Think Inside the Box:
The Role of Sustainable Packaging in Environmentally Conscientious Shopping

by

Walker Tottman
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We acknowledge and respect the lək̓ʷəŋən peoples on whose traditional territory the university stands, and the Songhees, Esquimalt and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day.

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Abstract

Based on public opinion, addressing plastic pollution is as imperative as solving climate change and biodiversity loss. One emerging market trend to solve plastic pollution is the shift towards plastic-free 'sustainable packaging.' However, pro-environmental solutions are not without risk of negative consequences. Previous research highlights how waste-reduction mechanisms – which sustainable packaging ostensibly represents – can alter consumer behaviours, reduce guilt, and increase overall consumption. Similarly, research suggests that sustainable packaging erroneously influences perceptions of a product's and brand's attributes favourably. While these data allude to a risk of compromising consumers' conscientiousness, the relation between sustainable packaging and environmentally conscientious shopping remains unknown. In this research, we ask: What is the relation between sustainable packaging and purchase intent, package and product evaluations, and pro-environmental behaviours? And second: What are the implications of sustainable packaging on the environmental conscientiousness of consumer habits? Using a mixed-method qualitative and quantitative survey from a sample of 156 Canadians, the results suggest: 1. A package's perceived level of sustainability positively influenced perceptions of the product's sustainability; 2. The footprint of a sustainable package was viewed disproportionately more favourable when it is on a conventional product; 3. Products with sustainable packaging received a higher purchase intent, regardless of whether the product itself is sustainable; 4. Sustainable packaging elicited more emotionally-positive, plastic-specific comments, without a concomitant increase in non-plastic-based environmental or negative comments; and 5. Consumers preferred pro-environmental behaviours that focus on plastic and packaging rather than product-focused pro-environmental behaviours. By influencing consumers' perceptions and capitalizing on consumers' focus on plastic packaging, we argue that sustainable packaging represents a new stage of greenwashing that corporations may co-opt as a market strategy.

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Dedication

I dedicate this research to *Ipomoea batatas*. You sustain me.

I. Introduction

Concern for plastic pollution has emerged in public opinion as one of the most pressing global environmental threats alongside climate change, biodiversity loss, and water pollution (Dilkes-Hoffman et al., 2019; Eurobarometer, 2019; D. Kennedy et al., 2022; WWF International et al., 2020). Single-use plastic (SUP) packaging represents, on average, 1/3 of the globe's plastic consumption (Geyer et al., 2017), and eradicating SUP packaging has become a focal point for the public, academics, and corporations (Ellen MacArthur Foundation, 2022; Mahmoud et al., 2022; Meherishi et al., 2019; Walker et al., 2021). 'Sustainable packaging' is one emerging market trend that seeks to replace these SUPs with packaging that meets better ecological, social, and economic standards (Boz et al., 2020; Kozik, 2020).

Despite the pressing severity of plastic pollution, scholarly debate cautions about the potential for unintended negative impacts from avoiding plastic and switching to sustainable packaging (Miller, 2020; Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019a; Stanton et al., 2021). One point of criticism arises because some alternative materials for plastic packaging have a larger environmental footprint (Miller, 2020; Monbiot, 2018). Additionally, environmental researchers have found that more efficient use of resources and the presence of waste reduction mechanisms – which sustainable packaging represents – can counterintuitively increase consumption to the point that the ecological savings are negated (Catlin & Wang, 2013; Reimers et al., 2021; Sun & Trudel, 2017). Ultimately, these scholars argue that the preoccupation with solving plastic pollution may be distracting individuals from challenging the systemic drivers of ecological harm writ large, primarily overconsumption and unfettered growth capitalism (Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019a; Valenzuela & Böhm, 2017).

The literature, however, has gaps. The field has yet to be substantiated with empirical data, and a synthesis is needed between market research on sustainable packaging and political critique on reformist 'sustainability' efforts. As such, this current research studies the risks associated with sustainable packaging, specifically related to how exposure to sustainable packaging impacts consumer perspectives and pro-environmental behaviours, to assess what this means for the environmental conscientiousness of consumer habits.

In the following, a literature review explores the current knowledge on the plastic crisis, describes alternative materials to plastic, and discusses the scholarly critiques of sustainable packaging. Next, I situate my methodology and explore the mixed methods orientation of this research, describe the qualitative and quantitative survey design used for data generation, and discuss the methods of analyses I conduct. A results and a discussion section interrogate each hypothesis. Then, I discuss the broader implications of this research and the study's limitations. References and an appendix follow.

II. Literature Review

II.1. Plastic Pollution as a Crisis

Across the globe, plastic is as ubiquitous as it is polluting, with environmental harms and chemical toxicity associated with its production, use, and disposal phases (Halden, 2010; Hamilton et al., 2019). In 2015, plastic production, use, and disposal accounted for approximately 4.5% of global GHG emissions (Cabernard et al., 2021) and 8-9% of the globe's oil and gas consumption (Nielsen et al., 2020). This same year, 407 million metric tonnes of virgin plastic were produced worldwide, and of this, an estimated 14-24% were mismanaged into the environment (Geyer et al., 2017; Lebreton & Andrady, 2019). By some accounts, plastic has reached a 'crisis' stage (Hamilton et al., 2019), with scholars encouraging its adoption as a planetary boundary in overshoot (Rockström et al., 2009; Villarrubia-Gómez et al., 2018).

Packaging constitutes approximately 1/3 of the globe's plastic consumption (Geyer et al., 2017; WWF International et al., 2020). The majority of this packaging, 96%, is single-use – designed to be discarded immediately after only one use – and enters the waste stream within the same year (ECCC, 2020; Geyer, 2020). The near-immediate disposal time and visible waste of SUP packaging commandeer public attention unlike other sectors (Nguyen et al., 2020; Nielsen et al., 2020; Smith & Brisman, 2021) and has become a central focus of the anti-plastic movement (Canada, 2022; Ellen MacArthur Foundation, 2022; Stafford & Jones, 2019a; Xanthos & Walker, 2017). From this landscape the sustainable packaging movement emerged to take the place of SUP packaging, and sustainable packaging is receiving high public support from governments, the public, and industry alike (D. Kennedy et al., 2022; Kozik, 2020; Mahmoud et al., 2022; Meherishi et al., 2019; Pauer et al., 2019; Stafford & Jones, 2019a; Walker et al., 2021; WWF International et al., 2020).

II.2. Cautioning Against the Anti-Plastic Movement

Anti-plastic narratives are often alarmist (Smith & Brisman, 2021; Stafford & Jones, 2019a; Stanton et al., 2021). For example, this frequently used sentiment about fish and plastic was recently in a well-cited academic paper: "If we continue to consume plastic packaging at the current rate, by 2050, there will be more plastic than fish in the ocean by weight" (X. Ma et al., 2020, p. 1). Putting aside the grossly high margins of error associated with calculating this statistic (Liboiron, 2018a) and the dismissal of over-fishing as a concomitant cause for depleted fish stocks (Monbiot, 2018; Stafford & Jones, 2019a), this type of narrative myopically focuses environmental harms onto packaging. It fails to account for the other major global sectors consuming plastic, such as the construction and textile industries (Geyer, 2020); it disregards the necessary uses of plastics and evokes plastic as solely 'evil' needing to be eradicated (Liboiron, 2019); it disregards the environmental impact of our replacement materials because single-use anything has an environmental footprint (Boz et al., 2020; Herberz et al., 2020); and it flattens environmental destruction to focus on packaging without consideration to what that packaging is used for, i.e., the products they contain (Miller, 2020; Stafford & Jones, 2019a, 2019b; Stanton et al., 2021).

