning routine, and motives

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ABSTRACT

The hospitality literature is quite deficient in insights on consumer behaviour towards food waste generation and its mitigation in out-of-home dining. The present study addresses this gap by undertaking a mixed-method study to examining a broad spectrum of diners' behaviour, beginning from planning the meal and ending with bringing the leftovers home. To this end, it utilises the Stimulus-Organism-Response theory to conceptualise the association of planning routine, food-ordering routine, motives, attitude, and behaviour of taking away leftovers and throwing away leftovers. The results of analysis of the data collected from 276 diners in the United States confirm a positive association of food-ordering and planning routines with motives, which, in turn, are positively associated with attitude and the behaviour of taking away leftovers. Finally, attitude is not only negatively associated with throwing away leftovers but also partially mediates the association of motives with throwing leftovers away. Our findings provide useful inputs for businesses and researchers to motivate green consumer behaviour.

1. Introduction

Food waste is generated at various points of the food supply chain, including consumption (Chauhan et al., 2021). At the consumption stage, food waste is generated in at-home (household waste) and out-of-home dining (Dhir et al., 2020; Kaur et al., 2021). Consequently, scholars have shown considerable interest in investigating behaviours surrounding consumption waste in both settings (e.g., Stancu et al., 2016; Stöckli et al., 2018; Dhir et al., 2020; Kaur et al., 2021). Interestingly, a recent study by Sharma et al. (2021) has spotlighted the need to examine consumer food waste in the context of food delivery apps (FDAs) also, which represent a unique coming together of at-home and out-of-home setting. Despite this, food waste has continued to increase, leading to calls for more research to evolve a broader approach to tackle waste at the consumption level in both settings (Bravi et al., 2020). Within this, the need to better understand food waste generation and its

corresponding mitigation behaviours is particularly critical in the case of out-of-home dining (e.g., restaurants, food outlets) since there has been a noticeable rise in the trend of eating out across the globe (Okumus et al., 2020) and the resulting increase in food waste arising from it (McCarthy and Liu, 2017). Underscoring this urgency, scholars observe that there is an immediate need to understand and modify consumer behaviour, not only in the private contexts, such as the home or office, but also in public settings, such as restaurants (e.g., Stöckli et al., 2018).

Admittedly, food waste in out-of-home dining, particularly restaurants, has recently been receiving increasing attention from researchers in the hospitality area (Canali et al., 2017; Kizildag et al., 2016; Pirani and Arafat, 2016; Principato et al., 2018). However, most of these studies are associated with approaches and initiatives taken by restaurants to mitigate and manage food waste (Okumus, 2020; Camilleri-Fenech et al., 2020). Specifically, the prior literature has discussed the drivers of food waste (e.g., Kasavan et al., 2019), the impact

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of food waste (e.g., Papargyropoulou et al., 2014), interventions to reduce food waste (Stöckli et al., 2018), food recovery strategies, such as donation (Amato and Musella, 2017), and other aspects of food waste generation, composition, and control (Ho and Chu, 2018; McAdams et al., 2019). Consumers' values and behaviours around dining out have also been investigated to some extent. For instance, Filimonau et al. (2020) discussed the influence of consumers' pro-environmental behaviour on their attitude and subsequent intentions towards food waste mitigation in restaurant dining. Similarly, Kim and Hall (2019) revealed the influence of attitude, subjective norms, and perceived behavioural control on waste reduction behaviour in restaurants.

Some of these studies on consumer behaviour have shifted the focus of research to a hitherto underexplored aspect: leftovers. For instance, Stöckli et al. (2018) discussed interventions that can bring about behavioural change in diners to reduce food waste by taking away leftovers. Highlighting the importance of leftovers, Sirieix et al. (2017) examined consumers' attitudes and behaviours related to doggy bags (also spelt as doggie) – i.e., containers in which to carry leftovers home. Prior studies have revealed that taking leftovers away as 'doggy bags' is a complex decision that is impacted by various motives and barriers (Mirosa et al., 2018). On the one hand, factors like convenience, social stigma, shame, and saving face act as barriers preventing diners from asking for leftovers (Dagiliūtė and Musteikytė, 2019; Liao et al., 2018). On the other hand, factors like concern for the environment may motivate diners to engage in this behaviour (Hamerman et al., 2017). Furthermore, these studies have provided theory-based insights into consumer behaviour based largely on the theories of reasoned action (Hamerman et al., 2017), planned behaviour (Liao et al., 2018), and value-attitude-behaviour (Kim et al., 2019).

Based on the preceding discussion and the availability of the extended academic and industry literature on household food waste, we argue that the literature on food waste in out-of-home dining suffers from the following gaps: (a) there have been limited findings on the drivers of consumer behaviour towards leftovers despite the fact that leftovers can serve as a food waste reduction and food recovery strategy equally as effectively as a food donation; (b) there are no studies on how the diners' actions and thoughts about ordering prior to dining out as well as their food ordering routine when at restaurants drive their decisions related to taking away leftovers after dining out, despite the fact that ordering and planning routines are anecdotally known to affect the amount of leftovers generated. Notably, the behaviours of shopping (i.e., ordering) for food and planning before shopping have received scholarly attention in the at-home setting, i.e., household food waste literature (e.g., Stancu et al., 2016; Stefan et al., 2013). Similarly, although scholars have discussed portion sizes as one of the reasons for food waste generation (Berkowitz et al., 2016), it is not understood whether uncertainty about portion sizes contributes to over-ordering and the subsequent leftover takeaway decision; (c) while some studies have examined the enablers and barriers of the leftover takeaway decision, albeit, in a very narrow manner, no prior study has closed the loop in terms of examining what happens after the leftovers are brought home. For instance, it is not clear whether the leftovers brought home after dining are consumed or thrown away; (d) despite the increasing evidence that theories offering a sequential explanation of consumer behaviour, such as Stimulus-Organism-Response (SOR; Mehrabian and Russell, 1974) and Stimulus-Organism-Behavior-Consequence (SOBC; Davis and Luthans, 1980), are more effective in modelling pro-environmental behaviours (Tandon et al., 2021; Kumar et al., 2021; Talwar et al., 2021) than behavioural theories, such as the theory of planned behaviour, the food waste literature has so far ignored such sequential theories.

Given this, the current study proposes to address these gaps by examining four research questions (RQs):

RQ1. How do the food-ordering and planning routines act as stimuli to drive the organismic internal states of diners, as represented by their

motives to take away leftovers after dining out?

RQ2. How do motives to take away leftovers induce a response in the diners in terms of their attitude and behaviour of taking away leftovers in doggy bags?

RQ3. How do attitude and the behaviour of taking away leftovers in a doggy bag after dining out associate with the behaviour of throwing away leftovers brought home?

RQ4. Do attitude and the behaviour of taking away leftovers after dining out mediate the association of motives to take away leftovers with throwing away leftovers brought home and, if so, how?

To achieve the objectives of the study, we used a multi-pronged strategy to first evolve our understanding of the various dimensions of these gaps through a review of the extended literature. Then, we conducted a qualitative study with 35 diners to understand the individual behaviours in the specific context of restaurant dining and formulate the research model based on SOR. Finally, we conducted a cross-sectional survey to collect data from 276 diners residing in the United States (US) to test the proposed model. The rest of the article is presented through the following parts: theoretical background and research model in Section 2, followed by hypotheses development in Section 3, data and methods in Section 4, results in Section 5, discussion and conclusion in Section 6, and finally the study implications, limitations, and future research directions in Section 7.

