

Psychological determinants of consumption of reusable containers for takeaway food and drinks

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Abstract

Using food and drink disposable containers has heavy environmental and economic consequences. The widespread adoption of reusable containers is a challenge that requires understanding the psychological determinants and barriers of the behaviour. Two studies were conducted: one with a sample from the general public (study 1, N=302) and one with respondents having access to a reusable container system at work (study 2, N=737). Online surveys measured self-reported use of single-use and reusable containers for food and drinks takeaway (studies 1 and 2) and for food delivery (study 1). Stages of change and psychological determinants were also measured to provide behavioural levers. Results indicate that in study 1, most of the sample is aware of the issue associated with single-use containers but has not switched to reusable. In study 2, most respondents say they are already using few single-use and are willing to continue, particularly for drinks to go. Thus, accessibility at the workplace to a reusable container system is associated with higher stages of change. However, many respondents are also in the preactional phase for food takeaway, that is, willing to change but have not started yet. In both studies, perception of control on the behaviour and volitional variables are positively associated with stages of change. This suggests that making reusable containers easier to use and helping individuals plan how and when they can do it could encourage behaviour change.

Keywords

Sustainable consumption, public attitude, behavioural change, psychological determinants, reusable containers, single-use containers, takeaway consumption, food delivery

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Introduction

Takeaway and delivery food consumption is a rising tendency, strengthened by the COVID-19 pandemic. The use of food and drink containers, most of the time disposable, has heavy environmental and economic consequences. Although ‘compostable’ packaging has spread due to rising customers’ demand for eco-friendly products, composting is often impossible because of lack of organic waste sorting facilities in public spaces and businesses. Moreover, lots of packaging labelled as ‘biodegradable’ often does not conform to composting norms such as European Standard (EN) 13432, which leads to compost contamination. Finally, takeaway food packaging, including compostables, could present hazardous substances such as Per- and Polyfluorinated Substances (PFAs), warn nine European NGOs (Straková et al., 2021), most of the time in breach of the law, which is different according to countries. In Switzerland, costs of takeaway food and drinks packaging littering have been estimated at around 107 million Swiss Francs (CHF)/year, (pre-COVID-19 estimation) (Berger and Sommerhalder, 2011).

The better option would be not to produce waste in the first place by using an appropriate reusable containers system,

adapted to the local context and food. At the United Nations level, a historical resolution aiming to be a legally binding instrument by 2024 to end plastic pollution was adopted on March 2022 (United Nations Environment Programme, 2022). In Europe, the 2019/904 EU directive aims to reduce single-use plastic product consumption by 2026, including takeaway food and drink containers. This directive leads, in European countries, to laws and regulations in regard; thus, opportunities for reusable containers are slowly rising.

Reusable food containers are sometimes culturally well-established, as in Mumbai with the dabbawala system, which provides meals to 200,000 workers daily. The environmental impact of reusable can be calculated using life cycle analysis. The number

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of reuses is critical in lowering reusables' environmental impact (Copeland et al., 2013). In addition, materials, weight and distance to cleaning facilities must be considered too (Glock, 2017; Greenwood et al., 2021; Zimmermann and Bliklen, 2020). The better reusable system is to be based on solid, light containers, with an incentive return system to maximize reuses (sustainability factors of reusable packaging are reviewed in Bradley and Corsini, 2023).

The widespread adoption of reusable containers is a challenge that needs to be overcome to achieve a tangible impact on society level. For now, very few data are available on reusable containers use, but data from Canada show that only early adopters take their own containers in restaurants (Zhang et al., 2012) and only a few places offer customers a system of reusable containers (O'Neil, 2019). Aside from the psychological factors from the consumer side that will be explored in depth in this article, other elements can prevent the diffusion of this new mode of consumption: management of the new system by the professional, including the place needed to stock the containers, arrangements of drop-off, cleaning facilities. The level of difficulty depends on the type of system chosen, as described by Baumann et al. (2018): ranging from a centralized system (all actors in a zone share a standard procedure, which makes it easier for customers to take the container with food somewhere and drop it off somewhere else), to individualized system (where customers are responsible for purchasing, carrying and cleaning their own containers).

In the literature, only scarce papers have examined the psychological determinants of the consumption of reusable containers. Borg et al. (2020) examined the impact of social norms on plastic avoidance (plastic bags, straws, coffee cups and takeaway containers) in a representative sample in Australia. The authors show that intention to avoid plastic increases with the perception of other people in their state also avoiding plastic (descriptive norm, i.e. what others do), and to a lesser extent, the disapprobation perceived towards the use of items (injunctive norm, i.e. what ought to be done). Outcome expectancy (i.e. beliefs about the benefits of the behaviour) and self-efficacy (i.e. perceived ability to perform the behaviour) are also consistent predictors: the more people perceive that they can avoid plastic use and that this action would have an impact, the more they intend to reduce plastic use. Anticipated costs (i.e., anticipating that one will have to pay for an alternative to single-use) negatively predict intention for all items except plastic bags.

Ertz et al. (2017) used the theory of planned behaviour (Ajzen, 1991) to explain reusable container adoption in Canada and China. The model explains 76% of intention variance and 13% of the variance in behaviour in their data. The authors also show that context is essential. For example, the large availability of single-use cups for takeaway significantly influences attitude (i.e. evaluation of the behaviour), perceived behavioural control (i.e. perception that performing the behaviour is under one's control) and subjective norms (i.e. belief that people whose opinion matter to the person are in favour of the person doing the behaviour) and ultimately might prevent a consumer from asking to have their container refilled instead.