In response to the predominantly negative dominant discourse around plastics (Liboiron, 2019), a growing body of literature advises caution on unthoughtfully adopting anti-plastic initiatives and is especially critical of substituting SUP packaging in favour of alternative material packaging choices (Smith & Brisman, 2021; Stafford & Jones, 2019a; Stanton et al., 2021).

The consistent thread from those commenting on the anti-plastic movement is that a systemic focus is required (Herberz et al., 2020; Miller, 2020; Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019b). Climate change, biodiversity loss, and habitat destruction all occur concomitantly with

plastic pollution, as they are all rooted in the overconsumption of resources and growth capitalism. Therefore, solutions to these issues are similar, necessitating drastic behavioural, political, and economic changes (Monbiot, 2018; Stafford & Jones, 2019b). Contrary to achieving this, scholars argue that the current form of the anti-plastic movement is side-stepping the issue of consumerism by substituting plastic packaging with another item. What is needed is an interrogation of consumerism itself and the profligate purchasing of unsustainable products. However, if sustainable packaging does not significantly challenge the products consumed and instead encourages the substitution of the product's packaging materials, then the status quo remains, replete with all its current environmental harms (Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019b, 2019a; Stanton et al., 2021).

The position of these academics is not 'pro-plastic' but instead encourages the careful investigation of plastics and alternatives to plastic. However, public villainization of plastic has led to a backlash against academics who produce data seemingly at odds with the plastic crisis. Dr. Max Liboiron, a prominent scholar in the sphere of feminist and anticolonial methodologies studying marine plastic pollution, writes about receiving hate mail when they published a study suggesting that Silver Hake from the south coast of Newfoundland, Canada, had a zero-percent plastic ingestion rate (Liboiron, 2018a). The public's vitriolic dislike of plastic may crowd out meaningful conversations (Liboiron, 2019). Recognizing that well-intentioned solutions can cause unintentional negative consequences, nonpartisan research that questions the merits and risks of sustainable packaging is needed.

II.3. Sustainable Packaging

The concept of sustainable packaging is rooted in the term 'sustainability,' which, among its many definitions, is broadly defined as that which "meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987, p. 41).

Consistent in its many definitions, sustainability upholds three pillars of economic, environmental, and social and ethical standards (Geissdoerfer et al., 2017; White, 2013).

Sustainable packaging also attempts to uphold these three pillars of economic, social, and environmental standards and is defined as packaging that adequately protects the packaged good, efficiently uses its material resources, is safe for the environment, is non-toxic to humans, and has circularity (limits waste) in its post-consumption phase (Kozik, 2020; Pauer et al., 2019). The public, academics, and commercial sectors use numerous alternative terms for sustainable packaging, such as 'green packaging,' 'eco-friendly packaging,' and 'environmentally conscious design' (Nguyen et al., 2020; Wandosell et al., 2021). In this research, I will refer to the term 'sustainable packaging' because it is the most relatable to the central concept of sustainability (Boz et al., 2020; Kozik, 2020; Pauer et al., 2019).

The term 'sustainability' emerged from development studies before being widely adopted by businesses and governments and has remained closely associated with economic growth (Alves, 2009; King, 2013; MacDonald, 2013; Valenzuela & Böhm, 2017). Academics criticize this pursuit of growth as a normative approach that supersedes the genuine pursuit of ecological and ethical justice (Alves, 2009; King, 2013; MacDonald, 2013; Mulvihill & Milan, 2007; Valenzuela & Böhm, 2017; Vucetich & Nelson, 2010). Similarly, the term 'sustainable packaging' emerged from the consumer market, with implicit ties to business and market growth (Boz et al., 2020; Kopnina, 2019; Nielsen et al., 2020).

The term 'sustainable packaging' is misleading because although the word 'sustainable' implies no negative impact on the environment, all packaging has an environmental impact (Boz et al., 2020). Thus, sustainable packaging is defined primarily by comparing the relative burdens between packaging with higher and lower environmental impacts (Boz et al., 2020; Herberz et al., 2020). For this reason, sustainable packaging can create a false impression among consumers because the packaging still has a negative environmental footprint (Boz et al., 2020). The act of creating false impressions about the ecological merits of an item or misleading consumers towards an erroneous understanding of a

company's environmental conscientiousness is referred to as 'greenwashing' (Alves, 2009; de Freitas Netto et al., 2020; De Jong et al., 2020; Kassinis & Panayiotou, 2018).

Sustainability and sustainable packaging remain contested and nebulous terms (Mulvihill & Milan, 2007; Vucetich & Nelson, 2010). They should be critically unpacked for their hegemony, as they are implicitly oriented towards the pursuit of market growth (MacDonald, 2013; Valenzuela & Böhm, 2017), and the term 'sustainability' is a subtle expression of permission-to-pollute environmentalism that is based on the theory of assimilative capacity (Liboiron, 2021; Vucetich & Nelson, 2010). These issues with the term 'sustainability' are beyond the scope of this paper, and I choose to use the term because it operates as an acceptable shorthand to refer to anything that ostensibly maintains environmental, social, and economic standards (Kozik, 2020).

Consumers define sustainable packaging based primarily on the end-of-life attributes of the materials, with biodegradability as the most critical factor (Nguyen et al., 2020; Norton et al., 2022). Paper and fibre-based materials are consistently the most desirable material choice, next to bioplastic and glass, and then plastic and metal as the least desirable (Dilkes-Hoffman et al., 2019; Lindh et al., 2016; Magnier & Schoormans, 2017; Nguyen et al., 2020; Oloyede & Lignou, 2021; Steenis et al., 2017). This consumer ranking is opposite to life cycle analyses (LCAs) of overall environmental impacts, in particular on the production side of the materials, where paper often has the worst environmental impact, followed by glass, bioplastics, metal, and plastic with the smallest environmental impact (Bisinella et al., 2018; Miller, 2020; Steenis et al., 2017; Tobler et al., 2011). The environmental impacts of paper materials come from costly upstream production processes and the post-consumer impacts of methane release from landfilled paper products (Dias et al., 2007).

Consumers mistakenly associate post-consumption waste as representative of the item's cradle-to-grave environmental impacts because they are discounting the sourcing and production of the item (Boz et al., 2020; Nielsen et al., 2020; Tobler et al., 2011). Admittedly, the crisis of plastic is primarily

from post-consumption pollution (Geyer et al., 2017; Lebreton & Andrady, 2019), and so the bias towards post-consumption impacts suggests why consumers favour biodegradable materials such as paper as their choice for sustainable packaging (Boz et al., 2020). However, while the visibility of plastic pollution is immediate, all packaging materials – if not all consumption practices – cause adverse environmental impacts (Herberz et al., 2020; Smith & Brisman, 2021). These impacts – nebulous and challenging to see, such as methane emissions, or in geographically distant contexts – lack the tangible visibility of plastic pollution (Gunderson, 2020; Smith & Brisman, 2021; Stafford & Jones, 2019a).

An important caveat is that LCA analyses are only beginning to consider diverse end-of-life impacts (Miller, 2021). Although all of these LCA studies do not fully quantify the end-of-life environmental burdens of mismanaged plastic (Herberz et al., 2020; Walker & McKay, 2021), end-of-life impacts for plastic are still relatively low compared to the rest of plastic's lifecycle, and thus these studies still provide a useful metric to compare paper and plastic (and other materials) together (Miller, 2021, 2022; Song et al., 2015).