2. Theoretical background: Stimulus-Organism-Response (SOR) theory

The SOR theory, conceptualised by Mehrabian and Russell (1974), is a behavioural framework from the area of psychology that explains the reasons that drive the behaviour of individuals. The theory offers a sequential mechanism whereby stimuli (S) in the individuals' environment trigger a behavioural response (R) based on their internal or organismic (O) state. The theory accommodates the fact that the organismic state representing the internal processing of the cues received from the stimuli can be conscious as well as unconscious. SOR is suitable for the current study for several reasons: (a) it enables us to understand human behaviour-related issues by considering the external and internal aspects of rationalisation and decision making. In this regard, SOR effectively captures the decision-making process, which commences with the informational and environmental cues that induce internal processing. This finally manifests itself in the form of a response that encompasses a reflection of the inner feelings and mental state of individuals and can take the form of either affirmative or avoidance behaviour; (b) it offers insights into human behaviour through a more sophisticated approach than the attitude-behaviour-consequence (A-B-C) model (Skinner, 1963) and has been successfully applied in recent studies to examine pro-environmental consumer behaviour (e.g., Kumar et al., 2021; Tandon et al., 2021); (c) it supports a better understanding of the complex association of environmental stimuli and consumers' psychological elements, including motives and the attitude associated with the decision to take away leftovers when dining out, which have received limited attention to date (Cavazza et al., 2011; Silvennoinen et al., 2015); (d) although the original conceptualisation offered a sequential mechanism to explain consumer behaviour, scholars (e.g., Jacoby, 2002) have highlighted the inherent possibility of overlap in organism-response, indicating the existence of more dynamic interactions that go beyond the linear theorisation and automatic processing in the SOR conceptualisation. This makes the theory even more relevant to explain the food waste generation-mitigation-diversion loop.

2.1. Adapting SOR to the current context

According to SOR, informational and environmental elements serve

as antecedents for the affective and cognitive processes that develop in the individual when interacting with the prevailing environment. In the present study, based on the review of the literature and our qualitative inquiry, we identified two variables that provide cues for diners to internally contemplate taking away leftovers. The first stimulus that we have identified is the food-ordering routine. This variable characterises the tendency of diners to order more food than is warranted by their hunger. The tendency to over-order, driven by various hedonic, psychological, and situational factors, such as unawareness of portion sizes, the discounts being offered, and the variety of dishes, has been recognised by scholars (e.g., Cornil and Chandon, 2016; Chang, 2021). Conceptually, we have conceived the idea of a food-ordering routine by extrapolating the findings of studies exploring the routine related to over-purchase of food in households and its association with food waste (e.g., Stefan et al., 2013; Stancu et al., 2016).

The second stimulus that we have identified is planning routine. We have conceptualised this construct by similarly drawing upon the household food waste literature (e.g., Stefan et al., 2013; Stancu et al., 2016), wherein scholars have described it as a routine related to making a shopping list and checking inventories at home before shopping. The relevance of this construct as the stimulus is supported by other prior studies that have also indicated that such routines can contribute to limiting food waste (Bravi et al., 2020) and strengthening the willingness to reuse leftovers (Visschers et al., 2016). Thus, we propose food-ordering routine and planning routine as stimuli, which we theorise as having a positive association with the organismic state of motives for taking away leftovers after dining out.

Organism, or internal state, in the original SOR is modelled in the current study through motives for taking away leftovers. These motives mainly capture the internal disposition of diners that offers them a positive motivation to take away unconsumed food ordered while dining out. The findings of our qualitative study reveal these motives to be largely situational, representing the thought process that leftovers can be consumed at home for a meal to avoid waste and save cooking time and money. Since such anticipated benefits and uses can be plausibly expected to impact the behaviour of diners towards taking away leftovers, we have utilised these motives to represent the *organism*.

We have conceptualised the response component of SOR to include manifestations that mirror the complexity of the leftover takeaway decision of diners. Due to this, we have theorised three variables as the response of diners: the *attitude* towards taking away leftovers, the behaviour of taking away a doggy bag, and the leftover recycling *routine*. Attitude, typically defined as a favourable or unfavourable appraisal of behaviour (Ajzen, 1991), is instrumental in decisions related to a specific course of action and is based on an individual evaluation (Hwang et al., 2019). It is a key variable in both the consumer behaviour and social psychology literature, and its association with behaviour has been well-documented. However, the extent of attitude-behaviour may vary with situations and contexts (e.g., Ajzen and Fishbein, 1977; Glasman and Albarracín, 2006). Due to this, we have conceptualised a more complex role of attitude in our model: (a) as a cognitive response of diners to take away leftovers, knowing that leaving the unconsumed food behind leads to food waste and monetary loss, (b) as a response in the SOR context along with actual takeaway behaviour and routine, namely, taking away a doggy bag and leftover recycling routine, and (c) as an antecedent of the other two, i.e., behaviour and routine. Through this proposed role of attitude as a consequent of motives and an antecedent of behaviour and routine, coupled with its anticipated parallel mediation effect with behaviour on the association motives and recycling routine, we attempt to bring out varied nuances of decision-making in the context of leftover takeaway behaviour and recycling routine, with the two being temporally and spatially apart.

Finally, we complete our conceptualisation of the research model by proposing to control the outcome variables for the confounding effects of socio-demographic factors, such as age, gender, educational background, and household size. The model, with its underlying associations,

is presented in Fig. 1, while an operational description of the study variables from the perspective of their theorisation in the present context is presented in Table 1.

3. Hypotheses development

3.1. Stimulus-organism: food-ordering routine, planning routine, and motives for taking away leftovers

We postulate food-ordering and planning routine as critical environmental and informational stimuli that induce internal cognitive processes (*organismic states*), represented here as motives for taking away leftovers. The *food-ordering routine* represents the quantity of food ordered by consumers when dining out. It is a counterpart of *shopping routine*, a variable that has been used in the extended food waste literature to represent shopping for more food than required in households (Stancu et al., 2016; Stefan et al., 2013). Scholars have noted that due to changes in lifestyle (Parfitt et al., 2010), shopping behaviours have become very much routinised, which sometimes results in consumers buying more than they need (Stefan et al., 2013), thereby contributing to food waste. Since ordering more food than required is likely to generate leftovers, we anticipate that the tendency to over-order is driven by multiple factors, such as variety, uncertainty about portion sizes, discounts, and just an intrinsic impulse to order more without thinking, which would cause diners to contemplate taking away leftovers. Although there is no existing evidence in support of this supposition, we speculate that ordering routine would be positively associated with the motives for taking away leftovers. Expressed differently, generating leftovers by ordering more food than required to satisfy hunger would cause diners to justify their impulse by finding various motives to take the unconsumed food away. Hence, we propose:

H1. Food-ordering routine has a positive association with motives for taking away leftovers.

The role of planning routine as a stimulus is in consonance with prior studies underlining its impact on decisions related to leftovers (Stancu et al., 2016; Stefan et al., 2013). Specifically, the prior literature has emphasised the role of food-related routines in managing food waste (Romani et al., 2017; Stefan et al., 2013). Planning routine, such as making a list of food items to buy before shopping and checking inventories at home, can combat this tendency and can thus be a significant factor in reducing food waste (Bravi et al., 2020; Stancu et al., 2016). Such routines can also contribute to the willingness to reuse leftovers (Visschers et al., 2016). Based on the links discussed in the previous literature between planning routine, food waste, and motivation to reuse leftovers, we argue that consumers with the habit of following a planning routine will be motivated to take away leftovers after dining out. Hence, we posit:

H2. Planning routine has a positive association with motives for taking away leftovers.