Keller et al. (2021) used a stage model to understand the shift from single-use to reusable drink cups. Given the vast difference in explained variance for intention and behaviour observed in the data by Ertz et al. (2017), the stage model of self-regulated behavioural change (Bamberg, 2013) used by the authors is particularly adequate. Using a reusable container is not only a matter of willingness to do so but also planning how and when (action planning) and how to react to unexpected situations (i.e. coping planning). The data show that 46% of the variance in bringing one's cup behaviour is explained by implementation intention (i.e. having already a specific plan of when and how to perform the behaviour), highlighting the importance of considering the intention-behaviour gap. Personal norms (i.e. moral obligation based on the person's values), perceived goal feasibility (i.e. belief that the goal is easy to reach) and positive emotions (i.e. anticipating that performing the behaviour would make the person feel good) predicted the intention.

In the present study, we aim to investigate directly the behaviour of using a reusable container and not the reduction of single-use plastic. The focus on reusable containers allows us to investigate beliefs and barriers specific to using them, such as carrying them. Those beliefs and barriers might not be elicited if the survey concerns single-use plastic reduction. Furthermore, we choose to investigate also volitional variables given the potential intention-behaviour gap highlighted in the literature. Finally, we study food containers in addition to drink containers because several obstacles are specific to meals. For example, the question of the container size according to the type of food consumed (e.g. pizza cannot be put in the same box as rice meal) can be an obstacle, or the inconvenience of odours when the container cannot be returned or washed immediately. We conducted two studies, one with a sample from the general public and one with a university sample (students and collaborators) that has access to a reusable container system at the university.

Those studies were conducted in the territorial context of the canton of Geneva, homing approximately 2000 restaurants. It is unclear what proportion of these restaurants offer takeaway/delivery services since there are no data available. Nevertheless, approximately 450 restaurants were members of the leading delivery platform in Geneva. In Switzerland, there is no legislation regarding use of disposable containers (e.g. additional taxes or penalty based systems), nor incentives regarding use of reusable ones. Marginally, some restaurants or cafés charge for some disposable items or, on the opposite, offer a discount for using reusables. The federal government has declared that reusable packaging solutions that already exists are sufficient and efficient. So these studies focused on a reusable container service based on a deposit return system, which has been implemented by an award winning Swiss firm at the national level since 2016. At the time of the studies, approximately 120 restaurants were partners of this service in Geneva (i.e. 6%) (with more than half of them being company restaurants). The system is 100% Swiss-made, which has its importance given that the origin of materials and products is a concern often expressed by users (a product made locally optimizes its environmental impact and provides

more reliable guarantees that the product complies with local legislation, in terms of food contact for example). Reusable container can be returned to any partner restaurant, which must professionally clean the container. The deposit amount is 10 CHF for a bowl and 5 CHF for a cup. For comparison, the Swiss median gross salary was of 6665 CHF in 2020 (Federal Statistical Office, 2023), and the average budget dedicated to lunch during the working week was around 15 CHF (Swibeco, 2021).

Study 1

Method

Data collection and sample. Data was collected through a panel provider (Link survey institute) via their online platform between 10th June and 8th July 2021. Only individuals who were takeaway consumers at least once a week were included ($N=302$, corresponding to 33.9% of contacted panel members). Being a takeaway consumer included ordering coffee/tea to go, buying meals for takeaway, or using food-delivery service at home. Given only consumers of takeaway were included, the sample is not necessarily representative of the general population of the Canton of Geneva (i.e. people who are not consumers of takeaway food are not represented). However, the sex balance and age repartition in the sample is somewhat similar to the general population (comparison is presented in Supplemental Appendix, Table S1). The survey language was French.

Questionnaire. The questionnaire measured first the patterns of takeaway consumption (average frequency, and type of container used, context for takeaway consumption and type of food usually consumed). Then, stages of change were measured regarding the three behaviours examined in the survey (food takeaway, drinks to go and food delivery) (items adapted from Keller et al., 2021). Then, several items measured psychological determinants (items adapted from Borg et al., 2020; Ertz et al., 2017; Keller et al., 2021) including beliefs towards consequences, normative beliefs, perception of ease of use for reusable containers, volitional items (action planning and coping planning) and barriers to the use of reusable containers. Finally, a section of the survey was specific to a deposit system to question the amount of the deposit judged acceptable. And for respondents that indicated using their personal container for takeaway were asked additional questions about the material of the container. The survey ended with a

series of sociodemographic items. The items and scales are presented in Supplemental Material.

Statistical methods. Nonparametric tests (Field, 2018; Gibbons and Chakraborti, 2020) are used to test difference on stage of change because stages of change are not an interval measurement (i.e. the distance between two stages (e.g. predecisional denial and predecisional inhibition) is not necessarily the same as the distance between two other stages (e.g. predecisional inhibition and preactional). The Mann–Whitney test is used when the predictor variable has two groups (e.g. gender), and the Kruskal–Wallis test is used when the predictor has more than two groups (e.g. age categories). For the Mann–Whitney test, the test statistic is U and is used to calculate if the difference between group is statistically significant or not. The z -value corresponds to the z -score (standardized test statistic). The p -value is the significance of the test (a p -value below 0.05 is significant, a value above 0.05 is not), and the r is the effect-size, representing how big is the effect. For the Kruskal–Wallis test, the test statistic is H , and the p is the significance of the test.

Confidence Intervals-Based Estimation of Relevance (CIBER) analysis (Crutzen et al., 2017) is used to select the psychological determinants that are relevant for behaviour change. Visualization of answer distribution and correlation coefficients with stages of change at the same time allows to identify quickly the good candidates for an intervention. A promising determinant to be selected for a behaviour change intervention is simultaneously associated with the outcome (here, stages of change) and for which there is a margin of progress on the distribution (i.e. not everyone scores already high on this determinant).