LCAs on different packaging choices show that the specific production, use, and disposal circumstances must be factored in (Abejón et al., 2020; Herberz et al., 2020). Neither paper nor plastic (or any other material) is the universally appropriate material choice (Abejón et al., 2020; Van der Werff et al., 2014). It also bears repeating that this discussion of sustainable packaging is based on 'lesser' and 'more' environmental impacts (Boz et al., 2020). Even the most 'sustainable' packaging will have a footprint, and as such, single-use anything is environmentally harmful (Herberz et al., 2020; Sörqvist & Langeborg, 2019).

II.4. Distinguishing Between the Product and the Packaging

A careful distinction between products and packaging is needed to facilitate a greater discussion about the potential negative consequences of sustainable packaging. Packaging is a subset of single-use

items, divided into primary and secondary packaging (Berk, 2009). Primary packaging - approximately 1/2 of all of Canada's food packaging – is the packaging that directly contacts the product and consists of wrappers, containers, trays, bottles, paper, cartons, and other items (Berk, 2009; ECCC, 2020; Meherishi et al., 2019). Secondary packaging contains the primary packaging, constituting items such as shopping bags and boxes holding the primary packaged trays (Berk, 2009; ECCC, 2020). In addition to packaging, single-use items include convenience items like utensils and drink cups, essential items including masks and gloves, and disposable products such as cigarette butts, razors, and toothbrushes (ECCC, 2020). Convenience items like disposable cups and utensils, although not strictly a form of packaging, are used in combination with a product just like packaging. They represent an extrinsic attribute to a product –a container used to drink something or a utensil used to eat something (Magnier et al., 2016). Within this research, I will include them in the 'packaging' designation.

In this research, I use fast-moving consumer goods (FMCGs) to explore sustainable packaging and products. FMCGs are mass-produced everyday household items, such as food, beverages, household supplies, and personal care products (Bocken et al., 2022). Although each item's footprint is relatively benign individually, the environmental toll of FMCGs is caused by the cumulative impact of their everyday consumption, and even modest gains or losses in sustainability amplify outwards (Bocken et al., 2022; Ischen et al., 2022; X. Ma et al., 2020; Magnier et al., 2016). As the globe's primary use of single-use plastic packaging, the FMCG sector faces public pressure to reduce its plastic waste footprint (Bocken et al., 2022; X. Ma et al., 2020; WWF International et al., 2020). However, the environmental footprint of packaging is only a minor portion of the product's total environmental footprint (Castellani et al., 2019; Miller, 2022; Silvenius et al., 2014). For the food products within the FMCG sector, packaging represents approximately 10% of the product's total environmental impact (Kan & Miller, 2022; Licciardello, 2017; Silvenius et al., 2014).

When considering a food product's impact, its packaging – and plastic packaging more so – represents only a minor portion of its overall environmental footprint (Kan & Miller, 2022; Licciardello, 2017; Silvenius et al., 2014). The relatively small footprint of packaging compared to a product is why the distinction between packaging and products is critical. More significantly for FMCGs, a food item's entire footprint can change by an order of magnitude depending on the specifics of the food itself – such as its production method (organic vs. conventional), transportation method (freight vs. air), and type of food (animal-based or plant-based), among others (Miller, 2020; Poore & Nemecek, 2018; Smetana et al., 2021; Tobler et al., 2011). For example, compared to the modest 10% reduction that package-free food would contribute, shifting to a plant-based diet rather than an animal-based diet can reduce the footprint ten-fold (Miller, 2020; Smetana et al., 2021). Despite the environmental benefits of reducing animal consumption, consumers are three times more willing to buy products with less packaging than fewer animal products (Dubois et al., 2019).

Consumers prioritize plastic-based behaviours (Dubois et al., 2019). This preference for a plastic-focus could be explained by the mistaken understanding consumers have of the environmental impacts of various pro-environmental behaviours, exaggerating the value of plastic-based behaviours and disregarding the value of other, non-plastic-based pro-environmental behaviours (Dubois et al., 2019; Miller, 2020; Wynes et al., 2020). Additionally, from psychology research (Gifford, 2011; Truelove et al., 2014), two phenomena explain this disregard for challenging the more environmentally significant, product-focused behaviours. These are negative spillover – where engaging in one pro-environmental behaviour results in less engagement with other pro-environmental behaviours (Truelove et al., 2014) – and tokenism – a type of negative spillover when taking part in an easy and simple pro-environmental behaviour subsequently reduces engagement in more impactful pro-environmental behaviours (Gifford, 2011). Plastic- and package-based pro-environmental actions can be relatively easy to make – for example, bringing a reusable bag to the grocery store. While bringing a reusable bag is an

environmentally conscientious thing to do, the environmental benefit is lost if the behaviour leads individuals to perform fewer of the more significant pro-environmental behaviours, or increase their overall rate of consumption (Miller, 2020, 2021; Monbiot, 2018; Reimers et al., 2021; Smith & Brisman, 2021; Stafford & Jones, 2019a; Sun & Trudel, 2017).

II.5. Unintended Negative Consequences

It becomes clear that because products represent the majority of an item's environmental footprint and its packaging represents a small portion (Castellani et al., 2019; Dubois et al., 2019; Kan & Miller, 2022; Miller, 2020), reducing packaging should not happen at the expense of increasing consumption (Smith & Brisman, 2021; Stafford & Jones, 2019a; Valenzuela & Böhm, 2017). However, An increase in consumption is the response observed with recycling (B. Ma et al., 2019). Most individuals experience negative emotions when they are being wasteful, and recycling – a behaviour that ostensibly reduces waste – increases an individual's feelings of pride and self-identity as 'environmentally conscientious' (B. Ma et al., 2019; Sun & Trudel, 2017). When recycling was available, consumers felt less guilt about the impacts of their consumption and consumed more resources (Catlin & Wang, 2013; B. Ma et al., 2019; Sun & Trudel, 2017). This phenomenon is referred to as a rebound effect – where increased material efficiencies or ecological savings lead to increased consumption levels until the ecological savings are negated (Gifford, 2011; Gunderson, 2020; Laurenti et al., 2016). The rebound effect is a form of negative spillover (Truelove et al., 2014).

Recycling is just one method of reducing post-consumer packaging waste. Sustainable and plastic-free packaging appears to be the more sustainable choice to eliminate visceral SUP packaging waste. Therefore, sustainable packaging may incur these same 'guilt-reducing' feelings and boost consumers' self-identity as environmentally conscientious (Monbiot, 2018; Smith & Brisman, 2021), and consumers may subconsciously increase their consumption (Catlin & Wang, 2013; B. Ma et al., 2019; Sun

& Trudel, 2017). It remains unknown if sustainable packaging will evoke the same response as those studies found with recycling.

Psychology-based marketing research supports the idea that sustainable packaging may engender the same guilt-reducing mechanisms that increase consumption when recycling is present. Packaging – as the primary means that consumers interpret a product's attributes – influences a product's perceived sustainability (Ischen et al., 2022; Magnier et al., 2016; Magnier & Schoormans, 2017; Monnot et al., 2015; Steenis et al., 2017). Even without explicit ques, packaging can implicitly signal product sustainability: When participants viewed two identical products in different packaging – one in conventional plastic packaging and one in a paper-based sustainable packaging – participants regarded the paper-packaged product as more sustainable (Magnier et al., 2016; Magnier & Schoormans, 2017). When a product had less unnecessary packaging, participants similarly viewed the product itself as more sustainable (Monnot et al., 2015). Pairing sustainable packaging with a verbal claim about the packaging's sustainability significantly increased consumers' purchase intent for the product (Magnier & Schoormans, 2015). Even the simple presence of a verbal claim about having sustainable packaging increased the perceived social responsibility of the brand (Magnier & Schoormans, 2017). By increasing a product's perceived sustainability, as well as increasing a brand's perceived social responsibility, the research alludes to how sustainable packaging may reduce a consumer's guilt and decrease their concern about the impacts of their consumption (Smith & Brisman, 2021; Valenzuela & Böhm, 2017). However, the literature has yet to directly explore the relationship between sustainable packaging and consumer's interrogation of their own consumption habits. Understanding the effect of sustainable packaging on consumer perspectives is a critical component necessary to establish how sustainable packaging enables or challenges consumerism (Stafford & Jones, 2019a).

