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Potential of online food shopping

An opportunity to relieve mothers' everyday life food routines?

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Summary

The food retail industry is establishing an increasing number of online food shopping services with delivery or collection at a drive-through supermarket. This study aimed to find out whether both distribution channels are recognized and competently used by private households. To this end, a regional case study surveyed German-speaking mothers with at least one child of primary school age, as they still see themselves as primarily responsible for the nutritional care of their family. Results show significant correlations between the use of online food shopping with home delivery and level of education, occupation and level of household income. Non-users of both distribution channels believe they lack the skills required to order food online. Recommended actions include communicating the advantages of ordering food online and promoting the skills required.

Keywords: everyday life food routines, online food order, drive-through supermarket, internet skills, purchasing behavior, mothers

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Introduction

Private households are nowadays confronted with a variety of services offering information on food and its purchase. In this regard online food shopping and purchasing options are expanding. Customers first choose between different providers and product ranges on the internet, select the food they want by clicking on it and fill a virtual shopping basket [1]. They can then choose to have the products delivered to their home. If they choose a drive-through supermarket (drive-through), they can request that the desired products are packed in the shop and left for self-collection [2]. The question arises as to whether and to what extent both distribution channels are used for food provision. To answer this question, nine questions from the project on *Ernährungskompetenz in Familien (EFA) – Eine empirische Untersuchung*[1] (Nutritional Competence in Families [EFA] – An Empirical Study) have been evaluated, which related to the use of online food ordering with home delivery and the hypothetical use of self-collection at a drive-through. Asking this in the context of nutritional competence[2] was relevant, based on the assumption that competent use of these distribution channels as part of food planning and purchasing could help to relieve the everyday life food routines on the responsible person.

Background

By 2013, 71 % of the population aged 14 and over in Germany, i.e. approx. 50 million people, had purchased or booked a product or service via internet [5]. Online trading turnover amounted to €34.3 billion in 2013 and accounted for 8 % of total retail trade. In 2014, revenue increased by a further 25 % to €42.9 billion, the proportion of total retail trade rising to 10 % [6].
Since 2011, the market for online food order has been tested by several start-up companies and established

[1] The study was carried out in the town and district of Gießen under the scientific supervision of Prof. Dr Ingrid-Ute Leonhäuser, Professorship of Nutrition Education and Consumer Behaviour at *Justus Liebig Universität Giessen*. The project was funded by the *Stifterverband für die Deutsche Wissenschaft e. V.* from July 2012 to July 2014.

[2] Nutritional Competence is "the ability to implement theoretical knowledge and practical skills in everyday nutrition appropriately – e.g. in terms of healthy or sustainable nutrition." [3]. In the above-mentioned study it refers to all areas of food provision, i.e. the acquisition of information on food, shopping, organization and planning of meals, preparation and storage [4].

food retailers [7]. The focus has been on user groups who are physically disabled, older or time-poor, such as e.g. professionals and young families [8]. An empirical study showed that among those questioned, the proportion of those ordering food online rose from 18 % to 27 % between 2011 and 2013 [9]. Online food sales revenues in the category of "food/delicatessen/wine" also rose from €400 million to €752 million in the period from 2011 to 2013 [10, 11]. However, if online trade in non-food and food categories is compared, one can see that goods such as "flowers and plants" (10 %) and "food and drink" (9 %), for which freshness is crucial, are much more rarely purchased than the top sellers of "books including eBooks" (64 %) and "clothes, shoes and accessories" (60 %) [5]. It is therefore unsurprising that the proportion of online sales of food amounted to only 0.3 % in Germany in 2013, i.e. approx. €0.5 billion of the domestic market in food (€175 billion) [12]. Abroad, particularly in England (2013: 5.5 %) [13], France (2013: approx. 3.5 %) [14] and Switzerland (2013: 0.7 %) [9], purchasing food via internet is on the contrary more widespread.

This may be due to the fact that these markets are no longer in their infancy; the online food market has already existed in England for 20 years [12], in Switzerland for 17 years [15] and drive-through points have existed in France for 15 years [16]. In addition, these countries have less branch density and retail space in comparison to Germany, particularly England [17]. Absence of haptic, an uncertain product quality or to use products immediately, presents far fewer problems for Swiss consumers than German consumers [9]. Shorter opening times (closure at 6:30 PM or 7:00 PM), depending on canton, may be another reason [18]. Other criteria impede online distribution in Germany, such as e.g. high supermarket density in rural areas, lack of willingness to pay more for this sales channel [7], consumer satisfaction with the "retailers around the corner" [9, 19], complex delivery conditions, lack of trust in suppliers, poor product quality and less familiarity with ordering food online [12]. In addition to these market complications, consumers also require internet access as well as the willingness and media competence to purchase food online [20]. However, according to the study by Eberle et al. (2005), as the time required for food provision is increasingly restricted by other tasks, there is a growing need for release [21].