Results

Consumption habits. Data show that in the sample, 87.1% of respondents eat at least one takeaway meal per week and one-third at least three times a week. Regarding food delivered at home or the office, 60.3% order at least once a week. Concerning takeaway drinks, 68.2% buy some at least once a week.

Most respondents (67.5%) go to the same places (between 1 and 5). This consumption occurs in the professional context (62%) (mainly in the morning or lunchtime), compared to 46% in their private time (morning, lunch or evening) and 19% on their way to work. The type of container used is presented in Table 1.

Table 1. Frequency of use according to container type (study 1).

		Always (%)	Most of the time (%)	Sometimes (%)	Rarely (%)	Never (%)
Drinks	Single-use	45.6	36.4	11.2	4.4	2.4
	Reusable from the restaurant/café	9.7	12.1	14.1	16.0	48.1
	Own reusable container	6.8	12.1	14.1	15.5	51.5
Meals	Single-use	31.2	43.3	13.3	8.0	4.2
	Reusable from the restaurant/café	6.8	12.5	17.1	26.6	36.9
	Own reusable container	9.1	14.4	20.9	18.6	36.9

Overall, single-use containers are much more often used than reusable ones. There is no big difference between reusable containers from the restaurant/café and one's own: both are occasionally used, if not never.

There is an interesting variety in which dishes are consumed in the professional context compared to free-time. Salads are more than twice as frequently consumed as takeaway meals in the professional context (23.5% of respondents) compared to free-time (7.6%). Sandwich and hot dishes (e.g. pasta/rice) are also more frequently consumed as takeaway meals in the professional context (respectively, 23.8 and 21.9%) compared to free-time (respectively, 12.6 and 13.9%). Some types of food are consumed equally frequently in both contexts (e.g. sushi, consumed as takeaway by 14.9% of the sample in the professional context and by 13.2% during free-time). Pizza and burgers are more frequently consumed as takeaway meals in the private context (by 21.2 and 18.2%, respectively,) compared to the professional context (18.5 and 12.9%, respectively). Overall, the type of dishes most frequently consumed as takeaway in any context are pizza (39.7% of respondents consumed pizza as takeaway), sandwich (36.4%), hot dishes (35.8%), burger and salad (31.1% each) and sushi (28.1%). Tart and soup are much less frequently consumed as takeaway (13 and 8%, respectively).

Psychological determinants of consumption. Despite this majoritarian consumption of single-use containers reported by respondents, stages of change indicate that only very few consider using single-use containers as okay. As presented in Figure 1, for all types of consumption (food takeaway, drinks to go and food delivery), the most frequent answer was in the preactional stage, meaning that people would like to use more reusable containers but do not know how to do it concretely. This answer is the strongest for food takeaway. Regarding food delivery, a non-negligible share of respondents indicates that they would like to use fewer single-use containers but do not think it is possible. For drinks to go, the second most frequent answer after the preactional stage is the actional stage, that is, people want to change and know how to change but have not started yet in their everyday life.

Nonparametric rank tests were used to test the association with sociodemographic variables. The Kruskal–Wallis test showed that age did not predict significantly stages of change for meals takeaway, $H(5)=9.58$, $p=0.088$, nor for drinks takeaway, $H(5)=7.81$, $p=0.167$, nor for food delivery, $H(5)=3.943$, $p=0.558$.

The Mann–Whitney test showed that males and females have various distribution on the stages of change for the three types of consumption, respectively: takeaway meals, $U=10,935.50$, $z=2.67$, $p=0.008$, $r=0.16$; drinks to go, $U=9356.50$, $z=4.18$, $p<0.001$, $r=0.27$ and food delivery, $U=6927.00$, $z=2.57$, $p=0.010$, $r=0.17$. In both three cases, women are at more advanced stages of change than men (see Supplemental Appendix Figure S1).

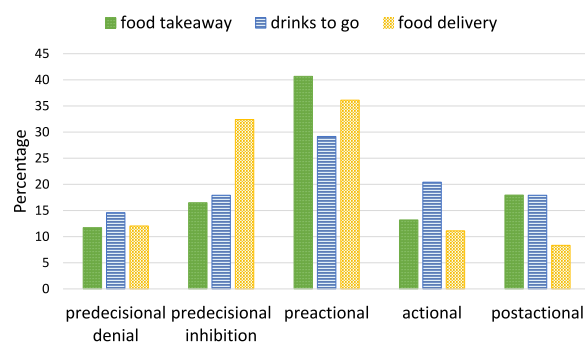


Figure 1. Stages of change according to the type of consumption (study 1).

Predecisional denial=I often use single-use containers, this way of doing is fine with me and I do not see a problem with it. Predecisional inhibition=I often use single-use containers, I would like to use fewer but I do not think it is possible. Preactional=I often use single-use containers, I would like to use fewer but I do not know concretely how to reach that goal yet. Actional=I often use single-use containers, I would to use fewer and I know how, but have not started to do it in my everyday life. Postactional=I use very few or no single-use containers and want to continue in the future.

Figure 2 presents the psychological determinants associated with the stages of change using the CIBER analysis (Crutzen et al., 2017).

Answers distribution is presented in the central column, whereas the correlation coefficient of association with the stages of change is presented in the right column. Diamond fill colour in the central column represents the level of the mean: the greener the diamond, the lower the mean, whereas the bluer the diamond, the higher the mean. In the right column, the more the diamond is far from zero, the stronger the correlation. If the correlation is above zero, it means the association is positive (the higher one variable, the higher the stages of change), whereas if the correlation is negative, the association is negative (the higher one variable, the lower the stages of change).