The above research suggests that sustainable packaging – putting aside the understanding that it is not actually environmentally 'benign' (Herberz et al., 2020) – could lead to unintended negative consequences by problem-shifting from one material to another without significantly altering consumption practices (Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019a). "For many companies, then, the issue of plastic waste provides them with the opportunity to react to ecological concern, with visible results, which tend to be lauded by the media… [and] the need for consumers to engage in radically different behaviour (which would entail, *inter alia*, consuming *less*) is diminished" (Smith & Brisman, 2021, p. 300).

Given the strong public dislike of plastic waste (D. Kennedy et al., 2022; Liboiron, 2019), consumers may perceive sustainable packaging as a successful waste-reduction mechanism and may therefore experience less guilt at their consumption (Catlin & Wang, 2013; B. Ma et al., 2019; Sun & Trudel, 2017). FMCG corporations may gain favour in the eyes of customers, media, and shareholders when they commit to reducing plastic waste via sustainable packaging while still profiteering from overall poor environmental standards (Boz et al., 2020; Nielsen et al., 2020; Smith & Brisman, 2021; Stafford & Jones, 2019a). This favourable view of corporations that use sustainable packaging puts consumers at risk of developing a passive spectatorship that increases consumer compliance towards corporations (Gunderson, 2020; Rogers, 2007). Additionally, this may limit how much consumers interrogate their consumption practices (Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019a) and may even increase their overall consumption levels (Boz et al., 2020; Catlin & Wang, 2013; B. Ma et al., 2019; Sun & Trudel, 2017). The ability for corporations to profit from sustainable packaging without making substantive positive changes is especially likely if all it takes to appear 'sustainable' is to use packaging with a paper-based appearance (Lindh et al., 2016; Magnier et al., 2016; Magnier & Schoormans, 2017; Oloyede & Lignou, 2021; Steenis et al., 2017).

However, there is a lack of synthesis between the literature critiquing the anti-plastic movement and the market-based research on sustainable packaging. Within this lacuna, there remains uncertainty about the risks and benefits of sustainable packaging on consumer perceptions and behaviours.

The literature that cautions against uncareful lambasting and replacing plastic has not yet used empirical data to investigate behavioural changes from exposure to sustainable packaging (Miller, 2020; Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019b). Political and structural critiques of capitalism provide the foundation of their caution against hyperfocusing on plastic (Smith & Brisman, 2021). In doing so, sustainable packaging has not been centrally explored, and instead, the critiques have focused on the generalized anti-plastic movement (Stafford & Jones, 2019a). This literature would be strengthened by investigating behavioural impacts – specific to sustainable packaging – through case studies or controlled experiments (Monbiot, 2018; Stafford & Jones, 2019a).

The market-based research, in contrast, performs robust controlled experiments to understand the effect of packaging sustainability on product perceptions. However, this research has not fully explored the connection of sustainable packaging with a critique of consumerism (Ischen et al., 2022; Magnier et al., 2016; Magnier & Schoormans, 2015, 2017; Monnot et al., 2015; Steenis et al., 2017). An avenue needing further investigation is to study the effects of sustainable packaging on how consumers reflect on the environmental impacts of their consumption and their pro-environmental behaviours (Ischen et al., 2022; Magnier & Schoormans, 2017; Steenis et al., 2017).

II.6. Research Questions and Hypotheses Development

I base my research question on the following rationale:

1. There is high salience and hyper-focus by the public, governments, and industries to address plastic pollution, and in particular, packaging-related plastic waste (Boz et al., 2020; Canada, 2022; Smith &

Brisman, 2021; Stafford & Jones, 2019a; Stanton et al., 2021; WWF International et al., 2020; Xanthos & Walker, 2017).

2. In regards to the fast-moving consumer goods sector, consumers misjudge the relative environmental impacts of plastic in comparison to other materials; they misjudge the environmental impacts of packaging relative to the whole product; and consumers sometimes display a preference for anti-plastic pro-environmental behaviours rather than product-based pro-environmental behaviours (Dubois et al., 2019; Miller, 2020, 2021; Wynes et al., 2020).
3. Research suggests that the presence of sustainable packaging increases consumers' perceptions of a product's sustainability, their purchase intent for it, and their belief in the company's social responsibility (Boz et al., 2020; Ischen et al., 2022; Magnier et al., 2016; Magnier & Schoormans, 2015, 2017).
4. In various circumstances, allegedly environmentally friendly behaviours can counterintuitively impede more subsequent and significant pro-environmental behaviours (Gifford, 2011; B. Ma et al., 2019; Sun & Trudel, 2017; Truelove et al., 2014). All of this suggests that sustainable packaging may increase unsustainable consumption behaviours.

This research intends to corroborate the evidence of these previous studies and to add to the gaps in the literature by analyzing the influence that sustainable packaging has on consumer perceptions and behaviours as these relate to compromising environmentally conscientious shopping habits. I ask: ***What is the relation between sustainable packaging and purchase intent, package and product evaluations, and consumer pro-environmental behaviours*****?** And: ***What are the implications of sustainable packaging on the environmental conscientiousness of consumer habits?***

II.6.a. Plastic Concern and Environmental Concern

Previous research has suggested that concern for the environment is a meaningful influence on how consumers perceive and relate to products (Catlin & Wang, 2013; Magnier & Crié, 2015; Magnier & Schoormans, 2017; Mahmoud et al., 2022). As such, it will be included in this study as a covariate. Similarly, as this study is mainly focused on the influence of plastic and paper-based 'sustainable' packaging, an additional metric of concern for plastic pollution will be measured as another covariate.

H1) Higher levels of concern for plastic pollution and environmental harm will affect the results.

II.6.b. Purchase Intentions

Consumers desire more sustainable packaging, and therefore, it should be expected that their purchase intent for sustainable-packaged products will increase (Magnier & Schoormans, 2015). In contrast, consumers seem reticent to shift their behaviours in ways that significantly alter their consumption patterns (Dubois et al., 2019), and therefore, it should be expected that conventional products are the most sought-after. Thus, sustainable packaging on conventional products may be desired the most.

H2) Conventional products with sustainable packaging will have a greater purchase intent than sustainable products with conventional packaging.

II.6.c. Package Evaluations

Previous research suggests that sustainable packaging and sustainable packaging certification labels have the greatest influence on the perceived sustainability of packaging when it is on

conventional products, in contrast to sustainable products (Magnier & Schoormans, 2017). Therefore, to corroborate these results, conventional products with and without sustainable packaging are expected to yield the largest change in their package evaluations compared to conventional products.

H3) Conventional products with and without sustainable packaging will have the highest and lowest perceived package sustainability, respectively.

II.6.d. Product Evaluations

Magnier and Schoormans (2017) suggest consumers view sustainably packaged items as implicitly signifying the product itself is more sustainable (via the categories of biodegradability and naturalness, among others). Therefore, it should be expected that:

H4a) Sustainable packaging increases the perceived sustainability of the product itself.