Quantitative survey on use of online ordering

Families in which both partners work, have less time for food provision activities [22]. In this respect, especially mothers with children under 10 years of age see themselves as primarily responsible. They are faced with the need to provide food alongside their occupation [4]. The 8th *Familienbericht der Bundesregierung* (Government Family Report) concluded that 70 % of mothers managed childcare and housework largely alone [23]. As a result, mothers ran into time conflicts which affected meal preparation and food shopping [4]. The EFA Research Project therefore decided to question German-speaking mothers with at least one child of primary school age on whether and to what extent they were prepared to use the internet for food shopping and whether this could help to relieve the organizational and time burden. To the authors' knowledge, there was no existing research into this area in the German-speaking region.

A qualitative preliminary study was carried out to develop research hypotheses and a questionnaire. Three issue-based expert interviews took place in October 2012, each with a representative from the food industry, nutritional education and research, who gave opinions on the subject of nutritional competence and food provision in the everyday family routine. Two group discussions took place in November to record genuine opinions and experiences of individual mothers on the use of electronic distribution channels.

Questionnaire and data collection

The questionnaire was selected as the quantitative survey instrument, as it is particularly suitable for homogenous groups, can reach a large number of dispersed persons, and enables fast and cheap collection of data [24].

A structured, semi-standardized questionnaire was developed based on the results of the qualitative preliminary study [25]; this questionnaire comprised a total of 37 questions and was divided into four subject areas. In addition to socio-demographic information, the first and second subject areas comprised questions on food provision and nutritional competence. The third dealt with new media; this related to both the use of the internet and smartphone apps [26, 27], and the use of online food shopping with delivery or self-collection. Results of the third subject area are illustrated and discussed in this article [28].

To enable the recruitment of German-speaking mothers with at least one child aged 6–10, the heads of all 13 primary schools in the city and district of Gießen were contacted by telephone (after permission was given by the responsible state education authorities). 11 school heads were willing to allow teachers to distribute questionnaires to the students for their mothers in their primary school classes. In order for the study to be able to determine statistically significant statements and trends, in spite of the

lack of representativeness, we aimed for a return of N = 500 through a conscious selection process [25].

Statistical evaluation

572 of the 1,734 distributed questionnaires were returned, corresponding to a return of 33 %. Participants who submitted questionnaires which contained unclear responses were contacted with their consent.[3] Open questions were categorized by the research team. Statistical evaluation was carried out with statistics software PASW Statistics 19.0. Validation and plausibility checks were linked to the capture of raw data. Only questionnaires with many missing values were excluded, resulting in a total of 522 questionnaires for data analysis (occasionally missing individual values). Different N-values therefore appeared in the results.

Bivariate tests were carried out in addition to descriptive analyses; these have been listed in the respective tables and results explanations. The evaluations served to clarify the question of whether and, if so, which socio-demographic variables had an impact on online food shopping, and whether mothers who were online users and had supplies delivered differed from those who collected the food themselves. Significant test results[4] were subsequently examined for correlation by means of paired comparisons [30].

Attribute		n[1]	%
age (N = 517)	< 35	109	21.1
	35–39	127	24.6
	40–44	147	28.4
	> 44	134	25.9
migrant background (N = 517)	yes	166	32.1
	no	351	67.9
education (N = 516)	none	13	2.5
	low (basic certificate of secondary education)	60	11.6
	medium (higher certificate of secondary education)	135	26.2
	high (technical or higher education entrance qualification)	308	59.7
employment (N = 512)	unemployed	106	20.7
	hourly basis (1–14 hours)	54	10.5
	part-time (15–34 hours)	246	48.0
	full-time (≥ 35 hours)	106	20.7
single parent (N = 521)	yes	89	17.1
	no	432	82.9
number of people in household (N = 514)	< 4 people	146	28.4
	4 people	242	47.1
	> 4 people	126	24.5
number of children (N = 515)	1 child	109	21.2
	2 children	262	50.9
	> 2 children	144	28.0
monthly household net equivalent income[2] (N = 390)	low (< 70 %)	167	42.8
	medium (70 % – < 150 %)	181	46.4
	high (≥ 150 %)	42	10.8

Tab. 1: **Socio-demographic attributes of sample** [own analysis]
[1]n = subsample
[2]Calculations based on the OECD Scale. Division into the three categories was based on the relative net equivalent income in Germany (2011) [31–33]. 96 respondents selected the category of "unspecified" and were therefore not included.