The distribution of attitude items (1–2) indicates that most people hold positive beliefs about reusable containers and that there is a positive association between attitudes and stages of change. There is a broader distribution of answers for the items measuring the perceived responsibility (3–4–5), whereas the positive association with stages of change remains, suggesting a stronger possibility for improvement for perceived responsibility than for attitudes. Anticipation of positive emotions (6) could also be improved with a potentially positive effect on stages of change because the association is non-negligible.

On the contrary, subjective norms (7–8), that is, the perceived approbation by the person close to the respondent, are not good candidates for intervention because they are already perceived as positive, whereas the association with stages of change is small (and could include zero). Similarly, the perception of descriptive norms (9–11), that is, the number of other people who already use reusable containers, is not associated with stages of change (except for drinks to go, where there is a small positive association). The perception of the norm is low for all three behaviours (food takeaway, drinks to go and food

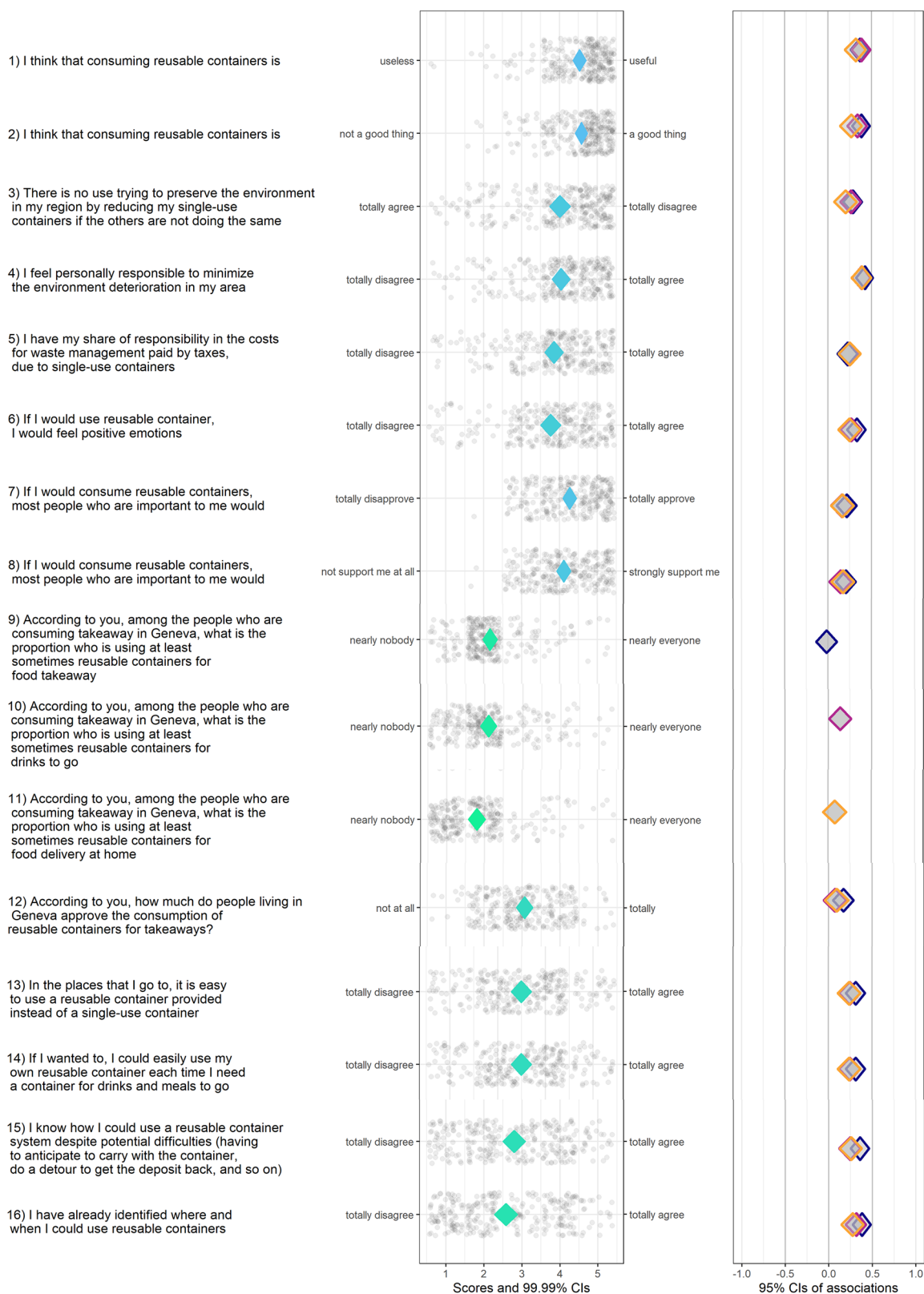


Figure 2. CIBER analysis of psychological determinants and stages of change (study 1).

Violet = meals to go; pink = drinks to go; orange = food delivery. For a simpler, greyscale version of the graph, see Supplemental Figure S2 in Appendix. CIBER: Confidence Intervals-Based Estimation of Relevance.

delivery). Regarding injunctive norm (12), that is, the perception of approval by other people in the region, the association with drinks and food delivery is null, but small and positive for

meal takeaway. Because the distribution is intermediate, it might be a candidate for an intervention to promote reusable containers for meal takeaway.



Figure 3. Frequency of reported barriers according to gender.

The total length of the bars represents the proportion of the barrier cited in the top three most important. The colours represent the percentage according to the ranking (most important, second most important and third most important).

Perception of control (13–14) is broadly distributed and positively associated with stages of change (more strongly for meals takeaway), suggesting another useful determinant to target, as are the volitional variables (15–16), showing a similar pattern (broad distribution and positive association with the outcomes).

The top three barriers reported by respondents are the organization and planning needed to use reusable containers, having to return to where the consumption was bought for the deposit and the hygiene of the containers provided by restaurants/café. Less frequently cited were being afraid of a refusal by the staff to use one's own container, the smell after usage, having to clean the container and the price for the deposit. Barriers differentiated by gender are presented in Figure 3.