Viewing a product may elicit comments related to the environmental impacts of the product – such as its environmental footprint, where the ingredients are sourced from, if it is Fairtrade certified, if it is non-toxic, etc. These expressions also convey latent feelings (Graneheim et al., 2017). These latent feelings may be emotionally positive, such as a show of support or belief that the item is good for the environment, or they may be negative, such as the belief that the item is guilty of greenwashing and that it is misleading the consumer about the item's benefits.

Plastic and packaging are focal points for consumers (Boz et al., 2020; Stafford & Jones, 2019b; Xanthos & Walker, 2017). Scholars argue that sustainable packaging can, therefore, 'distract' attention away from challenging one's consumption outright (Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019a). One mechanism to explain this is through reduced feelings of guilt when consumers have

'waste reduction' methods available, such as sustainable packaging that limits plastic waste (Catlin & Wang, 2013; Duke & Amir, 2019; B. Ma et al., 2019; Sun & Trudel, 2017). If sustainable packaging reduces guilt or distracts consumer attention from the problems of their consumption, then it is suggested that the amount of environmental comments expressed towards a product will be lower when it has sustainable packaging compared to conventional packaging.

H4b) *Consumers express fewer environmental comments for sustainably packaged items compared to conventionally packaged items*.

Additionally, if sustainable packaging reduces consumer guilt and the negative feelings associated with waste during consumption (Catlin & Wang, 2013; Duke & Amir, 2019; B. Ma et al., 2019; Sun & Trudel, 2017), it should be expected that participants express more emotionally positive comments for sustainable packaging, in contrast with negative comments towards conventional packaging.

H4c) Consumers express more positive environmental sentiments for sustainably packaged items than conventionally packaged items.

II.6.e. Pro-Environmental Behaviours

Consumers misjudge the effectiveness of pro-environmental behaviours (Boz et al., 2020; Steenis et al., 2017; Wynes et al., 2020). Plastic's high public salience and the overestimated footprint of plastic packaging relative to a product suggest that consumers might prefer anti-plastic behaviours (Dubois et al., 2019; Smith & Brisman, 2021; Stafford & Jones, 2019a).

H5a) Package-focused pro-environmental behaviours will be more common than product-focused pro-environmental behaviours.

The presence of sustainable packaging may act as a cue to consumers about the impacts of plastic packaging. Therefore, when asked about their shopping behaviours, a focus on plastic packaging and a desire for more sustainable packaging may increase. Similarly, this may 'crowd out' consumers' attention to other non-plastic environmental issues (Smith & Brisman, 2021; Stafford & Jones, 2019b, 2019a).

H5b) Exposure to sustainable packaging will increase the amount of plastic-focused concerns and decrease the amount of non-plastic-based concerns consumers have about shopping.

III. Methodology and Methods

In the following sections, I discuss this research's methodological orientations. Then, I will discuss this study's sample, survey, and methods for analysis.

III.1. Methodology

In this research, I embody a paradigmatically pragmatic stance within the epistemological and methodological fields.

Epistemologically, this research borrows from a relativist epistemology (Lincoln et al., 2005) to recognize that "all understanding – including scientific understanding – is historically and linguistically shaped" (Browning, 2003, p. 319; Sandage et al., 2008). Knowledge is dialogically co-created – that is, knowledge is actively created by all participants involved – implying that the specific context of the research and my positionality as a researcher have fundamental roles in the ultimate direction of the study. To account for my influence as a researcher, this requires checking in, coming to self-awareness of my own "personal and professional traditions," and reflexively working through the "accompanying sources of bias" within my work (Sandage et al., 2008, p. 357).

I have created the following positionality statement, which I use to situate where I am coming from as a researcher. This positionality statement is one means to keep me accountable for my role in the knowledge creation of this research (Sobh & Perry, 2006).

> *I am a 31-year-old white male settler-Canadian of European descent who grew up in an upper-middle-class and peri-remote environment. I am trained in a combination of formal and natural sciences, social sciences, and the humanities; my academic background was focused on*

environmental studies, psychology, and anthropology. I have worked in and around the food system and am active outdoors. I pick up trash daily (and have for the past ten years), indicating that I strongly focus on 'garbage' and 'trash.' This provides me with an emic perspective on how people (myself included) might perceive and care about plastic and trash while also potentially indicating a bias of mine to be hypersensitive to issues of garbage. My background has influenced my values, and I am attempting to minimize and honour how these values affect my research.

Axiologically, my research is guided by emancipatory goals that directly attempt to transform society (DeForge & Shaw, 2012; Lincoln et al., 2005; Sandage et al., 2008). This research aims to uncover knowledge about the factors influencing shopping habits and ultimately address consumerism's social, ethical, and ecological impacts. As a researcher, I aim to uphold these emancipatory goals to alleviate environmental and social harm.

Paradigmatically, this research uses mixed methods techniques that combine qualitative and quantitative methods (Sale & Brazil, 2004). Qualitative and quantitative methods, although routinely characterized as incommensurable (Iofrida, 2016; Loseke, 2017), can dovetail together when the research questions are appropriate (Bryman, 2006; Sandage et al., 2008).

My first research question is quantitative: "*What is the relation between sustainable packaging and purchase intent, package and product evaluations, and consumer pro-environmental behaviours?*". This question emerged from my preliminary analysis of the literature (Sobh & Perry, 2006). My second research question is qualitative: "W*hat are the implications of sustainable packaging on the environmental conscientiousness of consumer habits?*" By bringing the qualitative and quantitative methods together, mixed-methods research overcomes the deficits of a single approach and allows the

researcher to “simultaneously ask confirmatory and exploratory questions and therefore verify and generate theory in the same study” (Teddlie & Tashakkori, 2009, p. 37)

I have, therefore, deliberately chosen mixed methods research because my research questions drive its use (Bryman, 2006). I also use mixed methods because I recognize my bias and influence as a researcher. I have incorporated open-ended qualitative components to give participants more flexibility in shaping this research (Fakis et al., 2014; Sandage et al., 2008).

This research uses two primary metrics to assess its quality: truth value and applicability (Bryman, 2006; Sale & Brazil, 2004; Teddlie & Tashakkori, 2009; Wahyuni, 2012). Truth value means the research is qualitatively credible and quantitatively internally valid – that I have triangulated my sources and methods, properly expressed when I am making interpretations versus quotations of participants, practiced proper consent protocols and confidentiality, and identified and controlled for confounding variables (Bryman, 2006; Fakis et al., 2014; Sale & Brazil, 2004). Applicability means I have qualitative transferability and fittingness, along with quantitative external validity and generalizability – I have explicitly situated the research questions and objective of the study, provided detailed descriptions of the sample population, the control and comparison groups, the instruments, intervention methods, statistical procedures, and outcomes (Bryman, 2006; Sale & Brazil, 2004; Teddlie & Tashakkori, 2009). A benefit of mixed methods research is its heightened ability to triangulate findings, as it imbues qualitative and quantitative data (Bryman, 2006; Sandage et al., 2008; Schoonenboom & Johnson, 2017). This combination of qualitative and quantitative data creates diverse perspectives, yielding more robust results, and helps the research move towards a closer approximation of what is ‘truth’ (Browning, 2003; Fakis et al., 2014; Wahyuni, 2012).

