



What makes people leave their food? The interaction of personal and situational factors leading to plate leftovers in canteens



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ABSTRACT

In order to provide a basis for the reduction of food losses, our study analyzes individual food choice, eating and leftover behavior in a university canteen by consideration of personal, social and environmental determinants. Based on an extended literature review, a structural equation model is derived and empirically tested for a sample of 343 students. The empirical estimates support the derived model with a good overall model fit and sufficient R^2 values for dependent variables. Hence, our results provide evidence for a general significant impact of behavioral intention and related personal and social determinants as well as for the relevance of environmental/situational determinants such as portion sizes and palatability of food for plate leftovers. Moreover, we find that environmental and personal determinants are interrelated and that the impact of different determinants is relative to perceived time constraints during a visit of the university canteen. Accordingly, we conclude that simple measures to decrease avoidable food waste may take effects via complex and interrelated behavioral structures and that future research should focus on these effects to understand and change food leftover behavior.

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1. Thematic background

Sustainability in food production and consumption has gained substantial attention in international politics and research (see e.g. the UN sustainable development goals set up in September 2015, (United Nations, 2016)). Within this context, the reduction of food losses along the food supply chain is declared a specific target (FAO, 2013). Even though data on food waste in the European member states comes still with a high level of uncertainty, the Fusions Project estimated an annual food waste for the year 2012 of 88 million tons in EU-28 member states of which about 53% occur at household level and 12% in the food service sector (Stenmarck, Jensen, Quested, & Moates, 2016). Apart from research on private households (Evans, 2011; Graham-Rowe, Jessop, & Sparks, 2014; Katajajuuri, Silvennoinen, Hartikainen, Heikkilä, & Reinikainen, 2014; Langen, Goebel, & Waskow, 2015) the relevance of consumers for food waste has been addressed in the food service sector by estimates in Finland (Katajajuuri et al., 2014), Sweden (Engström & Carlsson-Kanyama, 2004) and Germany (Kranert et al., 2012),

where plate leftovers at the guest level have been estimated to contribute between 17% (Katajajuuri et al., 2014) and 55% (Engström & Carlsson-Kanyama, 2004) to all food waste. Moreover, they have been identified as important sources of avoidable food waste since relevant shares of leftovers are uneaten vegetables and starchy side dishes (Engström & Carlsson-Kanyama, 2004; Silvennoinen, Heikkilä, Katajajuuri, & Reinikainen, 2015). Relating to the trend of increased out-of-home consumption of food, the European Commission named “standardised portion sizes in restaurants and canteens” as one of the factors that contribute to avoidable food waste (European Union, 2016). Considering research on food-related behavior in general, the emphasis on portion sizes as single factor for food leftovers in out-of-home catering appears too simplistic. Various studies indicate that food choice and eating behavior in out-of-home consumption settings relate to a wide set of personal, social and situational factors such as food-related values (Lusk & Briggeman, 2009), attitudes (Mahon, Cowan, & McCarthy, 2006; Sparks, Hedderley, & Shepherd, 1992), social norms (Cruwys, Bevelander, & Hermans, 2015), personal comfort (Byker, Farris, Marcelline, Davis, & Serrano, 2014) and choice design (Hanks, Just, Smith, & Wansink, 2012). Moreover, studies that have specifically considered plate leftovers, mainly to determine consumption of specific food types (e.g. fruit and vegetables),

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support an extended behavioral framework in order to understand what makes people leave their food on the plate (Lowe et al., 2010; WRAP, 2011).

There are only few studies that have applied a comprehensive behavioral model for the analysis of food leftovers (Finkbeiner, 2013; Mahon et al., 2006). One limitation of those studies is that leftovers were either measured in an aggregate form or by individuals' self-reported behavior. Accordingly, the aim of the paper is to test an extended behavioral framework concerning the relevance of determinants related to food choice and eating on plate leftovers in the out-of-home setting of canteens, with plate leftovers being measured by researchers' visual estimation. Based on an extended literature review, a structural model is derived considering three dimensions of influencing factors: (physical) environment, social contexts and personal behavioral determinants. The model is empirically tested for a dataset of observational and survey data, collected among 343 students in a university canteen. Finally, we relate our results to past studies in the research area and draw conclusions on the interaction of environmental, social and personal determinants for the presence of food leftovers in catering.

2. Derivation of research hypotheses

In order to provide a theoretical basis on the analysis of individuals' food leftover behavior, we consider studies on food-related behaviors in out-of-home settings, which mostly focus on specific determinants for food-related behavior. By linking findings for personal, social and environmental factors, research hypotheses are derived and translated into a structural model.