Description of sample

The respondents were 40 years old on average (min. 27, max. 61 years; standard deviation [SD] ± 6 years) and were distributed relatively evenly over the four age categories, as shown in ◆ Table 1. The majority of mothers had no migrant background, had a high level of education, worked part time, and was not a single parent. On average, there were four people per household, most including two children. The monthly net equivalent income was low for approx. four tenths and high for one tenth of respondents.

A comparison with the total (female) population in Germany reveals that women of higher ages (45–64 years), without a migrant background, without a technical or higher education entrance qualification, and unemployed women as well as households with two or three people or with at least an average household net equivalent income, were underrepresented [34, 35].

[3] The question and its response options were read out again and/or described in writing on a one-to-one basis, and the participant was asked for her response.

[4] Definition of level of significance: $p > 0.05$ = not significant (n. s.); $p \leq 0.05$ = significant (s) [29]. The following tests were applied: Fishers Exact Test, Chi2-Test (χ^2), non-parametric Mann-Whitney U Test (MWU) and Kruskal-Wallis H Test (KWH).

Results

General use by distribution channel

Of the 522 mothers, 59 said they had already ordered food via internet for delivery at least once. ◆ Table 2 shows that the variables of education, employment and household net equivalent income have an influence on the use of online shopping. Mothers with a high level of education in particular state that they have ordered food online. In terms of employment, it appears that employed mothers use this option more frequently than unemployed mothers. There is no significant correlation between the employment categories. 16.7 % of mothers in the hourly employment group (N = 54) have already ordered food online once. This figure was only 12.6 % among part-time employees (N = 246) and 12.3 % for full-time employees (N = 106). There were only negligible differences in the category of household net equivalent income. The higher the income, the more likely the respondents were to have ordered food online for delivery. At the time of the survey, there was still no supermarket with attached drive-through in Gießen. In order to determine whether the respondents would accept this distribution channel, a description of the concept preceded the actual question: *"Some supermarkets in Germany offer 'drive-through' services. This means that you order food from the corresponding supermarket via internet, a supermarket employee packs your purchases in the shop and you can collect this from the supermarket at a requested time. If this concept would be available in Gießen in the future, would you use it?"* Approx. one fifth of all 522 respondents responded positively. There were no significant correlations between socio-demographic attributes and potential use of drive-through services. In the income bracket, it appeared only that mothers in a household with a high household net equivalent income would be most likely to use the drive-through service.

independent variables	N	test	p-value	significance	significance correlation
education[1]	516	Fisher's Exact Test	0.000	s ***	$\varphi = -0.159$***
employment	512	χ^2	0.043	s *	$r_s = -0.084^{n.s.}$
household net equivalent income	390	χ^2	0.022	s *	$r_s = -0.136$*

Tab. 2: **Correlation between delivery of food ordered online and socio-demographic attributes** [own analysis]
χ^2 = Chi²-Test; s = signifikant; φ = phi coefficient; r_s = rank correlation coefficient according to Spearman; * = significant ($p \leq 0.05$); *** = significant ($p \leq 0.001$); n. s. = not significant
[1] For all of the following significance tests, "high education" was tested against the other levels of education combined together as "low education".

The following question was asked of those respondents who had ordered food via internet for delivery, in order to record the impact of this distribution channel: *"If yes, how often do you order food online?"* The frequency of the potential use of a fictional drive-through in Gießen was also recorded by means of the question *"If yes, how often would you use a supermarket drive-through?"* The three pre-defined response options on frequency were identical, and produced the following results.
58 of the 59 users who had ordered food online for delivery answered the question. None of them had ordered food *"once a week or more often"*, however 27 respondents said they used the service *"at least once a month"* and the remaining 31 respondents said they used it *"less than once a month"* (N = 58). On the other hand, the respondents envisaged using a real drive-through service more frequently: 47 of the 107 mothers who would use the concept said that they would go to a drive-through *"at least once a week"*. 47 mothers would use this service *"at least once a month"* and 13 mothers *"less than once a month"* (N = 107).