3.2. Organism-response: motives for taking away leftovers, attitude, and taking away doggy bag

Prior studies have contended that taking away leftovers to reuse them is a viable and convenient way to conserve food (Bravi et al., 2020; Silvennoinen et al., 2015), decrease food waste (Stancu et al., 2016), and save money (Cappellini, 2009). However, consumers may not always take the leftovers home after dining out. Rather, their perceptions of taking away leftovers may vary due to their eating habits and cultural contexts (Okumus et al., 2020). This is in consonance with prior studies where scholars have noted that even when restaurant staff packs up the leftovers and offers them to diners, they do not take them away, a reaction that is attributable to social influence and eating habits (e.g., a preference for fresh cooking) (Cavazza et al., 2011). Thus, diners may

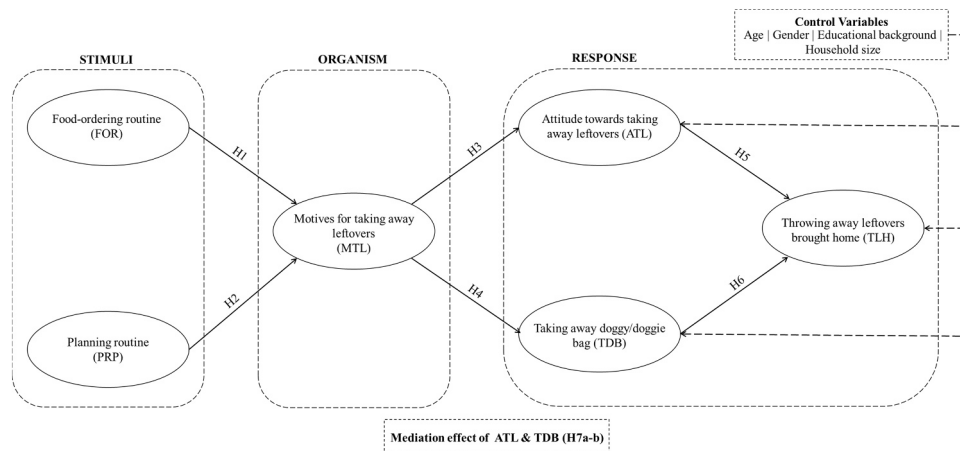


Fig. 1. Research model.

need internal processing of the fact that there are enough positives associated with taking away leftovers. Hence, their assessment of positive motives, such as food waste reduction, low cooking time, and monetary gain in terms of saved food costs, can play a role in impacting their favourable disposition towards taking away leftovers that can then translate into the actual behaviour.

Based on the existing evidence, we argue that if diners are able to internally enumerate the multiple benefits of taking away leftovers, it would positively impact their attitude and behaviour to do so. In other words, the positive outcomes that diners attribute to taking away leftovers will also serve as motives for driving their positive disposition and behaviour. This anticipation is also in concordance with the SOR premise that the organism drives response, which we have measured in terms of attitude and taking away a doggy bag. Thus, we posit:

H3. Motives for taking away leftovers have a positive association with attitude towards taking away leftovers.

H4. Motives for taking away leftovers have a positive association with the actual behaviour of taking away doggy bags.

3.3. Response: attitude, taking away doggy bag, and throwing away leftovers brought home

Many studies have utilised attitude to explain consumer behaviour and reveal its instrumental role in individual behaviours (Ajzen, 1991; Russell et al., 2017). These studies also offer substantial evidence for the influence of attitudes on consumer intentions (Neff et al., 2015; Zeweld et al., 2017). Furthermore, studies on food waste and leftovers have also underlined the prominence of attitudes in fostering behavioural intent (Stancu et al., 2016; Stefan et al., 2013). For example, Graham-Rowe et al. (2015) revealed the role of attitudes in harnessing consumer intentions to reduce food waste. Similarly, Choe and Kim (2018) confirmed the significance of attitude on food choices. In sum, previous studies have found evidence to support the association of attitude and intentions/behaviours.

Based on these findings on the role of attitude in driving food waste-related decisions, we venture to suggest that diners' favourable response in the form of a positive attitude to take away leftovers after dining out would drive their response in the form of what happens when leftovers are brought home. Similarly, we speculate that the actual behaviour of taking a doggy bag at a restaurant would also be correlated with the behaviour of how leftovers are treated at home. We argue specifically that the diners who have a positive attitude towards taking away leftovers and who actually do so would not tend to throw away these leftovers at home. In other words, they would recycle/reuse the leftovers in a way that reduces food waste. Although there is no a priori evidence to

support our anticipation, we rationalise that the diners with a positive cognition to take away leftovers to reduce food waste and who bring a doggy bag home are individuals concerned about food waste and, therefore, less likely to throw away leftovers at home. Hence, we propose:

H5. A favourable attitude towards taking away leftovers has a negative association with throwing away leftovers brought home after dining out.

H6. The actual behaviour of taking away a doggy bag has a negative association with throwing away leftovers brought home after dining out.

In addition to the hypothesised direct effects, we propose to examine mediation effects to better explicate the pathways and mechanism of how the study variables correlate. In this regard, we draw upon the extended literature to formulate our understanding of the indirect pathways, which, when examined, can better illuminate the intricacies of human decision-making. Prior studies have revealed that attitudes mediate various relationships, in general (Chen et al., 2017; Tsai et al., 2016), and intentions (a proxy for behaviour), in particular (Chu, 2018; Lee and Yun, 2015). For instance, attitude was found to have a mediation effect on the association of purchase intentions towards functional foods with its antecedents (Huang et al., 2019). Similarly, attitude was found to mediate the association of health consciousness with intentions to buy organic food (Çabuk et al., 2014). In sum, the mediation effect of attitude in food-related decisions is well-established in the literature.

Accordingly, we also propose to examine the mediation effect of attitude on the association of motives with throwing away leftovers. At the same time, although there is no prior study that has examined this, we argue that taking away leftovers might also mediate the association of motives with throwing them away. This pathway is important to understand since motives are linked with food waste reduction, and throwing away leftovers at home would defeat the purpose. The viability of taking away leftovers as a food waste reduction strategy is viable only after motives translate into the action of actually bringing leftovers home and making use of them. If not, the problem of food waste would continue, with its location only being shifted from restaurants to the home. Due to this, we contend that both attitude and behaviour are likely to serve as an intervening mechanism to transmit the effect from motives to then impact the throwing away behaviour. Hence, we propose:

H7. (a) Attitude towards taking away leftovers and (b) taking away doggy bags mediates the association of motives for taking away leftovers with throwing away leftovers brought home after dining out.

Table 1
Operational description of study variables.