2.1. Personal determinants of food leftovers

A prominent research area with respect to consumer behavior in catering facilities are the personal determinants of food choice and consumption from a health perspective (Graham-Rowe, Jessop, & Sparks, 2015; Nordström & Thunström, 2015; Scholderer, Kügeler, Olsen, & Verbeke, 2013; Schulte-Mecklenbeck, Sohn, de Bellis, Martin, & Hertwig, 2013). Generally, the Theory of Planned Behavior (TPB) is an extensively applied model for individual health- and food related behaviors (Aertsens, Verbeke, Mondelaers, & van Huylenbroeck, 2009; Tonglet, Phillips, & Read, 2004). It states that behavior can be determined by measuring behavioral intention (Ajzen, 1991). Behavioral intention itself is influenced by three constructs: first by attitudes towards the behavior; second by perceived social norms (subjective norms) or the evaluation of relevant others with respect to the behavior; and third by perceived behavioral control (PBC) over the behavior (Ajzen & Fishbein, 2005; Ajzen, 1991). With respect to the application of the TPB for sustainable consumer behaviors, such as regional and organic food purchasing (Arvola et al., 2008; Lorenz, Hartmann, & Simons, 2015; Tarkiainen & Sundqvist, 2005), healthy food consumption habits (Cook, Kerr, & Moore, 2002; Mahon et al., 2006; Sparks et al., 1992), as well as waste recycling behavior (Barr, 2007; Graham-Rowe et al., 2014), it has partially been suggested to add personal norms as a fourth construct to determine behavioral intention. Independent of studies applying the TPB, research supports the relevance of personal norms or of constructs closely related to personal norms (i.e. self-identity, personal value systems) for sustainability related food consumption practices such as purchasing "suboptimal" (visually imperfect) food products in supermarkets (de Hooge, Oostindjer, Aschemann-Witzel, Normann, Loose, & Almlí, 2017) or the purchase of sustainable dairy products (Vermeir & Verbeke, 2006). Personal norms measure a normative evaluation of the behavior based on personal value systems. They have been

found to have a direct influence on behavioral intention as well as an indirect effect from their influence on attitudes (Arvola et al., 2008; Harland, Staats, & Wilke, 1999). Moreover, personal norms have been shown to be interrelated with subjective norms (Aertsens et al., 2009; Arvola et al., 2008; Vermeir & Verbeke, 2008). Accordingly, three hypotheses are formulated for the behavioral determinants of plate leftovers in a university canteen.

H1. Food leftovers at lunch are negatively influenced by the behavioral intention to finish all food on one's plate in the university canteen.

H2. The behavioral intention to finish all food at lunch is positively determined by...

- (a) ...a positive attitude towards finishing all food at lunch in the university canteen.
- (b) ...high perceived personal control over finishing all food at lunch in the university canteen.
- (c) ...subjective norms which support finishing all food at lunch in the university canteen.

H3. Personal norms in favor of finishing all food at lunch in the university canteen...

- (a) ...are positively correlated with subjective norms that support finishing all food at lunch in the university canteen.
- (b) ...strengthens consumers' positive attitude towards finishing all food at lunch in the university canteen.

2.2. Social influences on food leftovers

Interrelated with personal determinants of food leftovers, food-related behavior in general has been stated to be influenced by social context (Cruwys et al., 2015; King, Weber, Meiselman, & Lv, 2004; Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008). One aspect of social context is already considered in the TPB (see section 2.1, hypotheses H2(c) and H3(a)). Based on an extended review on food-related behaviors, Cruwys et al. (2015) conclude that social influences go beyond this dimension and also include seeking affiliation with others. Moreover, besides having an indirect influence on behavior via behavioral intention, social context and specifically the presence and behavior of other persons has been found to influence food choice and eating behavior directly and partly unconsciously (Cruwys et al., 2015; Mollen, Rimal, Ruiters, & Kok, 2013). A comparably large body of research specifically addresses influences of social presence on food consumption in relation to various mediating factors such as extended meal duration (Bell & Pliner, 2003), or different social relationships between eating companions (Brindal, Wilson, Mohr, & Wittert, 2015; Salvy, Jarrin, Paluch, Irfan, & Pliner, 2007). Specifically for a university canteen setting, Young, Mizzau, Mai, Sirisegaram, and Wilson (2009) show that the presence of others tends to decrease food intake of females. Hence, we assume:

H4. Plate leftovers at lunch in the university canteen are positively influenced by the presence of other persons during lunch.

2.3. Environmental determinants of food leftovers

Besides personal and social determinants of food-related behavior, a growing literature body deals with the impact of environmental or situational factors on food choice and eating in catering settings and the respective impacts on nutritional meal

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