Container's material. Respondents using their own containers were asked to indicate which material it was. The majority

mentioned that they used a container made of plastic (66%), 54% a container made of glass, 27% a steel/inox container and 6% something else. They then rated the three materials (plastic, glass and inox) according to several characteristics. Glass is perceived as the best for recycling, environment-friendly, with no impact on health, easy to clean and dry and suitable for reheating in the oven and microwave. The only characteristics for which it was not judged as the top are weight (plastic was top-rated), unbreakable (steel/inox was top-rated) and keeping food warm (steel/inox was top-rated). Interestingly, despite being the most frequently used material, plastic is judged best only on one characteristic: weight. A further question examined this aspect by asking respondents which of the same list of characteristics were essential to them for a reusable container. The self-reported most essential characteristics are, in order: no impact on health (73%), easy to clean and dry (68%), environment-friendly (61%),

recyclable (60%), suitable for reheating in the microwave (56%) and then weight (51%). The other characteristics were judged as essential by less than 50% of the sample: keeping food warm (43%), unbreakable (42%), resistant to cutting scratches (42%) and suitable for reheating in the oven (36%).

Deposit system. Respondents indicated being more willing to pay a deposit if the reusable container could be returned to another place (39% 'totally', 43% 'rather yes'), compared to having to go back to the same place to get the deposit back (18% 'totally', 46% 'rather yes').

The most frequent answer for the maximum deposit amount was 5 Swiss francs (CHF) for a meal container, mentioned by 39% of respondents, and 10 CHF for 12%. For a drink container, 2 CHF was the most frequent answer (34%), followed by 5 CHF (17%).

The deposit amount below which it was considered not worth bringing back the container was below 2 CHF for a meal container for 66% of respondents. For drinks containers, below 1 CHF was mentioned by 53% of respondents.

Discussion

The study conducted on a general population sample showed that most people consume takeaways in single-use containers. Interestingly, data also showed that most of them are aware of the waste issues associated with their consumption. Psychological stages of change vary depending on the type of consumption: compared to meals, people indicated a greater willingness to change and knew how to do so for drinks to go, but haven't started yet. Knowing how to manage a reusable meal takeaway container appeared to be more challenging. Finally, the majority considered impossible to change behaviour for home delivery. Therefore, different behaviour change strategies should be employed for each type of consumption. Recommendations will be detailed in the general discussion.

Study 1 found that patterns of consumption vary based on the type of food, with pizza and burgers being primarily consumed as personal takeaway food, and salads, sandwich and hot dishes (pasta/rice) being mainly consumed as professional takeaway meals. As those types of food require containers of various sizes and shapes, and personal and professional contexts differ in practical considerations such as access to a fridge and rinsing/washing facilities, understanding which types of food are consumed in which context is critical for developing a reusable container system.

Stages of change did not vary significantly according to age of the respondents, but female were at more advanced stages than men. Detailed analysis of the barriers reported by each gender reveal that the top three barriers are similar but in a different order. Thus future studies could explore more in details the reasons behind this difference between gender (also found in Borg et al., 2020).

One of the main barriers identified by respondents is having to return to the place the meal was bought for the deposit. This could mean that respondents are not aware of the reusable system

that is in place in the region (where the deposit can be received in return in any partner restaurant), or that they are accustomed to restaurants that have their own, not-centralized deposit system.

One limitation of study 1 is that we lack information about reusable container availability in the daily life of individual respondents, which might influence their answers, notably the perceived possibility and difficulty of switching to reusables. To address this limitation, a second study was conducted with a specific population that had easy access to a reusable container system.

Study 2

A second study was conducted on a university sample of students and collaborators. The second study aimed to examine the determinants of the choice of takeaway containers among respondents with easy access to a reusable container system at their workplace/study place. A reusable containers deposit system is available at the university cafeteria. Deposit is of 10 CHF for a bowl/plate, and of 5 CHF for a cup (also suitable for soups), and containers can be returned to any partner restaurant, inside or outside the university. Containers are made of polybutylene terephthalate reinforced with glass fibres.

Method

Data collection and sample. Data were collected through the same online platform as study 1 (link survey institute). The invitation to answer the survey was sent using the university mailing list ($N=24,993$). Data collection occurred between 16th May and 10th June 2022.

In total, 737 surveys were filled, 287 by students, 209 by teaching/research staff and 241 by administrative and technical staff. The mean age in the student group is 24, 41 in teaching/research staff and 45 years old for the administrative and technical staff. Across all three groups the sample is mostly feminine, with 81% of respondents in the student group being female, 77% in the administrative and technical staff and 63% for the teaching/research staff.

Measures. Items were similar to study 1 (see Supplemental Material for items wording), except for questions on container materials and the deposit system, which were removed to shorten the survey. Food delivery items were also removed because less relevant in the workplace/study place context.

Results

Consumption habits. Seventy-six percent of respondents consume a takeaway meal one to three times a week, and 50% consume takeaway drinks one to three times a week. About 11% of the sample never consume takeaway meals, and 30% of the sample do not consume takeaway drinks. Finally, 13% of the sample consume takeaway meals more than four times per week, and 20% of the sample consume more than four times per week

Table 2. Frequency of use according to container type (study 2).

		Always	Most of the time	Sometimes	Rarely	Never
Drinks	Single-use	24.0	26.7	16.8	14.9	17.6
	Reusable from the restaurant/café	13.9	17.2	19.9	16.4	32.5
	Own reusable container	10.3	13.3	13.2	13.9	49.3
Meals	Single-use	15.3	26.9	24.7	19.9	13.2
	Reusable from the restaurant/café	16.1	20.6	21.2	16.5	25.5
	Own reusable container	10.0	18.4	16.8	15.0	39.8

takeaway drinks. Table 2 presents the frequency of use of each container type.