Type of food ordered

The half-open question on the type of food groups delivered was addressed solely to the 59 people who had already used the concept of online ordering for delivery. The following categories were given: *"fresh food"*, *"basic packaged foods"*, *"diet foods"*, *"exotic foods"*, *"canned goods"*, *"prepared meals"*, *"frozen good"*, *"drinks"*. Multiple responses were possible. The results showed that fresh food was ordered most frequently, as stated by 18 of the 59 respondents. Diet foods were mentioned by 10, exotic foods by 8 and basic packaged foods (flour, sugar, pasta) and drinks both by 7 mothers. A secondary role was played by canned goods, prepared meals and frozen goods; these were ordered by less than five mothers.

Reasons for use

The participants who stated they had ordered food online for delivery as well as those who could envisage using the drive-through concept were asked about their reasons why. Agreement with the given items was recorded on a scale of 1–5 (◆ Figure 1 and 2). Other reasons for use could be mentioned in an open category.[5]
The most important reason for using the delivery of online ordered food was products not being widely available, with which 82.5 % of participants comple-

tely or somewhat agreed (◆ Figure 1). Product variety played a decisive role for at least one half of mothers. This was followed by *"convenience"* and *"time savings"*, which were classified as almost equally important with approx. 40 %. As mothers' low time budget for food provision activities has been identified in existing research, the reason of *"time savings"* through delivery of online food orders was checked for correlations with socio-demographic details. There were no significances; mothers had food delivered irrespective of their type of employment and household size.

In the question about reasons for using the drive-through concept, the majority of the potential 104 users agreed with the response option *"time-flexible collection"*, closely followed by the responses *"time savings"* and *"better reconciliation of shopping and profession"* (◆ Figure 2). As with online food ordering for delivery, there were no statistically significant correlations to the socio-demographic variables in relation to potential time savings with the drive-through concept.

Reasons against use

Non-users of these two distribution channels gave their opinions on the given obstacles from ◆ Figure 3 on a scale of 1–5. As the bar chart shows, the order of possible disadvantages of both distribution channels was identical. Most mothers who did not use or would not use these services considered the obstacles primarily to be that they could not touch fresh food and that they would lose the relationship to the goods during purchase. In the question to non-users about whether the use of both distribution channels would ease food provision, approx. 60 % of respondents envisaged no relief. Online food ordering for delivery showed a less significant correlation to employment (Kruskal-Wallis-H-test [KWH] p = 0.043; N = 443). The more time the mothers spent working, the more they felt no relief. For self-collection of food ordered online, only age had a significant effect (KWH p = 0.049; N = 394). Multiple follow-up tests indicate that only mothers of the 40–44 age group found self-collection of food provided some relief.

Moreover, ◆ Figure 3 shows that 20 % of non-users of both distribution channels believed they cannot handle the service. For those who did not use the online ordering and delivery service, there were significant correlations in relation to migrant background and household net equivalent income (◆ Table 3). Mothers with a migrant background in particular stated they cannot handle the service (28.5 %; N = 144 vs. 13.6 %; N = 295). Self-assessment of a lack of skills in online

[5] This category *"other reasons, namely:"* was given as a response option in the questions on the reasons for use as well as the reasons for non-use of both distribution channels.