In mixed methods research, the quantitative analysis of qualitative data has limitations regarding the generalizability of the findings and conclusions (Fakis et al., 2014). This is partly because

qualitative research often only uses a small sample with a non-random selection process (Fakis et al., 2014). With the above in mind, a methodological strength of my research is the combined use of closed- and open-ended questions in an online survey delivered to a more extensive participant base. I have attempted to achieve a rich degree of participant depth, which might otherwise only come from personal interviews or case studies, surveyed a relatively large sample size so that statistical analyses are possible, and kept within the practical constraints of my abilities as the sole researcher analyzing these data. However, there is a limit to the depth that can be generated, and further research could utilize more open-ended qualitative data.

In summary, the paradigm I use in this research is pragmatically mixed-methods, combining qualitative and quantitative methods to achieve the research objectives.

III.2. Methods

III.2.a. Sample

This research administered an online survey to Canadian participants through Amazon's Mechanical Turk (MTurk) platform. A Canadian population was selected, in part, because reducing the use of plastic packaging is an important topic for the Canadian public, and the Canadian government demonstrated this interest by enacting a ban on a select group of problematic single-use plastics in December 2022 (Canada, 2022; PWC, 2019). Canada is a global leader in consumption-based per capita emissions, signifying that pro-environmental consumer behavioural changes can potentially reduce significant emissions (Ritchie et al., 2020). The use of a Canadian population is also fortuitous, as the results from previous studies on sustainable packaging and product perceptions would be strengthened by including a North American sample in comparison to the Dutch, Swedish, and French samples used previously (Ischen et al., 2022; Magnier et al., 2016; Magnier & Schoormans, 2017; Steenis et al., 2017).

The study recruited participants online through MTurk. MTurk is an online crowdsourcing platform where participants – 'Workers' – sign up to complete various tasks for remuneration (McEwan, 2020; Sheehan, 2018). MTurk is a form of convenience or non-probability sampling. Probability sampling is preferred over non-probability sampling when making statistical generalizations. However, MTurk's ability to reach a wide proportion of the population makes it more viable, representative, and generalizable than a strictly student sample (Gerlich et al., 2018; Landers & Behrend, 2015; McEwan, 2020).

Previous studies have critiqued the use of MTurk on the grounds of generating poor-quality data (McEwan, 2020). MTurk's low-quality data is due to participants: being 'non-naïve' by having already performed numerous surveys of a similar variety; giving ingenuine, insincere, or careless responses; and giving fraudulent expressions of one's positionality (Ahler et al., 2021; Sheehan, 2018). To pre-emptively compensate for a part of this, the MTurk recruitment profile was set to '*no minimum HIT approval rate*' to avoid receiving only responses from Workers who are professional respondents (Hauser et al., 2018). A general conclusion is that upwards of 30% of response data can be of poor quality and must be systematically cleaned (Ahler et al., 2021; R. Kennedy et al., 2020).

III.2.b. Survey

III.2.b.(i) Survey Design

This study used an online survey with a quasi-experiment employing a 2 (packaging sustainability: conventional vs. sustainable) x 2 (product sustainability: conventional vs. sustainable) x 3 (product type: burger patty, laundry detergent, frozen dessert) between-subject design (see VIII.2 for the survey). Open- and closed-ended questions assessed consumer preferences, perceptions, and pro-environmental behaviours. The survey evaluated the variables of purchase intent, package evaluations,

and product evaluations. Participants answered hypothetical shopping questions to assess the effect of packaging on their behaviours and ranked their environmental concern and plastic pollution concern.

In a four-way A/B test format, participants viewed one of the possible four versions for each of the three products. The three products used in the survey – burger patty, laundry detergent, and frozen dessert – were chosen because they are fast-moving consumer goods (FMCGs) sold in high quantities. They are intended to be virtue, utilitarian, and vice products, respectively (van Doorn & Verhoef, 2011). Burgers, frozen desserts, and detergents have moderate-to-high environmental footprints, and conventional and sustainable versions are readily available to the public. Burgers and frozen desserts can reduce their footprint by switching to a version without animal products (Miller, 2020), and the footprint of detergent can be reduced by changing its ingredients to limit eutrophication potential and energy use for hot water (Castellani et al., 2019; Chirani et al., 2021; De Moura & Da Silva, 2023).

Each product was modified along two axes – a conventional vs. sustainable packaging axis and a conventional vs. sustainable product axis (**Figure 1**). All materials remained consistent between the four versions unless necessary to convey the product or packaging distinctions. On the product axis, the items are a burger ("beef burger" vs. "plant-based burger"), laundry detergent ("original formula" vs. "plant-power formula"), and frozen dessert ("coconut caramel ice cream" vs. "non-dairy coconut caramel frozen dessert"). Paperboard and aluminum-styled metal were used on the packaging axis to represent the sustainable packages. Paperboard is the material of choice among consumers (Magnier & Schoormans, 2017), and metal was chosen because it provides a low-impact reusable option based on LCAs (Tobler et al., 2011). For the remainder of the study, I will use shorthands to refer to the four different product versions. These will be EPD for 'eco product,' NEPD for 'non-eco product,' EPK for 'eco packaging,' and NEPK for 'non-eco packaging.' When possible, I will refer to the 'product' dimension first and the 'packaging' dimension second, for example, NEPD-EPK for a non-eco-product with eco-packaging.

Figure 1
Example of the 4-Way Typology on the Burger Product

The survey also investigated consumer-based, pro-environmental choices, using three closed-ended questions about purchasing coffee. The three questions were designed to elicit a choice between a sustainable option and a conventional option, and the questions focused on packaging, a product dimension with ethical consumption, and a product dimension with the use of animal products. The intention was to compare participants' interest and support for either the sustainable or conventional option along these three domains.

In this hypothetical coffee purchasing scenario, question one asked, "*What type of cup would you like?*" with the options "*Ceramic Mug or Thermos*," "*Corn Starch Compostable Cup*," "*Regular Take-away cup*," and "*Doesn't Matter*." The reusable ceramic mug or thermos and the corn starch

compostable cup were coded as the perceived sustainable option, and the regular takeaway cup and "*Doesn't Matter*" represented the conventional and less sustainable choices. Question two was "*What type of coffee beans would you like?*" with the options "*Dark Roast*," "*Light Roast*," "*Fair-trade certified sourced beans*," and "*Doesn't Matter*." The dark roast, light roast, and "*Doesn't Matter*" represented the conventional choice, and the fair-trade certified beans were the ethical and sustainable choice. As notions of 'sustainability' embody an ethical dimension (Geissdoerfer et al., 2017), and fair-trade certification embodies an environmental dimension (Sama et al., 2018), this choice represented a product-based sustainable option. Question three was "*Would you like anything added to your coffee?*" with the options "*Milk or Cream,*" "*Non-dairy alternative,*" "*Nothing (black coffee, please),*" and "*Doesn't Matter.*" Milk, cream, and "*Doesn't Matter*" were coded to represent the conventional option, and the non-dairy alternative and black coffee represent the sustainable option along the product-based dimension of avoiding animal products. These three questions were designed to provide data on consumers' preference for package- and product-based pro-environmental behaviours.

The survey proceeded with an environmental concern measure using an adapted version of Schultz's (2001) SC scale, regarded as a quick yet robust scale for measuring environmental concern (Cruz & Manata, 2020). Environmental concern was a potential covariate in the analysis because it has been recognized to significantly influence individuals as they judge sustainable products (Magnier et al., 2016; Magnier & Schoormans, 2017). Schultz's SC scale asked participants to respond to the question, "I am concerned about environmental problems because of the consequences for _____," as these related to nine categories. These nine categories are plants, marine life, birds, animals, me, my health, my future, all people, and children, and they represent the broader themes of biospheric, egoistic, and social-altruistic environmental concerns. Answers ranged from "Not Important" (1) to "Supreme Importance" (7).