Variable	Operational description
Food-ordering routine (FOR)	FOR is a new construct developed for the present study to better reflect the underlying drivers associated with leftover generation and the subsequent takeaway decision of diners in out-of-home dining settings. The variable is conceptualised to capture the tendency of diners to order more food than needed for satisfying their hunger, when consciously driven by the bargains offered, the variety available or the lack of certainty about portion sizes being sufficient, as well as unconsciously ordering more food dishes than required when dining out. FOR is an important stimulus in the context of food waste since it embodies the inherent possibility of food remaining unconsumed
Planning routine (PRP)	PRP is a construct extrapolated from the household food waste literature to measure the routine that diners conscious about food waste may follow before actually ordering the dishes when dining out. It represents the diners' routine in terms of their thought process to plan and decide their meals before dining out by checking the menu of the restaurant online and thinking about the dishes they would like to order
Motives for taking away leftovers (MTL)	MTL posits that the factors that would make diners internally be positively oriented towards taking away the unconsumed food as a doggy/doggie bag after dining out are both societal and personal. From the greater good or societal perspective, the driving motive is food waste reduction, and from the personal perspective, the driving motive is the benefits, such as consuming leftovers for another meal, which saves cooking time and the cost of another meal
Attitude towards taking away leftovers (ATL)	ATL measures the favourable disposition that diners develop towards taking away leftovers after dining out, considering it to be a positive and wise act that saves money and reduces food waste
Taking away doggy/doggie bag (TDB)	TDB is another new construct developed for the present study to better capture the actual behaviour surrounding the leftover takeaway decision of the diners. It represents the diners' frequency of thinking about taking away doggy/doggie bags, asking the staff for the same to pack the leftovers, agreeing to take away leftovers when the staff offers, and actually carrying home the doggy/doggie bag after dining out
Throwing away leftovers brought home (TLH)	TLH captures the dynamics of what happens when the doggy/doggie is actually brought home. Thus, it represents the temporal and spatial shifting of the possibility of food going to waste or getting recovered from an out-of-home setting to an at-home setting. It is a critical variable since it reveals that taking away leftovers would remain a mere dissonance-offsetting rationalisation used by diners if the leftovers brought home are just forgotten and finally thrown away

3.4. Socio-demographics as control variables

Prior studies have highlighted the importance of socio-demographic factors, such as age, gender, educational background, income, and household size, in food conservation behaviours (Flagg et al., 2013). More recently, scholars have also investigated food-related attitudes and leftover reuse intentions while controlling for age and gender (Bravi et al., 2020). Educational background has also been used as a control variable in consumer studies (e.g., Xiao et al., 2015; Xiao and O'Neill, 2016). With regard to household size, the extant literature has revealed differences in food waste and its related outcomes between single-person and multi-person households (Parizeau et al., 2015). In agreement with this empirical evidence, we have used age, gender, educational background, and household size as control variables.

4. Data and methods

4.1. Qualitative data collection

We utilised a qualitative research approach (Creswell and Clark, 2017) as an intermediate step to help us better adapt the existing measures to the context of our study. In this qualitative study, we conducted open-ended essays with diners residing in the US to better understand the different aspects of dining out, the leftover takeaway from the restaurant, and leftover handling at home. To this end, we collected 35 qualitative responses from the target group (individuals who dined out frequently) via open-ended essays. The age range of the respondents was 19–49 years [mean age: 28.6 years], with 20 of the respondents being female. We reached theoretical saturation at 32 responses but collected three more responses to ascertain that no fresh inputs were missed.

To begin with, we thoroughly reviewed the extant literature to generate the questions for the qualitative study (Stancu et al., 2016; Stefan et al., 2013; Romani et al., 2017; Bravi et al., 2020; Visschers et al., 2016). Then, to ensure the reliability and validity of the questions, we consulted three scholars specialising in the hospitality and restaurant management fields. Based on their feedback, we modified, merged, and removed some questions. Additionally, we conducted a pilot study with three individuals who dine out. Based on this study, we finalised the questions to be asked in the open-ended essay after further modifications. We conducted the final data collection on *Prolific Academic*. The respondents were invited from amongst individuals residing in the US who had dined out frequently during the preceding three months. The essay key comprised nine questions: (a) What do you think of food waste? In your opinion, what are the consequences of food waste?; (b) Do you have any experience with the use of a doggy bag? What do you think about it?; (c) What causes you to order more food than required when dining out?; (d) Do you enquire about the portion size of each dish while placing an order? Why?; (e) When you are going to dine out, how do you plan the meal ahead?; (f) What are the various reasons for leftovers, i.e., leaving uneaten food behind when dining out?; (g) What are the factors that motivate you to take leftovers in a doggy bag when dining out?; (h) When leftover food is brought home in the doggy bag, what happens next?; and (i) What are the factors that may cause you to throw away food?

A panel of two researchers manually analysed, organised, and theoretically labelled participants' responses to identify the key themes (Creswell, 2014). Our manual coding process was guided by the research questions, as suggested by previous scholars (e.g., Mkono and Hughes, 2020). The coding process helped us synthesise the response of the participants for each of the study constructs. It also helped us understand the views of the respondents with regards to food waste, the consequences of food waste, and the taking away of doggy bags. In addition, it served as the basis for us to identify the keywords to capture the study constructs, namely, food-ordering routine, planning routine, motives for taking away leftovers, and throwing away leftovers brought home. Illustrative responses are presented in Table 2.

4.2. Quantitative data collection

We selected *Prolific Academic* to collect quantitative data online since it has been used by many recent studies (Talwar et al., 2021). The survey instrument was developed and deployed in English. The items for measuring food-ordering routine, planning routine, motives for taking away leftovers, and throwing away leftovers brought home were developed on the basis of the keywords identified through the coding of the qualitative data. Food-ordering routine was measured through a seven-item scale; planning routine was measured through a four-item scale, while motives for were measured through a six-item scale, and throwing away was measured through a two-item scale. The scales for other constructs (attitude and taking away doggy bag) were developed

Table 2
Qualitative study.

Themes	Illustrative responses
Food-ordering routine	<i>I will overorder if there is a deal (buy one get one free) If I arrive hungry, or there are several choices I cannot get anywhere else</i>
Planning routine	<i>If I don't know how big the portions are If the portion sizes are huge like if the burger is as big as my face or something, I probably won't get through it unless I'm extremely hungry or unless I absolutely love the food excessively I pace myself on portions otherwise I'd feel pressured to eat everything whether or not I'm still hungry Of course, if it's an acceptable size, then I won't have to worry about it Sometimes I will ask about how big the portion size is if I'm trying to eat on the healthier side and watch my calories I also might ask the meal size if I'm not that hungry I will sometimes look at sites like Yelp to look at photos of food</i>
Motives for taking away leftovers	<i>Leftovers allow for additional meals that you don't have to pay for I always take leftovers in a doggy bag so I can save on money and not waste food They're just going to throw it out, so I should use it to prevent waste It was probably overpriced, so I should get the most out of my money I like having food I don't have to cook and I like being able to get my money's worth and eat the food I paid for.</i>
Throwing away leftovers brought home	<i>After food is brought home, it goes in the refrigerator to save it and then you usually eat the rest the next day Or use it on a "leftover" day when you don't feel like cooking and just want something already made It may also be accidentally forgotten and then spoil in the fridge, but not usually, at least not for me Either refrigeration or is eaten at home shortly after – or maybe given to someone else if a situation arises It goes in the fridge until someone in the house eats it, sits on the counter until someone throws it away I throw it away if I forget to eat it and it goes bad, if I did not put it in the fridge.</i>

on the basis of the qualitative study as well as adapting pre-validated scales to the present context. Thus, attitude was measured through a four-item scale adapted from [Kim and Hall \(2019\)](#), and taking away a doggy bag was measured through a five-item scale extrapolated from [Tandon et al. \(2021\)](#).