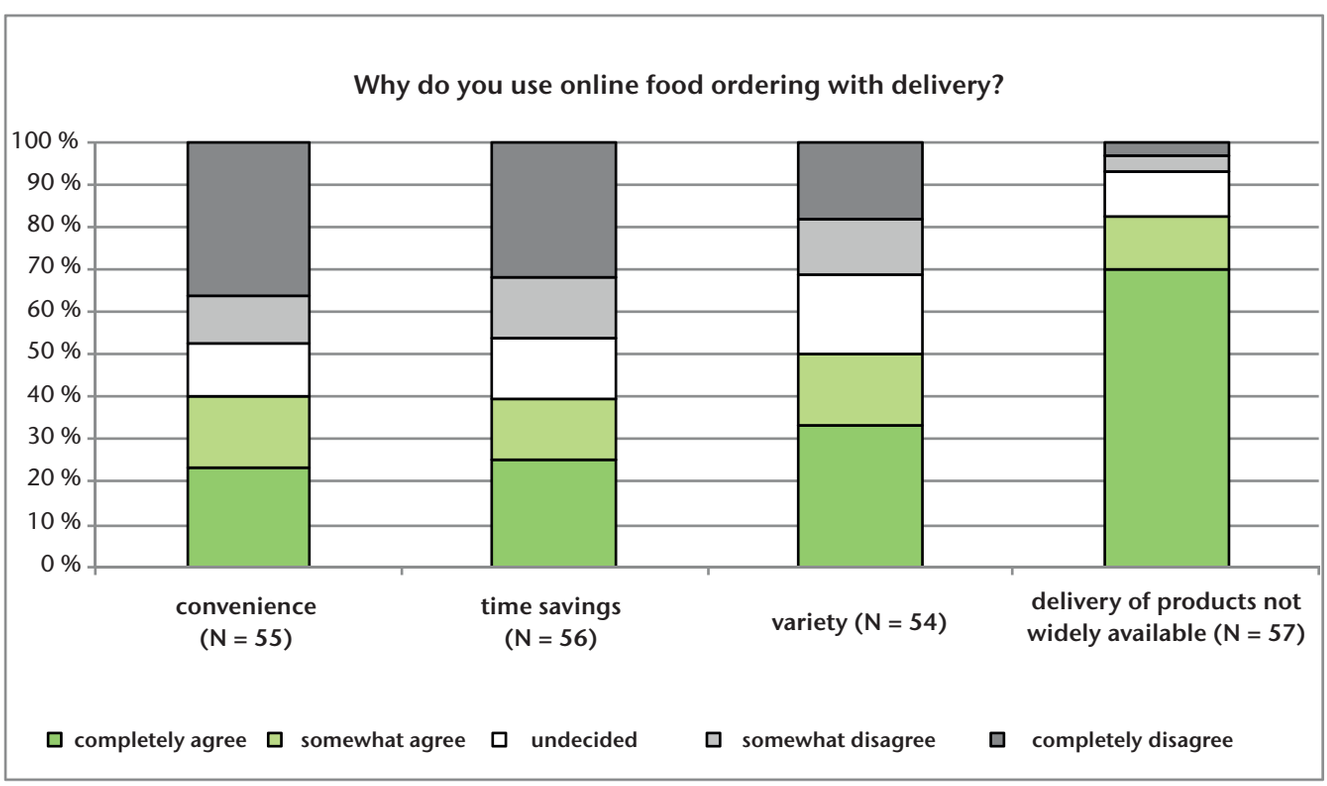

Fig. 1: **Reasons for ordering food online for delivery** [own analysis]