Results indicate that the sample majority consume more single-use containers than reusable ones for drinks and meals. Nevertheless, reusable containers are occasionally used, though it is more frequently the container available from the restaurant/café than one's own.

Psychological determinants of consumption. The stages of change pattern indicates that most respondents describe themselves in the last stage of the process, where they are already using few single-use containers and being willing to continue. Figure 4 shows that it applies strongly not only for drinks to go but also for meals. For food containers, the second most frequent answer is the desire to reduce single-use container consumption, but not knowing how to do so. A significant share of respondents is in the stage of wanting to change, knowing how, but not having started to implement the change. This pattern is observed for both drinks to go and food takeaway. Overall, the sample is well aware of the issues related to single-use containers, as evidenced by the fact that less than 5% of respondents are satisfied with using them.

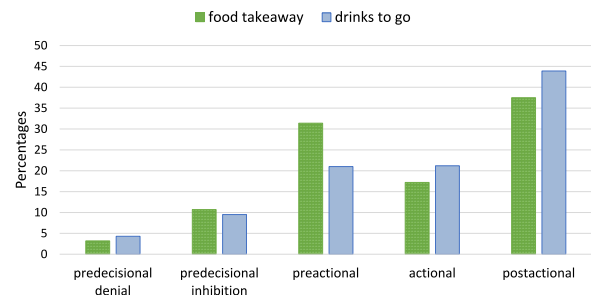
The difference between students and staff (divided into teaching/research staff vs administrative and technical staff) was tested using the Kruskal–Wallis tests. Results showed that status predicted significantly stages of change for meals takeaway, $H(2)=6.97$, $p=0.031$, but not for drinks takeaway, $H(2)=4.07$, $p=0.130$. For meal takeaway, paired comparisons showed the difference was mainly between students versus teaching/research staff, $p=0.011$, the latter being the one with the highest level on the stages of change (see Supplemental Appendix Figure S3).

The Mann–Whitney test showed that females are in more advanced stages, both for takeaway meals, $U=49,212.00$, $z=2.07$, $p=0.038$, $r=0.08$; and drinks to go, $U=38,837.00$, $z=2.61$, $p=0.009$, $r=0.11$ (see Supplemental Appendix Figure S4).

The CIBER analysis presented in Figure 5 shows which determinants are associated with stages of change.

Attitude item (1) shows that the university sample is favourable to reusable containers. However, communicating to the minority who is not convinced yet could be useful as the association with stages of change is positive.

Items measuring personal responsibility (2–3–4) suggest that most respondents feel responsible for the environmental and financial impact of their waste. Given the positive association with stages of change, those aspects could be fruitful targets to work on with the unconvinced minority.

**Figure 4.** Stages of change according to the type of consumption (study 2).

The anticipation of positive emotions (5) for using reusable containers is present with some variety among respondents. Because the association with stages of change is positive, this factor is also a possible target for intervention.

Responses to norm items vary according to the type of norm. Although most respondents consider that people important to them would encourage them to use reusable containers (6) and that other colleagues and university students approve of them (7), only the former is associated with stages of change. Perception of how many others use reusable containers for food (8) and drinks (9) varies widely from a minority to a majority, with fewer responses for 'nearly nobody' and 'nearly everybody'. Perception of norms is positively associated with stages of change: the more people perceive others using reusable containers, the more advanced they are in the stages of change.

Perception of control (10–11) is widely distributed throughout the scale, meaning that some people consider it very difficult and others very easy to use reusable containers. Perception of control is positively associated with stages of change, with a stronger association observed for stages of change towards reusable containers for meals than containers for drinks.

Similarly, answers to volitional variables (12–13) are widely distributed and positively associated with stages of change.

Discussion

The second study found that respondents were more advanced in the stages of change compared to study 1 sample. As the university sample was overall composed mostly of females, the difference in gender distribution between the two studies is a potential confounding factor. To answer this element, we compared the average level for men on stages of change. In study 1, the mean for stage of change level for meals containers ($M=2.89$,