To ensure the content and face validity of the initially developed survey instrument, we first requested feedback from three experts from the area and revised the text per their suggestions. Thereafter, we invited three researchers to evaluate the psychometric robustness of the instrument and further revised the survey according to their inputs. Finally, we pilot-tested this modified instrument with 13 respondents representing the target group of our study. The primary idea at this stage was to ascertain that the language of each item was simple, easy to understand, and unambiguous. The respondents were generally able to fill the survey with ease and suggested some minor changes that would improve the language. We made further revisions, as required, and prepared the final questionnaire to collect data from the identified target group comprising individuals falling in the age bracket of 25–60 years, who confirmed that they dined out frequently during the period preceding the time of data collection. The survey participants were compensated for responding to the survey per *Prolific Academic's* policy.

A total of 298 responses were received, of which 22 were rejected during the data cleaning process; thereby, 276 responses were taken forward for further analysis. The socio-demographic profile of the respondents is presented in [Table 3](#).

Table 3
Socio-demographic profile of the respondents.

Variable	Percentage	Frequency
Gender		
Female	58.3	161
Male	41.7	115
Age group		
25–30	25.4	70
31–35	21.4	59
36–40	21.7	60
41–45	10.5	29
46–50	8.7	24
51–60	12.3	34
Household size		
One member	25.4	70
Two members	21.4	59
Three members	21.7	60
Four members	10.5	29
Five members	8.7	24
Six members	12.3	34
Educational background		
High School	18.8	52
Professional degree	8.0	22
Bachelors	41.3	114
Masters	26.4	73
Doctorate	5.4	15
Economic background (in terms of annual household income)		
Low income (less than \$40,100)	23.19	64
Middle income (\$41,000–\$120,400)	62.32	172
Upper income (more than \$120,400)	14.49	40

4.3. Method

We employed the popular two-step covariance-based structural equation modelling (CB-SEM) technique after confirming the suitability of the data for Maximum likelihood (ML)-based CB-SEM. This method has also been used by many recent studies (e.g., [Dhir et al., 2021](#); [Talwar et al., 2020a](#); [Talwar et al., 2020b](#)). We conducted the required statistical analysis in IBM SPSS and AMOS (Version 27) to assess the validity, reliability, model fit, and significance of the path coefficients of the hypothesised relationships. Thereafter, we used the PROCESS macro to conduct a mediation analysis.

5. Results

5.1. Data diagnosis

We examined the distribution of the data for kurtosis and skewness to ascertain the suitability of the data for analysis. The kurtosis and skewness values met the prescribed threshold limit, confirming that the data followed Gaussian distribution, as required. Next, to assess the data suitability further, we tested for the existence of multicollinearity among the study constructs, which can potentially increase the standard error of loading estimates ([Kock and Lynn, 2012](#); [O'Brien, 2007](#)). The variance inflation factor (VIF) value of less than three and tolerance greater than 0.1 indicated that the data had no such issues. Finally, since the data were obtained from a single source, we also examined it for the existence of common method bias (CMB) using Harman's single factor test ([Podsakoff et al., 2003](#)). The results reported that the variance explained was 23.2%, which is less than the recommended threshold value of 50%, thereby confirming that CMB was not an issue in the data under the study. In addition, we followed the procedural remedies of a robust survey design and data collection process to counter the issue of CMB at its inception. Our approach to data diagnosis is consistent with many recently published studies (e.g., [Kaur et al., 2021](#); [Kumar et al., 2021](#)).

5.2. Validity and reliability

We performed confirmatory factor analysis (CFA) to generate the measurement model and evaluate the validity and reliability of the study measures. To begin with, we assessed the validity of the measurement model by evaluating the goodness of fit indices. The model reported a good fit ($\chi^2/df = 1.70$, $CFI = 0.95$, $TLI = 0.94$, $RMSEA = 0.05$) in line with the values recommended by Hair et al. (2020). Next, we checked

Table 4
Factor Loadings for the measurement and structural model.

Study measures	Measurement items	CFA	SEM
Food-ordering routine (FOR)	I often order more food dishes than required when dining out	0.90	0.90
	I often order food dishes than needed for satisfying my hunger	0.92	0.92
	I often order food dishes that are too much for my appetite	0.76	0.76
	I often order more food dishes than required without thinking when dining out	0.83	0.83
	I often end up ordering more dishes because restaurants are offering bargains	0.64	0.64
	I often order more food dishes than required because of the variety in the restaurant food	0.84	0.84
	I often order more food dishes when I am not sure about portion size	0.66	0.66
Planning routine (PRP)	I often think about the dishes I will order prior to dining out	0.74	0.75
	I often plan my meal in advance before dining out	0.83	0.83
	I often check the menu of the restaurant online to plan the meal before dining out	0.66	0.67
	I often decide the dishes I will order prior to dining out	0.90	0.90
Motives for taking away leftovers (MTL)	I take away leftovers after dining out since it helps reduce food waste	0.62	0.62
	I take away leftovers after dining out if I want to avoid cooking again	0.79	0.79
	I take away leftovers after dining out if I want to save the cost of another meal	0.80	0.80
	I take away leftovers after dining out since it helps save time and money	0.85	0.85
	I take away leftovers after dining out if there are multiple uses	0.66	0.66
Attitude towards taking away leftovers (ATL)	I take away leftovers after dining out for using them for my next meal	0.72	0.72
	Taking away leftovers after dining out is an extremely positive thing	0.75	0.75
	Taking away leftovers after dining out is a wise act	0.85	0.86
	Taking away leftovers after dining out saves money	0.80	0.80
Taking away doggy/doggie bag (TDB)	Taking away leftovers after dining out reduces food waste	0.66	0.66
	How often do you think of a doggy bag to take away leftovers after dining out?	0.73	0.74
	How often do you ask the staff for a doggy bag to take away leftovers after dining out?	0.85	0.85
	How often do you agree when the staff offers you a doggy bag to take away leftovers after dining out?	0.80	0.80
	How often do you fill/pack the doggy bag with leftovers to take them away after dining out?	0.89	0.89
Throwing away leftovers brought home (TLH)	How often do you carry leftovers in a doggy bag after dining out?	0.90	0.90
	I throw away leftovers brought home after dining out if I forget to use them the next day	0.74	0.82
	Sometimes I just throw away the leftovers brought home after dining out	0.79	0.71

Notes: CFA = Confirmatory factor analysis (measurement model testing), SEM = Structural equation modelling.

the factor loadings of each item. As presented in Table 4, the loadings varied between 0.62 and 0.92. In consonance with recent studies (e.g., Aguiar-Quintana et al., 2021), we retained the standardised loadings of less than 0.70 because their removal did not significantly improve Cronbach's alpha, composite reliability (CR), and the average variance extracted (AVE). Furthermore, prior studies have noted that retaining loadings less than 0.70 is a rather common practice in the social sciences (Hulland, 1999).

Thereafter, we evaluated the validity and reliability statistics, as presented in Table 5, by comparing them with the values recommended by Fornell and Larcker (1981). We established internal consistency and convergent validity by assessing: (a) AVE with a cut-off value of greater than/equal to 0.50, (b) CR with a cut-off value of greater than/equal to 0.70, and (c) Cronbach's alpha with a cut-off value of greater than/equal to 0.70 for all study constructs. We also established the discriminant validity by confirming that the: (a) square-root of the AVEs of all constructs were greater than the corresponding correlations, and (b) Heterotrait-Monotrait Ratio (HTMT) values, as presented in Table 6, were less than the required cut-off of 0.90, in line with the recommended values (Hair et al., 2020).