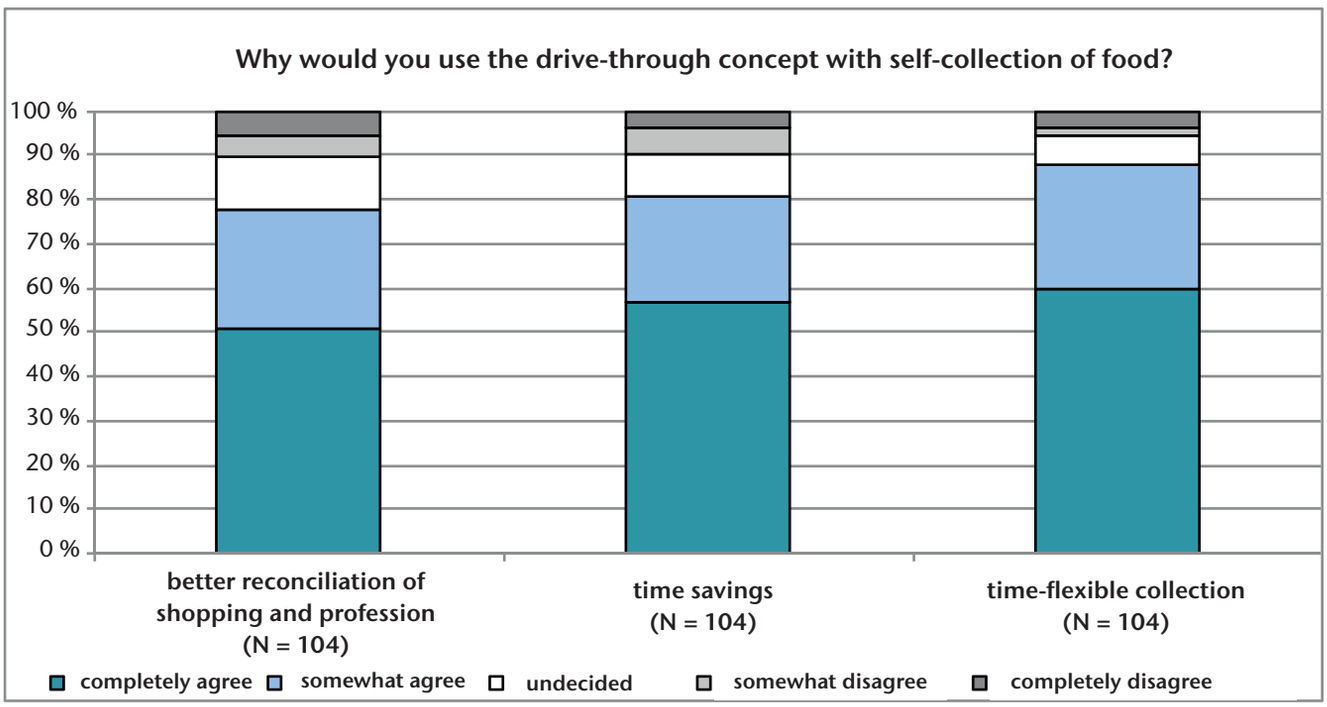

Fig. 2: **Reasons for potential self-collection of food ordered online at a supermarket drive-through** [own analysis]

ordering rose the lower the household net income (low: 25.5 %; N = 149/medium: 12.8 %; N = 148/high: 0.0 %; N = 32). Non-users of a potential drive-in service also showed significant correlations between perceived lack of skills in this electronic sales channel and migrant background and household net equivalent income on the one hand and education and employment on the other hand (◆ Table 4).

Non-users with a migrant background in particular (29.9 %; N = 127) said they cannot handle a drive-through concept. This is significantly different ($p \leq 0.001$) to German mothers (13.3 %; N = 263). In addition, non-users with a low level of education were significantly more likely to admit to a lack of skills than those with a high level of education (25.3 %; N = 127 vs. 14.2 %; N = 232). Furthermore, the lower the level of employment the more likely respondents were to state they would not know how to use the concept competently. Only 13.3 % of mothers in full time employment (N = 75) agreed that they had difficulties using this sales channel, followed by 14.1 % of respondents in part-time employment (N = 185) and 22.2 % of those employed on an hourly basis (N = 45) and 32.1 % of the unemployed (N = 81). Agreement with this option also increases with falling household net equivalent income (high: 0.0 %; N = 28/medium: 10.1 %; N = 139/low: 29.9 %; N = 124).

Discussion

The results of the regional case study confirmed that only very few of the mothers surveyed had already ordered food online for delivery [5, 9]. They are characterized by a high level of education, employment and a high income, in line with the characteristics of those who order food online in existing research [36, 37]. Based on the entire study population (N = 522), 5.2 % of mothers ordered food at least once a month and 5.9 % less than once a month. They therefore used this distribution channel somewhat more frequently than the respondents in the Online-Food-Retailing Study [9].

Users do not value delivery of food

independent variables	N	test	p-value	significance	significance correlation
migrant background	439	MWU	0,000	s ***	r_s = 0,184***
household net equivalent income	329	KWH	0,001	s ***	r_s = 0,211***

Tab. 3: **Test results between socio-demographic variables and reason for non-use of delivery of online food orders due to inability to use the service** [own analysis]
MWU = non-parametric Mann-Whitney U Test; KWH = Kruskal-Wallis H Test;
s = significant; r_s = rank correlation coefficient according to Spearman;
*** = significant ($p \leq 0.001$)

