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QUIZ IT! An all-generation approach to encourage sustainable food packaging practices

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ABSTRACT

There is increasing pressure for consumers to adopt sustainable lifestyles; however, there is widespread confusion and lack of clear information relating to appropriate food packaging disposal. This paper explores quizzes as a strategy to test food packaging disposal knowledge and encourage engagement in UK consumers of varying ages. Three hundred and eleven consumers (4–85 years) completed the food packaging symbols and disposal quizzes at various community-based events. In summary, quiz performance was encouraging; however, it was associated with various knowledge gaps such as symbols (tidyman and green dot) and disposal (cleaning and mixed materials). Positively, nearly 90 % of consumers are interested in modulating future food packaging disposal behaviour; hence, capitalising on such findings is key going forwards. Therefore, the use of quizzes was an effective strategy to engage consumers with appropriate disposal in community settings. Future work should focus on ensuring consumers have access to relevant information coupled with improved recycling infrastructure so that households can easily implement everyday sustainable food packaging behaviour.

Social Impact

There is widespread emphasis on sustainability, a multidimensional concept, involving economic, social and environment aspects; accordingly, consumers are encouraged to adopt everyday sustainable behaviour to help ensure sufficient resources for future generations [1]. However, despite the increasing public awareness relating to food packaging (especially plastic) this has not always been translated into appropriate disposal behaviour [2,3]. Moreover, consumers are faced with a plethora of challenges such as insufficient knowledge, confusion and lack of clear information coupled with limited recycling infrastructure and inconsistencies in UK approaches [1,3–6]. Therefore, this suggests engaging and targeted education may be a viable approach to help consumers adhere to more sustainable practices.

All households are encouraged to incorporate appropriate disposal behaviour mainly via council-based kerbside recycling; however, this is considered unnecessarily difficult for consumers (e.g., end product user) in most cases [3,6]. For example, food packaging can encompass a range of materials (e.g., plastic, glass, metal, paper, cardboard) often requiring different disposal approaches [1,6]. This is increasingly relevant since there are approximately 28.2 million households (mainly one-family or one-person) in the UK; therefore, there is scope for widespread impact if more households could modulate their disposal behaviour [7]. Positively, it is suggested that co-creating with and for consumers could help overcome associated disposal barriers [6,8].

Previously, our work has focused on interactive, informative and fun activities (e.g., worksheets, competitions, activity booklets, icon-based surveys, quizzes, discussions and presentations) in schools combining classroom and at-home tasks to engage, inform, inspire and involve children in disposing of food packaging sustainably [9,10]. The outcome has been very positive with noteworthy and impactful results; therefore, demonstrating willingness and scope for future work in this area [9,10]. However, like most research this was all undertaken in relatively controlled environments (mainly in classrooms) rather than in field settings (more real-world situations). In addition, future work would benefit from a whole household approach in the community so that all individuals are aligned and hopefully the collective aspect (e.g., doing your bit for society) may have greater impact on behaviour. Moreover, children have cited lack of motivation as a barrier to adopting sustainable food packaging practices; therefore, emphasis on interactive strategies that could encourage engagement at an individual and population level is key [10]. Accordingly, based on our previous work, quizzes were identified as a fun activity that can be targeted at all generations as well as conveying an impactful message in a quick and simple way in

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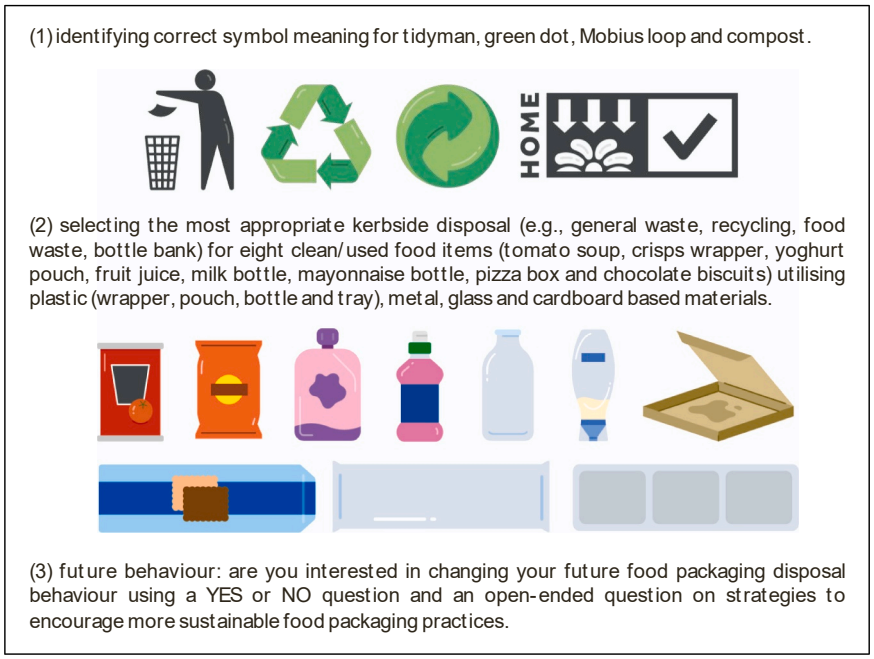

Fig. 1. Brief overview of the different quiz sections.