Concern for plastic pollution was elicited by the question “How much do you care about plastic pollution?” and recorded on a 7-point scale from “I don’t care at all” (1), “I’m indifferent to it” (4), and “I really care about it” (7).

An open-ended question gauged participants’ environmental concerns about shopping. “How do you feel about, and work through, the environmental impacts of your grocery shopping? What concerns and solutions come to mind?” Responses to this question were coded into different pro-environmental categories that I used for analyzing the effect of sustainable packaging on consumer attention. This coding scheme is explored in the *Qualitative Coding* section (III.2.c.(ii)).

III.2.b.(ii) Survey Procedure

After giving informed consent – following the University of Victoria ethics forms – participants viewed the three ads. One of the four versions – a conventional or sustainable product, with either conventional or sustainable packaging) was randomly selected for each ad through SurveyMonkey’s A/B test option.

Participants responded to an open-ended comment box for each ad before proceeding to the subsequent ad. “Please explain what this product makes you think about.” Participants must remain uninfluenced and unbiased to ensure credibility in the results; therefore, these questions were deliberately vague and did not prompt them to reflect on the environmental impacts of the items. Responses to this question were used to analyze how the four versions affect environmental concerns and emotions.

On a new page without the option to go back, participants rated their interest in purchasing the product from “I’m actively against purchasing this” (1) to “I’m very interested in purchasing this” (7). Proceeding to a new page, participants rated the perceived sustainability of the packaging on a 7-point scale from “Very environmentally harmful” (1) to “Very environmentally beneficial” (7). Then, on a new

page where they cannot go back to change their answers, and using the same 7-point scale, participants were asked, “What do you think is the environmental footprint of these PRODUCTS, as separate from their packaging?” These three questions prompted the participants to reflect on their impressions of the products because they were not immediately available to view. For all of the survey’s closed-ended Likert-style questions, the survey used a 7-point scale rather than a 5-point scale, and the questions were phrased to avoid the use of ‘agree-disagree’ statements. Using a 7-point scale without agree-disagree statements was done to improve the survey’s accuracy, to help reduce the potential for straight-lining through the survey, and to lower acquiescence bias in responses (Friborg et al., 2006; Kuru & Pasek, 2016).

An attention check followed, with seven distractor questions (e.g., “I like to shop in mega-supermarket chains”) and two attention check questions (“Carrots are made of gold” and “All sunflowers are carnivores”). Responses were taken on a 7-point scale from “Strongly Disagree” (1) to “Strongly Agree” (7), and the only acceptable answer for the two attention-check questions was “Strongly Disagree.”

Participants were asked if they drank coffee, preceding a three-part hypothetical coffee purchasing scenario. The survey used skip-logic before the three-part coffee purchasing question. If participants responded that they did not drink coffee, they skipped this component and moved to the environmental concern scale. Otherwise, participants answered on their choice of cup, coffee bean, and milk addition for their coffee. The environmental concern scale followed, and then participants answered how they think about the impacts of their grocery shopping. Afterwards, participants rated their concern for plastic pollution. Finally, participants entered their demographic information and received a debrief on the purpose of the study.

III.2.c. Analysis

I conducted data cleaning before commencing analysis. No non-Canadian IP addresses were accepted. For any IP addresses or MTurk Worker ID with duplicate submissions, the second (or any subsequent) submission was removed. Surveys completed in less than five minutes were removed, and surveys that failed either of the two attention checks were removed. There were *N* = 217 surveys in total, with *n* = 156 meeting the quality criteria, *n* = 2 meeting the quality criteria and only completing a portion of the survey, and *n* = 63 removed. Approximately 71% of the MTurk responses were of viable quality, and 29% were of poor quality and removed. This 71% acceptance rate matched other researchers' comments about the viability of MTurk data (Ahler et al., 2021; R. Kennedy et al., 2020).

Responses per product stimuli were *n* = 33 to *n* = 51. A total of 51% of participants viewed EPK ads, and 47% of participants viewed EPD ads (**Table 1**). The average time spent was 17 minutes (*SD* = 16, min = 5, max = 150, 1Q = 9, 3Q = 18). One participant who spent 42 hours and 39 minutes has been removed from this estimate. The survey was conducted between February 26, 2023, and May 5, 2023.

Results from participants who viewed the same condition multiple times were averaged. Each participant viewed three product advertisements, with each ad randomly assigned to one of the possible four conditions. This resulted in some participants viewing a single condition type (e.g., 'EPD-EPK') multiple times. To correct for the influence that any given participant may have, the results were averaged. For example, if participant #1 viewed two EPD-NEPK items and one NEPD-EPK item and rated their purchase intent as 5, 7, and 7-points for each item, respectively, then the averaged results received a purchase intent of 6-points for the EPD-NEPK item, and 7-points for the NEPD-EPK item.

In total, 154 participants completed the survey and reached the demographics section (**Table 2**). The mean age was 40; the mean household income was $89,763; political orientations were 13% conservative, 35% moderate, and 49% liberal, among others; 67% held a bachelor's or another degree; a

majority of diets were traditional omnivore (82%); and the genders were 40% women, 58% men, and 2% other or prefer not to say.

III.2.c.(i) Statistical Analysis

RStudio was used to perform statistical analyses (Version 2023.06.0, Build 421). Data normality was established before proceeding. Both asymptotic one-sample Kolmogorov-Smirnov tests and Shapiro-Wilk normality tests gave significant *p*-values, suggesting the data were not normally distributed. However, visual inspection of histograms and Q-Q plots sufficiently established normality (**Figure 2** and **Figure *3***) and justified the subsequent use of parametric tests. Tukey Honest Significant Difference (HSD) tests, Welch Two-Sample T-tests, Linear regression analyses, and Q-tests for Homogeneity were performed.

Figure 2

Histograms and Q-Q plots of Rated Product Sustainability, Rated Package Sustainability, and Rated Purchase Intent using Data Including Frozen Dessert