5.3. Structural model

We controlled the model for the potential confounding effect of age, gender, educational background, and household size on attitude, taking away doggy bag, and throwing away leftovers brought home. The results indicated that age has a significant controlling effect on attitude ($\beta = 0.10$, $p < 0.05$) but not on taking away doggy bag ($\beta = 0.05$, $p > 0.05$) and throwing away leftovers ($\beta = 0.02$, $p > 0.05$). In comparison, gender has a significant controlling effect on taking away doggy bag ($\beta = 0.13$, $p < 0.05$) but not on attitude ($\beta = -0.004$, $p > 0.05$) and throwing away leftovers ($\beta = 0.12$, $p > 0.05$). In addition, educational background has a significant controlling effect on taking away doggy bag ($\beta = -0.13$, $p < 0.05$) and throwing away leftovers ($\beta = -0.15$, $p < 0.05$), although not on attitude ($\beta = -0.07$, $p > 0.05$). Finally, household size has a significant controlling effect on attitude ($\beta = 0.12$, $p < 0.05$) but not on taking away doggy bag ($\beta = -0.01$, $p > 0.05$) and throwing away leftovers ($\beta = 0.07$, $p > 0.05$). The structural model returned a good fit ($\chi^2/df = 1.66$, $CFI = 0.94$, $TLI = 0.93$, $RMSEA = 0.05$). The variance explained for motives = 4.2%, attitude = 53%, taking away doggy bag = 25.6%, and throwing away leftovers = 18.9% indicate an acceptable explanatory power of our model.

The results of the hypotheses testing of the direct paths, presented in Fig. 2, confirmed the support for a positive association of food-ordering routine with motives (H1; $\beta = 0.13$, $p < 0.05$), planning routine with motives (H2; $\beta = 0.15$, $p < 0.05$), motives with attitude (H3; $\beta = 0.71$, $p < 0.001$), and motives with taking away doggy bag (H4; $\beta = 0.47$, $p < 0.001$). In addition, the results indicate the existence of a negative association between attitude and throwing away leftovers (H5; $\beta = -0.34$, $p > 0.001$). In comparison, the results do not indicate any statistically significant association between taking away doggy bag and throwing away leftovers (H6; $\beta = -0.12$, $p > 0.05$).

5.4. Mediation analysis

We conducted a mediation analysis using Model 4 in the PROCESS macro in SPSS, wherein the parallel mediation effect of attitude and taking away doggy bag was analysed. The results revealed that attitude partially mediates the association of the motives for and throwing away leftovers (H7a). In contrast, taking away doggy bag did not have any mediating effect on the association of motives and throwing away leftovers (H7b). The results are presented in Tables 7a and 7b.

Table 5
Descriptive statistics, Cronbach's alpha, validity and reliability measures.

	Mean	SD	α	CR	AVE	MSV	ASV	LCR	FOR	PRP	MTL	ATL	TLH
TLH	1.89	0.94	0.73	0.74	0.58	0.15	0.07	0.76					
FOR	2.33	0.94	0.92	0.92	0.64	0.03	0.01	0.15	0.80				
PRP	3.62	0.89	0.86	0.87	0.63	0.02	0.01	-0.10	0.09	0.79			
MTL	4.25	0.81	0.88	0.88	0.55	0.50	0.18	-0.35	0.17	0.16	0.74		
ATL	4.64	0.53	0.85	0.85	0.59	0.50	0.16	-0.39	-0.04	0.14	0.71	0.77	
TDB	3.94	0.97	0.92	0.92	0.70	0.21	0.08	-0.21	0.11	0.06	0.45	0.36	0.84

Notes: SD: Standard deviation, α = Cronbach's alpha, CR = Composite reliability, AVE = Average variance extracted, MSV = Maximum shared variance, ASV = Average shared variance, TLH = Throwing away leftovers brought home, FOR = Food-ordering routine, PRP = Planning routine, MTL = Motives for taking away leftovers, ATL = Attitude towards taking away leftovers, TDB = Taking away doggy/doggie bag.

Table 6
HTMT analysis.

	FOR	PRP	MTL	ATL	TDB	TLH
FOR						
PRP	0.109					
MTL	0.188	0.179				
ATL	0.024	0.160	0.722			
TDB	0.123	0.098	0.478	0.363		
TLH	0.157	0.116	0.379	0.392	0.212	

Notes: TLH = Throwing away leftovers brought home, FOR = Food-ordering routine, PRP = Planning routine, MTL = Motives for taking away leftovers, ATL = Attitude towards taking away leftovers, TDB = Taking away doggy/doggie bag.

6. Discussion

We sought answers to four research questions to examine the leftover takeaway behaviour of diners. To address RQ1, we examined the role of food-ordering routine and planning routine as stimuli driving the organismic state of motives for taking away leftovers after dining out, as proposed by H1 and H2. The results reveal a positive association of food-ordering and planning routines with motives for taking away leftovers, in line with the assertions of the prior extended literature (e.g., Visschers et al., 2016). These findings indicate (a) that individuals who order more food dishes than needed for satisfying their hunger or as driven by bargains, lack of certainty about portion sizes, for variety or without thinking, are more likely to be motivated to take leftovers away as a likely guilt off-setting rationalisation, and (b) individuals who have the habit of planning their meals in advance and checking menu items prior

to dining out have higher motives for taking away leftovers. Such individuals are probably more concerned and aware of the food waste-related issues, which causes them to take away leftovers.

We responded to RQ2 by examining the positive association of motives with attitude towards taking away leftovers (H3) and taking away

Table 7a
Mediation analysis.

MTL → ATL/TDB → TLH						
	β	se	t	p	LLCI	ULCI
MTL → ATL	0.41	0.03	13.16	0	0.3469	0.4689
MTL → TDB	0.51	0.07	7.81	0	0.3822	0.6396
ATL → TLH	-0.33	0.13	-2.53	0.01	-0.584	-0.0733
TDB → TLH	-0.04	0.06	-0.65	0.52	-0.1607	0.0814
Total effect of MTL → TLH	-0.36	0.07	-5.34	0	-0.4899	-0.226

Notes: MTL = Motives for taking away leftovers, ATL = Attitude towards taking away leftovers, TDB = Taking away doggy/doggie bag, TLH = Throwing away leftovers brought home.

Table 7b
Indirect effects between dependent and independent variable.

	Effect	se	LLCI	ULCI
MTL → ATL → TLH	-0.14	0.06	-0.2665	-0.0338
MTL → TDB → TLH	-0.02	0.04	-0.0967	0.0424

Notes: MTL = Motives for taking away leftovers, ATL = Attitude towards taking away leftovers, TDB = Taking away doggy/doggie bag, TLH = Throwing away leftovers brought home.