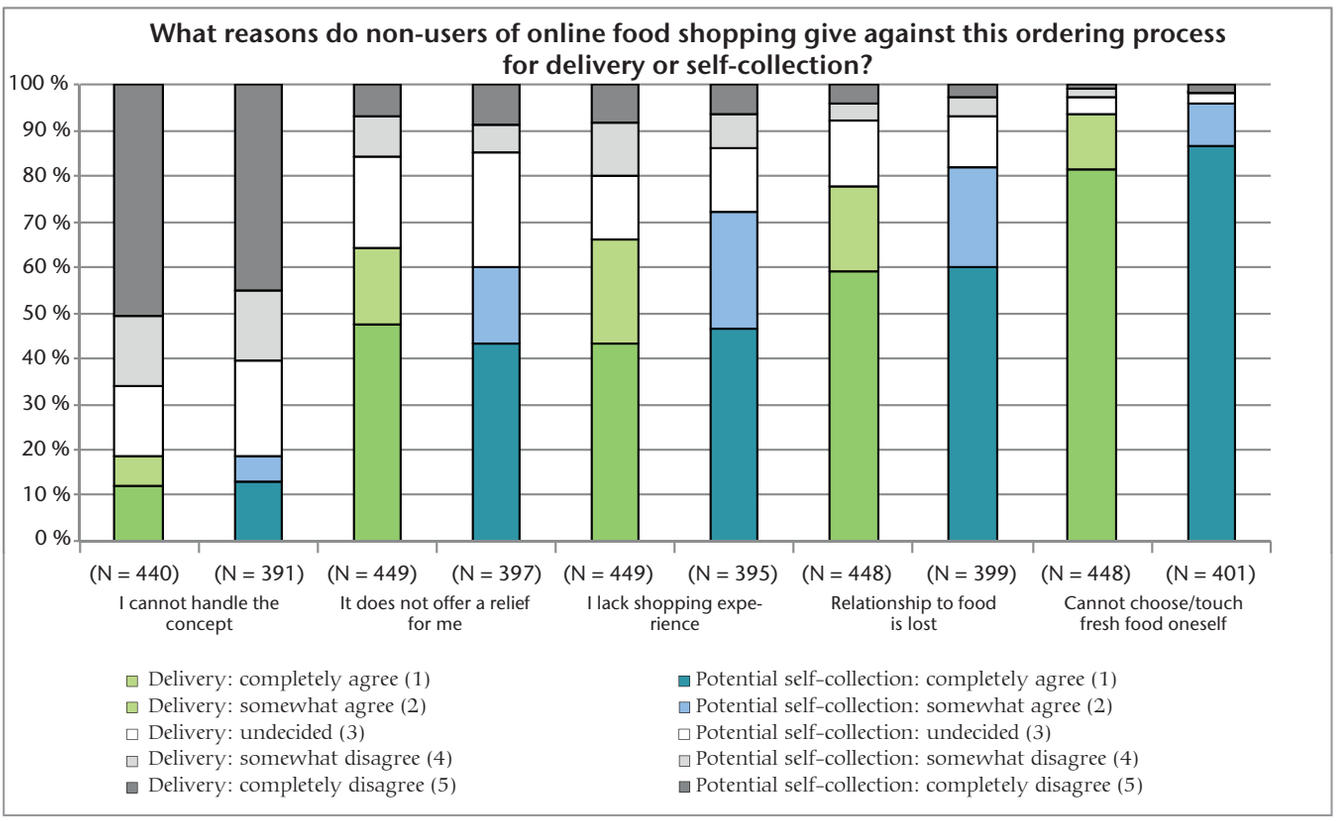

Fig. 3: **Reasons against the (potential) use of online food shopping with delivery/drive-through collection with percentage agreement** [own analysis]

ordered online primarily due to convenience [9] or time savings, whereby the food provision activities would be relieved. A much more influential reason for online delivery was products not being widely available [8, 38]. Obstacles for non-users were the lack of haptic and no relationship to foods. This was corroborated by respondents of other studies [2, 9, 39]. Market research studies of 2010 [38] and 2013 [12] suggested that fresh food played a minor role in online food ordering. However, this study concluded that users of this distribution channel were open-minded about ordering fresh food, and ordered this food type most frequently. A representative study showed that online ordering was too complicated for one in nine people [40]. In this study, almost one in five mothers gave this reason, a fact which should not be ignored. This self-assessment was primarily expressed by mothers with a migrant background and lower household net equivalent income. This response was given by an above-average number of respondents, in contrast to a study from 2013, in which only 5 % of respondents saw their lack of skills as an obstacle to online ordering [9].