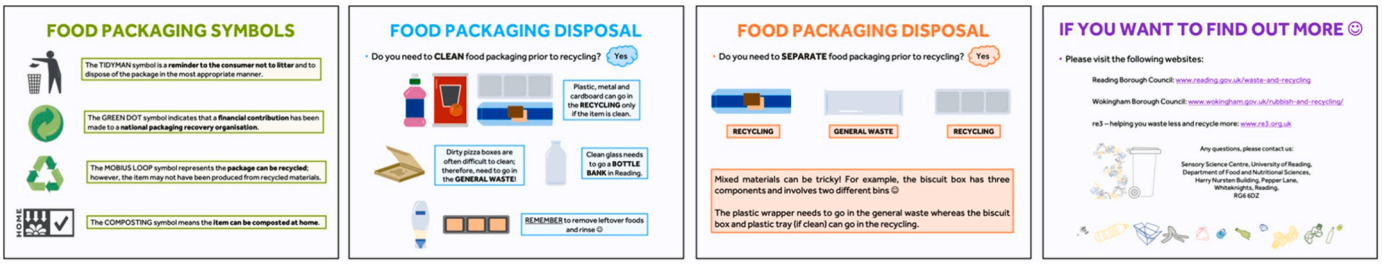

Fig. 2. Summary of educational information cards provided to consumers.

situations reflecting ecological validity.

It is important that households engage with appropriate disposal practices; therefore, promoting consumer-centric friendly activities in the community that are suitable for any age could help to promote sustainable behaviour. Thus, this paper aims to capture all generations food packaging disposal knowledge and engagement at community-based events via quizzes. More broadly, this research contributes to various Sustainable Development Goals (SDG) namely Goal 4: quality education (promoting lifelong education on sustainable behaviour), Goal 9: industry, innovation and infrastructure (encouraging council involvement and improve recycling infrastructure) and Goal 12: responsible consumption and production (consumers are the end user of packaging); accordingly, demonstrating the importance of this work and its subsequent societal impact.

Methodology

Quizzes provide an ideal tool to measure impact in field settings as they are easy, quick and simple to implement via either paper or digital formats (Compusense Cloud Software, Ontario, Canada). Consumers (n = 311; 4–85 years; 24.9 ± 18.3 years; 35.4 % male, 62.7 % female and 2.2 % other) were invited to take part in multiple-choice quizzes on food packaging symbols and disposal at various community-based events in the Reading area (Berkshire, UK) during May to July 2023. The quizzes were designed for all ages to test knowledge in a fun and informative way and consisted of fourteen questions (combining text and images) based on our previous work as summarised in Fig. 1 [9,10].

Having completed the quiz, consumers were provided with the results, education (e.g., food packaging symbols, cleaning prior to disposal and mixed material tips) and/or signposting to additional resources depending on an individual's needs (via information cards; Fig. 2). In addition, consumers were encouraged to ask questions and engage in discussion with the research team. Data analysis was carried out in XLSTAT (version 2022.3.2.1348, New York, USA) using the binomial expansion to determine differences between variables (e.g., yes vs no; incorrect vs correct); $p < 0.05$ was deemed significant and all data reported in a percentage format.

Results and Implications

Three hundred and eleven consumers completed the quizzes representing different stages of the life course (4–11 years: 28.0 %; 12–18 years: 27.7 %; 19–49 years: 31.8 % and 50+ years: 12.5 %). Overall quiz performance was encouraging with 87.5 % of consumers having six or more correct responses; however, the quiz demonstrated various knowledge gaps (Fig. 3 and Table 1). For example, there was a mixed consensus and an element of confusion relating to the tidyman ($p = 0.09$) and green dot ($p = 1.00$) symbols respectively resulting in no significant effect (Fig. 3). However, for the Mobius loop and compost symbols there were significantly more correct responses recorded ($p < 0.0001$; Fig. 3). This suggests that more public awareness on the different packaging symbols may be beneficial for the less well