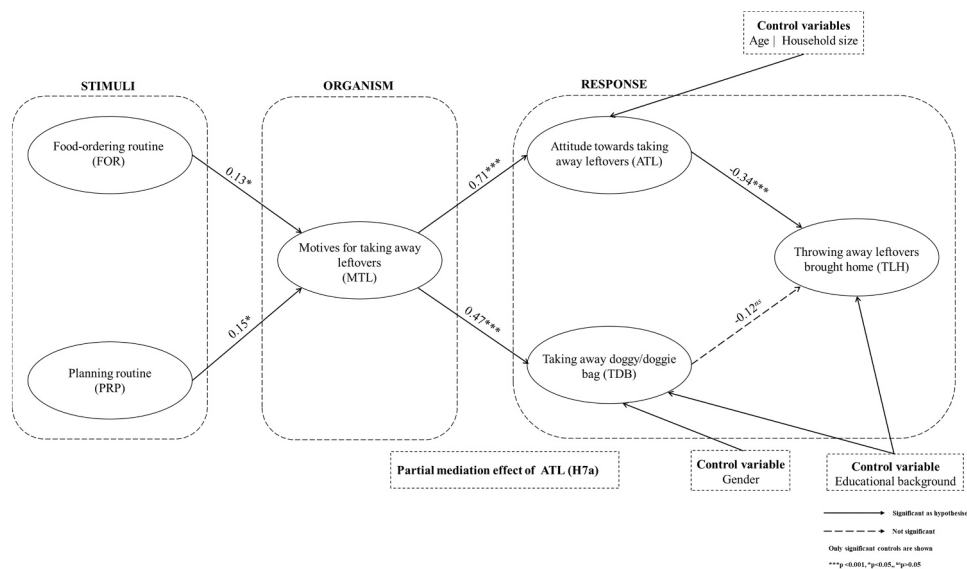


Fig. 2. Results of hypotheses testing.

doggy bags (H4) after dining out. The results of the analysis supported both the hypotheses, as anticipated by us based on the prior literature (e.g., Bravi et al., 2020; Silvennoinen et al., 2015; Stancu et al., 2016). The support for these hypotheses indicates that when consumers perceive that taking away leftovers helps them reduce food waste as well as save cooking time and the cost of another meal, their attitude towards taking away leftovers becomes favourable, which they reinforce by actually taking away leftovers in doggy bags after dining out.

We addressed RQ3 by proposing and testing a negative association of attitude (H5) and the behaviour of taking away leftovers in a doggy bag after dining out (H6) with the behaviour of throwing away leftovers brought home. The results revealed statistical support for H5, as anticipated by us based on the prior extended literature (e.g., Choe and Kim, 2018; Graham-Rowe et al., 2015; Russell et al., 2017). This implies that the favourable disposition and point of view that taking away leftovers after dining out is an extremely positive and wise act that saves money and reduces food waste will lower the tendency to throw away leftovers brought home after dining out. This underscores the fact that individuals who take away leftovers are concerned about food waste, which they reaffirm by not throwing away leftovers brought home after dining out. In comparison, H6 was not supported by the statistical output, implying that carrying home leftovers has no association with throwing away the leftovers brought home. A potential reason could be that those diners who actually bring home leftovers are not contemplating throwing them away at all. However, to our knowledge, the current study is the first attempt to empirically examine the association between these two constructs, and for this reason, the findings are exploratory in nature. More studies are required to make any conclusive deduction about the association between the two.

RQ4 raised the possibility of indirect effects in the proposed conceptual model. It was addressed by proposing and testing two hypotheses: H7a, related to the mediation effect of attitude on the association of motives for taking away leftovers with throwing away leftovers brought home, and H7b, related to the mediation effect of taking away leftovers in a doggy bag on the association of motives for taking away leftovers with throwing away leftovers brought home. These mediating effects were examined in consonance with prior studies (Chen et al., 2017; Huang et al., 2019; Tsai et al., 2016). The result of the mediation analysis indicates support for H7a, revealing that attitude partially mediates the association of motives and throwing away leftovers. This implies that motives for taking away leftovers, such as monetary savings, saving cooking time, and the desire to reduce food waste, lowers the tendency to throw away leftovers brought home through the intervening indirect effect of attitude that taking away leftovers is a positive and wise act. However, the results do not indicate any statistical support for the mediation effect of taking away leftovers in a doggy bag (H7b), indicating that contemplating taking leftovers in a doggy bag, asking the staff for the same, or accepting the leftovers packed by the staff does not serve as a path for transmitting the effect of motives on throwing away. This is a rather unexpected finding, and a potential reason could be that the diners who engage in the act of carrying home doggy bags are sure of consuming it and do not think of throwing it away at all. However, the motives and behaviours related to taking away leftovers after dining out and their handling at home are complex factors, and more research is required to improve our understanding of them and their interplay.

7. Conclusion

With growing concerns over food waste, a considerable amount of scholarly attention and industry practices have been focussed on various consumer-related and organisational aspects of food consumption globally. However, the practice of ordering more food than required when dining at restaurants and food outlets has received relatively little attention and has only anecdotally been discussed in a few studies. This presents a gap in the academic understanding of diners' behaviour since over-ordering has been an ongoing issue in some countries due to

individuals' eating habits, cultural context, and food availability (Okumus et al., 2020). In addition, despite the fact that planning routine has been discussed as a key variable in the context of household food waste (Stefan et al., 2013; Stancu et al., 2016), no study has contemplated its role in leftover generation in out-of-home dining settings. We explored various nuances of these two manifestations in out-of-home dining and deliberated upon their outcome in terms of food waste generation and the corresponding mitigation behaviour of diners. To this end, we first conducted a qualitative study, wherein we collected responses from 35 US-based diners through open-ended essays to better understand various aspects of their decision-making while dining out. Thereafter, we employed SOR to propose food-ordering and planning routines as stimuli that drive motives for taking away leftovers, which, in turn, are associated with attitude and behaviour towards taking away leftovers as a food waste reduction strategy. We also examined the direct association of attitude and behaviour towards taking away leftovers with the behaviour of throwing away leftovers brought home, as well as their mediation effect on the association of motives for with throwing away behaviour. Our analysis of the cross-sectional data collected from 276 diners in the US confirmed support for all of the hypothesised associations except for the direct association of behaviour towards taking away leftovers with the behaviour of throwing away leftovers brought home, as well as its mediation effect on the association of motives with throwing away leftovers.

The study offers various useful inputs for theory and practice, as discussed below.

7.1. Theoretical implications

The study contributes to improving the understanding of the food waste behaviours of individuals when dining out. It contributes to food waste research, in general, and restaurant dining, in particular, in four key ways. First, the results extend the understanding of behaviour-related drivers of taking away leftovers by first identifying and examining *food-ordering and planning routine*, which capture the general behaviour of consumers towards food procurement (Stancu et al., 2016; Stefan et al., 2013) to elucidate their approach towards food. By revealing that these routines can enhance the motives for taking away leftovers, the results contribute to the understanding of such behaviour. We next identified and examined the *motives*, which capture the consumers' thought process towards leftovers in terms of food waste reduction and saving of time and money to uncover their concern for food waste. The results indicate that motives increase the attitude towards and behaviour of taking away leftovers, which confirms that consumers' leftover takeaway behaviour is dependent on their level of concern for sustainability and practicality. This contribution offers empirical knowledge for food conservation researchers, particularly by revealing how stimuli and consumers' internal processes can be associated with a viewpoint and decision about taking away leftover food when eating out (Hamerman et al., 2017; Stöckli et al., 2018).

Second, the study has identified the food-ordering routine as a construct to capture the tendency of some consumers to order more than they need to satisfy their hunger. Clearly, such behaviour will increase the food waste volume in restaurants and households. An understanding of such behaviour, which could be associated with various factors examined in previous studies, such as individuals' hunger level, desire for variety, the food itself, or menu prices, and so on (Okumus, 2020; Okumus et al., 2020), helps create a better understanding of the food waste generation and the counterbalancing leftover take away motives. The results also highlighted food waste reduction behaviour when eating out. Consumers with a positive attitude towards taking away leftovers have a lower tendency to throw away leftovers that they bring home in a doggy bag. Thus, our study provides a broader approach to understanding food waste on the consumer side by bringing together the out-of-home and at-home sustainability-oriented behaviours.