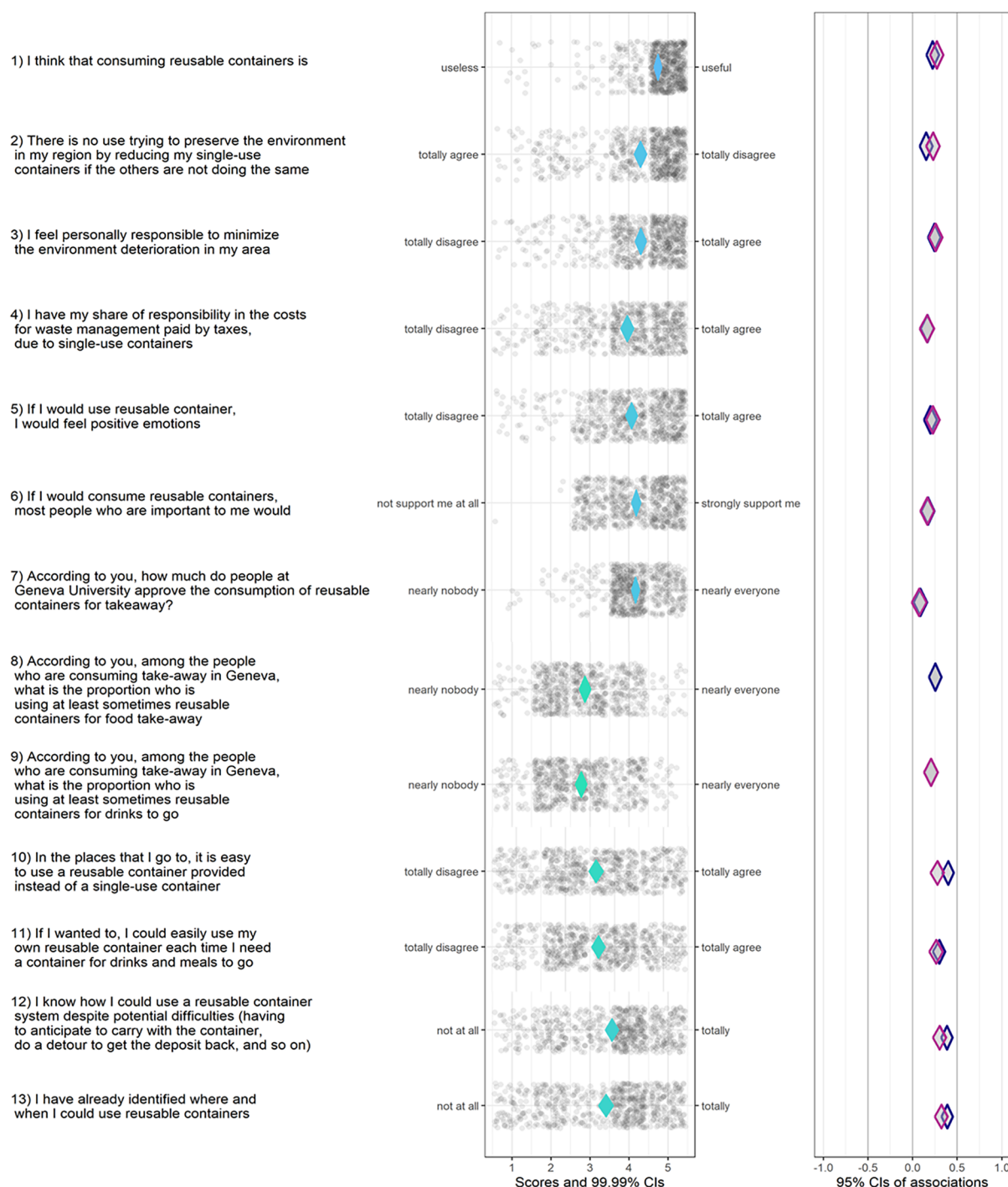


Figure 5. CIBER analysis of psychological determinants and stages of change (study 2).

Violet= meals to go; pink=drinks to go. For a simpler, greyscale version of the graph, see Supplemental Figure S5 in Appendix. CIBER: Confidence Intervals-Based Estimation of Relevance.

SD=1.27) is lower than in study 2, $M=3.80$, $SD=1.41$. For drinks, the pattern is similar, study 1: $M=2.72$, $SD=1.25$; study 2, $M=4.08$, $SD=1.45$. Thus, the average score of men in the stage of change is higher in study 2, which suggests that access to reusables may have a greater impact on behaviour than gender. Because several factors vary between the two samples (accessibility of a reusable containers system, education level, socio-demographics of the population), it is difficult to point one factor

responsible for the difference in results. This point will be returned to in section ‘General Discussion’.

Despite a general higher level in the stages of change, several people still use single-use containers both for drinks and meals, as seen in consumption habits. This reveals that accessibility alone is insufficient in adopting this habit.

A difference was found between students and staff in using reusables for takeaway meals but not for drinks. Logistical

barriers may play a role, as students may not have access to the same facilities as staff, like a storage place, possibly access to a fridge or a sink, and have to carry their reusable containers in their bag all day.

The CIBER analysis reveals that only the norm of people important for the respondent is associated with stages of change and not the perceived norm in colleagues and university students. This suggests that the perceived opinions of close acquaintances drive more behaviour change than those in the workplace/academic setting.

A limitation of study 2 is the low response rate (around 3%). We used the university mailing list for distributing the survey, and because of the large number of emails distributed through this channel, the survey invitation might not have been read by everyone. Also due to the large number of emails that collaborators and students receive every day, it was not possible to send a reminder email. It is plausible that the people who responded were the ones most interested by the topic. Thus, the results might overestimate the share of person who consume in reusable containers at the university.

General discussion

The purpose of the two studies reported in this article was to investigate the willingness to switch to reusable containers for meal takeaways, drinks to go and food delivery. Because only scarce studies (Borg et al., 2020; Ertz et al., 2017; Keller et al., 2021) were available on this topic, more data were needed. Socio-demographic variables associated with this disposition, as well as psychological determinants of behaviour, were explored. In general, it is evident that most respondents do not use reusable containers, despite being aware of the issues associated with single-use containers. Thus, communicating about the environmental consequences of takeaway waste is unlikely to change their behaviour as awareness is already high.

The analysis of psychological determinants reveals that some beliefs held by individuals are correlated with the stages of change. Although the correlational design of this study prevents drawing causality conclusions, the links between the determinants and behaviour have been demonstrated in other studies (e.g. Ajzen and Schmidt, 2020; Steinmetz et al., 2016).

Recommendations

Interestingly, the results show that many people are willing to change but do not think it is possible, or do not know concretely how to do so. In order to help them, a recommendation is making the use of reusables visible and easy. This includes displaying reusables more prominently than single-use (Manuel et al., 2007), offering primarily reusables when takeaway is asked and/or asking customers to bring their own containers to normalize this behaviour (Ziada, 2009). Single-use should be kept aside and provided only if explicitly asked (idea based on behaviour change technique (BCT) 12.1 Restructuring the physical environment, Michie et al., 2013). Providing a map of partner restaurants to

help customers locating reusable containers providers could also help (based on BCT 11.3 Conserving mental resources, Michie et al., 2013). Ideally, grabbing your own container in the morning or at lunchtime should become a reflex. Reusable containers could be associated with reflex behaviours already implemented like grabbing keys or cell phones when going out (BCT 8.3 Habit formation, Michie et al., 2013). To bridge the intention-behaviour gap, it could be helpful to use prompts (BCT 7.1 Prompts/cues, Michie et al., 2013) at critical times (just before people leaving their home to go to work, just before lunchtime), or use apps like Rippl (Ocean Conservancy, 2012) that allow users to set alerts reminding them to take reusables before leaving home.