The Online-Food-Retailing Survey in Germany came to the conclusion that food ordered online for delivery is more frequently used than the drive-through self-collection. However, the preferred sales channel varied depending on the type of products ordered. Home delivery was preferred for non-perishable foods and drinks, whereas the drive-

independent variables	N	test	p-value	significance	significance correlation
migrant background	390	MWU	0,000	s ***	r_s = -0,187***
education	386	MWU	0,004	s **	r_s = 0,146**
employment	386	KWH	0,002	s **	r_s = 0,188***
household net equivalent income	291	KWH	0,001	s ***	r_s = 0,219***

Tab. 4: **Test results between socio-demographic variables and reason for non-use of self-collection of online food orders due to inability to use the service** [own analysis]
MWU = non-parametric Mann-Whitney U Test; KWH = Kruskal-Wallis H Test; s = significant; r_s = rank correlation coefficient according to Spearman; ** = significant ($p \leq 0.01$); *** = significant ($p \leq 0.001$)

through was preferred for fresh products (45 % vs. 35 %) [9]. As this survey was only able to question respondents about their use of a hypothetical drive-through, only a limited comparison of both distribution channels is possible. A fifth of the mothers surveyed could envisage using a nearby drive-through. At 11.3 %, the number of fictional users of the drive-through is almost double the number of real users of the delivery option. Supporters of the service stated in particular that food could be collected from the drive-through at a flexible time; this also proved to be an advantage of delivery in the survey on retail trends (2012) [41]. 90 % of the mothers who could not envisage using the drive-through mentioned that they would not be able to select or touch fresh food themselves. However, this aspect was given as an advantage of delivery by the respondents of the Online-Food-Retailing Study [9]. In the present study more than 60 % were unable to envisage any relief due to the drive-through concept. This could be due to the fact that the drive-through saves shopping time, but not the journey to the shopping location [39]. Overall this study only revealed a few significant results in the evaluations of the drive-through concept. This may be due to the relatively small sample or to the fact that socio-demographic variables play no role therein.

Conclusion and outlook

Online trade is already filling certain gaps in the market, i.e. for products which are not widely available. But studies also show that many consumers are satisfied with the existing stationary outlets and online trade hitherto represents an additional service rather than competition [19, 42]. This gives multi-channel suppliers in particular the opportunity to expand their online market in addition to their stationary outlets [42]. There have been a number of different assessments of the future of the online food trade. According to the study on Consumer Markets-Trends in Retail 2020 only 21 % of both men and women in 2012 were able to imagine wanting to buy food online in future [41]. In contrast, in a survey by Ernst and Young (2013) 36 % of respondents said they would order food primarily via internet within the next five years. 64 % of the group of family shoppers identified in this study agreed. The survey also assumed that the current proportion of people ordering food online would increase from 0.3 % to 10 % by the year 2020 [12]. In this study, mothers are a relevant target group who still do not use online food shopping, yet who would experience relief as a result of food delivery or self-collection, or who are undecided. However, developments in these distribution channels only seem possible if their value is communicated. This value could be seen e.g. in the time saved through home delivery or collection of a pre-packed order or in the availability of special products which are only available online. Customers' quality standards should also be addressed [39]. Trust plays a central role in ordering fresh products; this could be reached by a helpful return system and reliable customer evaluations [9]. Customers' online ordering skills should also be assured. Almost 20 % of all non-users stated that they cannot handle the electronic food ordering system for delivery or self-collection, primarily mothers with a migrant background, lower education and low income. This could be addressed with step-by-step instructional videos on service providers' homepages. On-site service points could also be set up at the drive-through to respond to questions. Online platforms with product information and easily visible and transparent costs would also be helpful for ease of use.

According to Warschun and Rühle, corresponding investment by the retail trade is particularly important in the start-up phase to help build customer loyalty [39]. This is also significant in terms of differentiation between distribution channels; customers have increasing opportunities to obtain food online depending on their needs. *"Lockbox"*, *"Paketkasten"* and *"Locumi"* are examples of boxes installed on or in front of the home, which can be filled and locked by couriers without the recipient being present. Some systems offer refrigeration so that the user does not have to be at home at a specific time [43–46]. *"Emmasbox"* is a provider of collection points with varied climate zones. Online providers can set up these boxes in highly-frequented spaces such as train stations, enabling 24-hour collection [47]. In Switzerland, customers are able to collect ordered food at the post office or railway counter and to scan food at virtual shopping walls in the station with a smartphone and QR code and have them delivered to their home after work [48]. In Germany, both distribution channels – delivery and self-collection of food ordered online – present currently a transparent service overview due to regional limitations or limited online ranges. It remains to be seen how the online food market in Germany will continue to develop and whether a concept will be established.

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Conflict of Interest
The authors declare no conflict of interest according to the guidelines of the International Committee of Medical Journal Editors.

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