Third, the study also offers empirical evidence for the mediation

effect of attitude towards taking away leftovers on the association of motives with throwing them away, thereby supporting the prior evidence arguing a more dynamic role of attitude in consumer decision-making (Chen et al., 2017; Garg and Joshi, 2018; Huang et al., 2019; Tsai et al., 2016). The study findings also address major gaps in the food waste literature, wherein the food-ordering routine, motives for taking away leftovers after dining out, attitude, and leftover handling at home have remained under-explored as an interconnected ecosystem. By presenting them through an extended sequential mechanism, our study lays the foundation for future research to uncover the multiple dimensions of this seemingly simple logical act.

Lastly, the results respond to the lack of theory-based insights in the food waste domain by utilising SOR (Mehrabian and Russell, 1974) to propose the drivers of leftover takeaway and throwing away behaviour. To our knowledge, the present study is the first empirical attempt to apply SOR in this context. We thus provide empirical support for the extension of SOR to a newer area and highlight its versatility, thereby reinforcing its efficacy as a theoretical lens for conceptualising consumer behaviour in a variety of areas.

7.2. Practical implications

Food waste in the out-of-home setting is a concern for multiple stakeholders, including the restaurants who would be responsible for handling it in a sustainable manner, regulators who would want to reduce such waste, and restaurant owners who would not want anything to hinder diners' pleasure and their revisit intentions. By uncovering varied aspects of leftover generation and the takeaway behaviour of diners, our study offers useful, practical implications. Four key implications of our study may be summarised as follows:

First, it underscores leftover takeaway as a viable food waste reduction strategy by revealing the pivotal role of motives for taking away leftovers. By measuring the motives in terms of the sustainability aspect of food waste and the practical aspect of saving time and money, the study offers an actionable way of increasing leftover takeaway behaviour. Restaurants and other food service outlets could benefit from our findings since, by encouraging leftover takeaway, they would be able to avert the costs and legal issues associated with food donation and waste disposal (Dhir et al., 2020; Sakaguchi et al., 2018). Thus, we suggest that food service outlets should expend adequate effort in developing a well-defined approach to encouraging consumers to take away leftovers without feeling embarrassed about it (Stöckli et al., 2018) if the cultural context leads to such embarrassment (Okumus, 2019). One way of encouraging takeaway behaviour may be to show appreciation for the consumer who asks for leftovers by offering a discount on a future visit or sending a note of thanks. Another way is to make it fun for consumers. For instance, some high-end restaurants in the US pack leftover food in tinfoil swans to make it look like a gift to take away (Sirieix et al., 2017). In this context, we suggest that restaurants and other foodservice outlets pay special attention to message framing to encourage diners to take away leftovers. For instance, persuasive messages, such as 'You have to do it for your family and friends', or any such messages that have a moral or emotional appeal to persuade diners to take away leftovers after dining out may work since persuasive messages have been found to trigger pro-environmental behaviour in tourism settings (Grazzini et al., 2018). In addition to this, restaurants can also use subtle cues such as the colour of doggy bags to send a positive message to diners about the packaged leftovers. This approach could be quite useful to change diners' perception about leftovers since recent studies have revealed that consumers depend extensively on visual cues available through packaging to evaluate the health and taste quotient of food products, wherein *au naturel* colours are quite effective in communicating the desired message (Kunz et al., 2020; Marozzo et al., 2020).

Second, since diners tend to over-order when they are unsure about portion sizes, we suggest that restaurants and other food service

establishments strategize to make sure that by offering unplanned portion sizes, they do not cause the diners to waste food. One way these outlets can achieve this is by making efforts to understand the portion sizes suitable for the diners. Towards this end, they can try to determine adequate portion sizes by conducting observation studies to collect information about the portion sizes suitable for males versus females, and so on. Another way could be to have more elaborate menu cards with information about portion sizes and serving so that diners can make a more informed decision. The third way is to have a small to large size offer for each dish so that diners can choose not only the dish type but also the portion size, depending on their level of hunger, the number of people dining, and their mood. A positive approach to planning appropriate portion sizes is likely to enhance the reputation of these establishments as well as save the restaurant from the unnecessary burden of plate waste, which cannot be taken away in any case. This is quite important since many prior studies have noted portion sizes to be a significant contributor to food waste (e.g., Berkowitz et al., 2016; Betz et al., 2015).

Third, since diners with a favourable attitude towards taking away leftovers have a lower tendency to throw away leftovers brought home after dining out, food service establishments can try to enhance the positive disposition of the diners by encouraging them to have a leftover reuse routine, which would make them feel more comfortable about taking away leftovers. This is important because diners with no definite plans for using leftovers may respond in one of two ways: (a) avoid taking away leftovers completely, thereby burdening the restaurants and other foodservice outlets with the responsibility to handle them, or (b) avoid generating leftovers by ordering less food in the first place, which would adversely impact the profits of the restaurants and other foodservice outlets. Thus, we suggest that to promote leftover takeaway behaviour, restaurants, and other foodservice outlets also need to promote leftover reuse routines. One way to do so could be to have a live counter where chefs prepare dishes using leftovers. Watching a live demo or recording on a screen at a restaurant may give consumers new ideas about the cleanliness, freshness, and safety of leftovers.

Lastly, since food waste has become a key concern for many countries and organisations (Papargyropoulou et al., 2014), regulatory authorities should try to increase awareness via educational campaigns, reminders, and short advertisements on mass media and social media. The findings of our study can provide input for the design of such campaigns. Although similar campaigns are run in many countries, the message is usually rather general and focuses on reducing food waste. We suggest that to tackle the challenge of waste in out-of-home dining settings, the content can be more specific. For instance, the campaigns can reinforce the positive aspects of taking away leftovers and emphasise how easy and safe they are to reuse when handled properly.

7.3. Limitations and future research

Our study offers insightful findings related to food waste in the hospitality and foodservice sector by highlighting the positive diner attitude towards taking away leftovers and its consequences in terms of a lower tendency to throw away leftovers brought home. However, the contribution of the study must be understood in light of three limitations. First, the respondents for the study were drawn from a single country, the US, thus limiting the generalisability of the findings to other geographies. Future studies may consider undertaking similar research in other regions, which would also assist in comparing the outcomes to present a better theoretical model and more robust implications for practice. Second, the study employed a cross-sectional approach, which may result in self-reporting bias. Future researchers may consider longitudinal studies to examine how changes in motives, attitudes, and the behaviour related to taking away leftovers change over time. Finally, although our study covered a broad spectrum of variables ranging from planning before ordering, over-ordering, motives, attitude, taking away doggy bags, and throwing away leftovers brought home, there are many

other variables that may play a role in this context. For instance, factors preventing the taking away of leftovers can be discussed, such as social or cultural context, as discussed by prior studies (e.g., Okumus, 2019; Stöckli et al., 2018). Particularly, the influence of normative aspects such as social norms can be examined, since prior studies have noted their persuasive role in encouraging green behaviours (Do et al., 2021). In addition, future research may investigate the framing of messages, such as gain versus loss framing or prevention versus promotion framing, as discussed by scholars to promote sustainable behaviours in the context of tourism (Blöse et al., 2015; Lee and Oh, 2014).

Disclosure statement

No potential conflict of interest was reported by the authors.

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