There are differences based on the type of consumption: switching to reusables for drinks to go seems the easiest behaviour to adopt. Consequently, behaviour change strategies must be tailored accordingly: for drinks containers, the objective would be to assist people in starting something they have already decided on (e.g. BCT 1.4 Action planning, Michie et al., 2013, which have been shown to work by behavioural cueing, Human Behaviour Change Project, 2018), whereas for food takeaway, the challenge is to educate people on concrete steps they can take to reduce their consumption of single-use (e.g. BCT 4.1 Instruction on how to perform behaviour, Michie et al., 2013, increasing knowledge and skills, Human Behaviour Change Project, 2018). Regarding food delivery, many people believe it is impossible to switch to reusables, probably by lack of possibilities, thus highlighting examples of success would help to progress further in the stages of change (e.g. BCT 6.1 Demonstration of the behaviour/modelling, Michie et al., 2013, increasing beliefs about capacities, Human Behaviour Change Project, 2018).

The deposit amount (10 CHF for a bowl and 5 CHF for a cup) appears to be more expensive than wished by takeaway users. However, payment can be delayed by using an app, which allows to debit the deposit only if the container has not been returned after 1 week.

About materials, interestingly the results show that users mainly use plastic, although this material is only rated highly for its lightness. On the other hand, a fundamental criterion for users is a material that has no impact on health. This indicates either a lack of awareness of the potential health hazards of certain food contact plastics (Guecke et al., 2023), or a contradiction on the part of consumers. Those aspects are very important to be known when it comes to make material choices for a reusable system and very important communication elements to be clarified to the public.

Differences between studies 1 and 2

The results of the two studies show notable differences, such as the lack of association between perceived descriptive norms and stages of change in the general population (study 1), whereas those two parameters were significantly associated in the university sample (study 2). One possible explanation is that the context for the general population might not be supportive enough for the

norm to affect behaviour. According to the COM-B model (West and Michie, 2020), behaviour change requires not only motivation but also opportunities and capabilities. Thus, the study 1 sample might lack the necessary opportunities and capabilities, whereas the respondents in study 2 have easy access to the reusable container system in their workplace/study place. Consequently, if they perceive a positive norm, they might be more likely to act on it.

Another difference between the two studies is that in general population sample, there is no difference in usage between one's own reusable containers and reusable containers available from the restaurant/café; both are rarely used. Of note, in the university sample, where people have easy access to a reusable container system, the reusable containers available from the restaurant/café are used more frequently than one's own, suggesting availability is critical.

Aside from availability, the samples varied between studies 1 and 2 because of the different recruitment pools. In study 1, mean age is 48 and gender repartition is well-balanced (48% male, 52% female). In study 2, the sample is younger and more feminine (mean age=36 years old, 75% of female). In addition, the education level is higher in study 2 (68% of respondents have a university-level diploma, compared to 48% in study 1). Those differences co-vary with the difference in availability of reusable containers. Thus, the difference in results between both studies cannot directly be interpreted as exclusively due to availability. In existing literature (Borg et al., 2020), sociodemographic factors have been shown to have an influence: older respondents avoided single-use plastics more than younger, and female more than males. Because the study 2 sample is not only more feminine but also younger, it is difficult to interpret those variables effects. Future studies should aim to investigate more sociodemographic differences and how they are mediated by differences in beliefs (e.g. Ertz et al., 2021).

Limitations

The data collection for both studies took place during a relatively short period of time and both during spring/summer season. Factors such as eating cold versus warm food could influence consumption and covary with season. Future studies could collect longitudinal data and at various time of year to build more comprehensive results.

Another limit of the article is the reliance on self-report data. This choice was made because self-report is a good source of information about the respondents beliefs and perception (Baldwin, 1999), but future studies should extend this work by using methodological pluralism (Lewandowski and Strohmets, 2009), for example by recording actual use of reusable containers by using data from the restaurants/café participating in the deposit system.

Constraints on generality. The study was conducted in Geneva, Switzerland. This country is in the top three highest income countries according to OECD Better Life Index (OECD, 2020),

which limits generalization of the results to other places with different economic situation, notably because studies in United Kingdom (Adams et al., 2015) and Switzerland (Van Der Horst et al., 2011) have shown that income can be linked to takeaway food consumption. In addition to the wealth context, the city of Geneva has singular population, composed of not only Swiss people but also 41.3% of foreigners (OCSTAT, 2023). Among foreigners, 11.8% are international civil servant (OCSTAT, 2017). The international share of the population do not necessarily speak French, and because of turnover (people stay only a limited number of years), this means information about a reusable system should be frequently repeated for new people having to create new habits (but changing context is a good opportunity to create new habits, see Wood et al., 2005; thus, incoming residents could be targeted), and the information should be provided in multiple language.

Conclusion

To conclude, those studies provided general data on takeaway consumption and habits regarding the use of disposable and reusable food and drink containers, which are of interest when it comes to set up a reusable container system. The two studies demonstrated that people are motivated to use reusable containers, although many of them have not yet adopted the behaviour. The availability of reusable system is crucial, and taking actions to make reusables accessible and convenient for consumers is needed broadly.

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Supplemental material

Supplemental material for this article is available online.

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