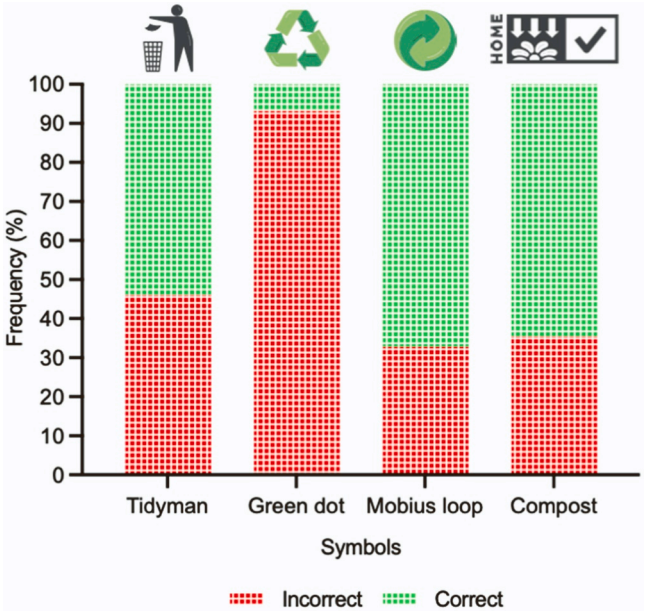

Fig. 3. Consumers' (n = 311) food packaging symbol knowledge (tidyman: remember not to litter; green dot: company provided money to a recycling organisation; Mobius loop: package can be recycled; and compost: compost the item at home) and data reported in percentage format.

Table 1
Consumers' (n = 311) food packaging disposal knowledge relating to different food items.

Food Item	Description*	Response (%)		p-value•
		Correct	Incorrect	
Fruit juice (clean)	Plastic bottle	76.8	23.2	**<0.0001**
Tomato soup (clean)	Metal can	78.5	21.5	**<0.0001**
Milk bottle (clean)	Glass bottle	88.4	11.6	**<0.0001**
Chocolate biscuits (clean)	Cardboard box | plastic tray | plastic wrapper	39.2	60.8	1.00
Mayonnaise bottle (used)	Plastic bottle	32.2	67.8	1.00
Pizza box (used)	Cardboard box	40.5	59.5	1.00
Yoghurt pouch (used)	Plastic pouch	70.1	29.9	**<0.0001**
Crisps wrapper (used)	Plastic wrapper	77.2	22.8	**<0.0001**

* description represents food packaging materials; •p-values reflect two-alternative forced choice test.

understood symbols.

There was a relatively clear consensus in terms of appropriate disposal for five food packaging items such as fruit juice, tomato soup, milk bottle, yoghurt pouch and crisp wrapper ($p < 0.0001$; Table 1). However, for chocolate biscuits, mayonnaise bottle and pizza box there was no significant effect ($p = 1.00$; Table 1); accordingly, demonstrating some misunderstanding concerning mixed materials and certain dirty food packaging materials. These findings support our previous work noting cleaning and mixed materials as areas that would benefit from additional clarification and education [9,10].

There is a clear willingness for change in this area as 89.1 % of consumers are interested in modulating future food packaging disposal behaviour, which is a very promising finding ($p < 0.0001$). However, this does emphasise there is an opportunity to capitalise on this by incorporating clearer labelling and instructions, improved recycling infrastructure and kerbside recycling, impact on climate change and

Fig. 4. Consumers' (n = 311) open-ended comments relating to encouraging sustainable food packaging practices.

make it easier; all identified as strategies to encourage consumers to adopt more sustainable food packaging practices (Fig. 4).

Overall, this paper successfully utilised quizzes in community settings as a strategy to promote engagement in everyday sustainable food packaging approaches. In addition, the quizzes worked well as quick (less than 5-min to complete) and relatively easy activities to engage all generations as well as helping to improve public awareness. The quizzes focused on kerbside disposal in the Reading area; therefore, expanding the quizzes to across the UK would be beneficial as well as including on-the-go disposal since it is also associated with widespread challenges [6]. It was apparent that consumers regardless of age need additional guidance on certain food packaging symbols (tidyman and green dot), cleaning prior to disposal and mixed materials disposal. Moreover, increasing a household's disposal related knowledge could have widespread implications for local councils and subsequently help to minimise associated barriers. Positively, there is interest in modulating future behaviour and engagement in an ecologically valid setting suggesting an appetite for change. However, consumers need to be appropriately supported (e.g., via schools, food companies, supermarkets, government) together with more standardisation and improved recycling infrastructure, suggesting a holistic approach could be fundamental. In summary, this research demonstrated that quick and easy quizzes can engage all generations as well as identifying knowledge gaps in ecologically valid locations which can subsequently help to inform local councils.

Ethics Statements

This project was carried out in accordance with the Declaration of Helsinki and received a favourable opinion for conduct from the School of Chemistry, Food and Pharmacy (University of Reading) Ethics Committee (study number: 04/2023). In addition, all the relevant informed consent was obtained from consumers partaking in this project and all data has been fully anonymised. It should be that noted for children (aged under 18 years) consent was provided by an appropriate adult (e.g., parent or guardian) prior to taking part in the quizzes.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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