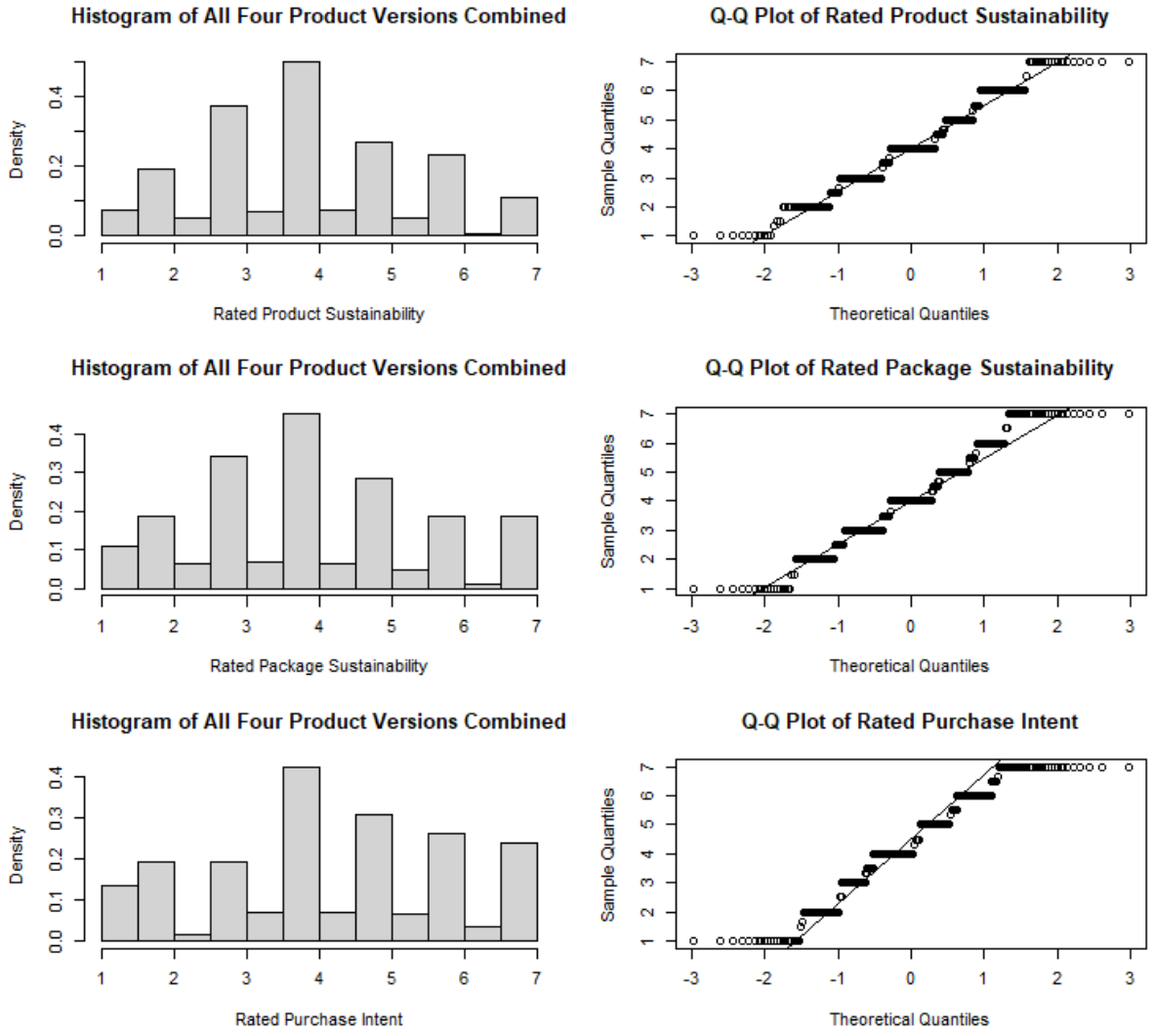
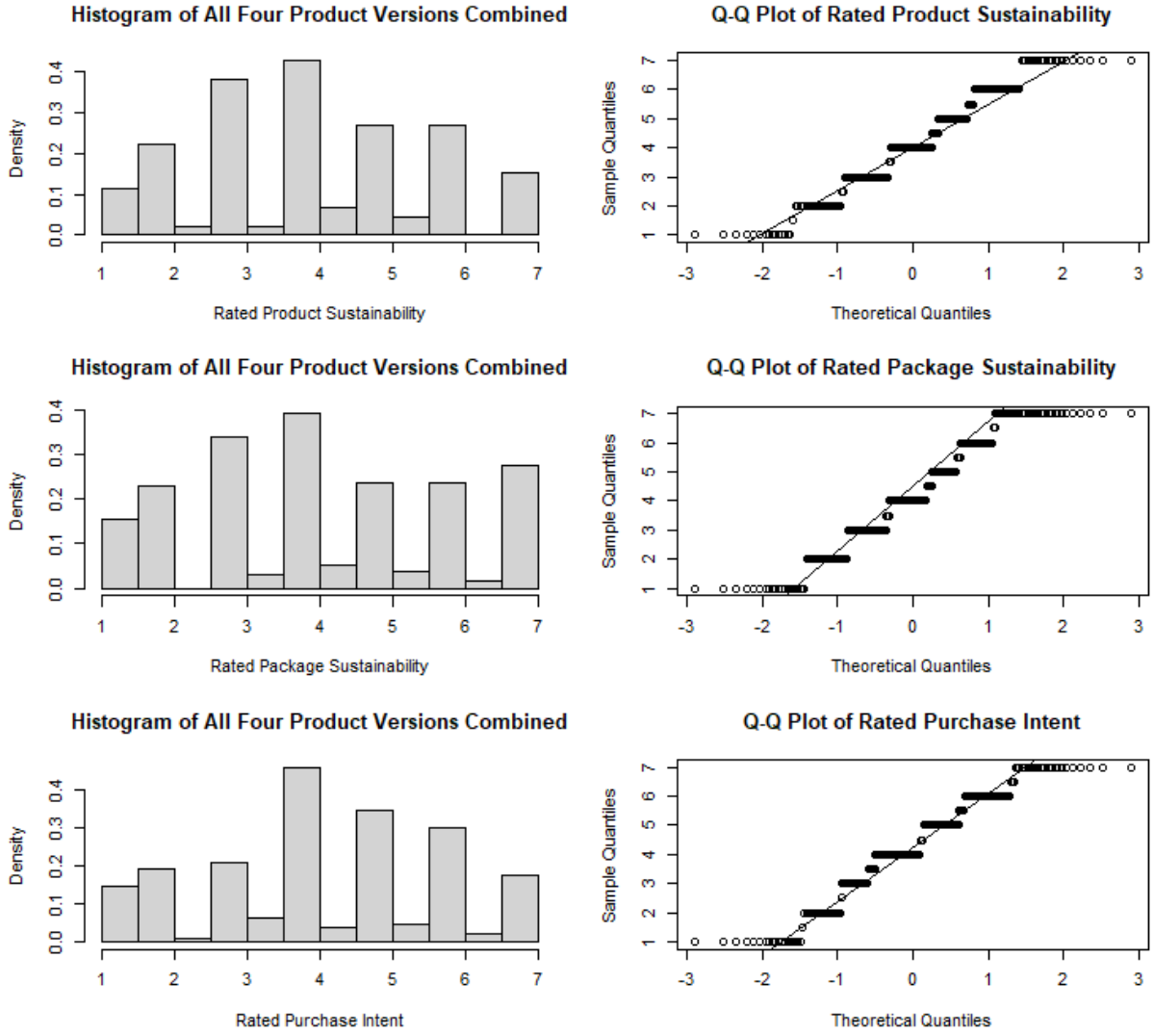


Figure 3

Histograms and Q-Q plots of Rated Product Sustainability, Rated Package Sustainability, and Rated Purchase Intent, using Data Excluding Frozen Dessert



Manipulation checks were performed on the four versions of the three products. Overall, the burger and detergent products were perceived as intended along both product and packaging sustainability dimensions. In contrast, the frozen dessert product was consistently misinterpreted on both product and packaging sustainability dimensions.

Along the product sustainability dimension (EPD vs. NEPD), with all three products analyzed together, the sustainable versions (EPD) received higher ratings of product sustainability compared to the conventional versions (NEPD) (Cohen's *d* = 0.44, **Table 18**). This effect size increased when analyzing the burger and detergent, excluding the frozen dessert (Cohen's *d* = 0.61). With the frozen dessert included, mean values between EPD and NEPD only change by 0.1 points (EPD, *M* = 4, *SD* = 1.4; NEPD, *M* = 3.9, *SD* = 1.2), compared with the burger with a change of 1.3 (EPD, *M* = 4.9, *SD* = 1.5; NEPD, *M* = 3.6, *SD* = 1.7), and the detergent with a change of 0.7 (EPD, *M* = 4.3, *SD* = 1.6; NEPD, *M* = 3.6, *SD* = 1.4) (**Table 18**). While all three products displayed a general trend towards being accurately perceived as either conventionally or sustainably produced, this result indicates that the frozen dessert was not robustly perceived as intended along its product sustainability dimension compared to the burger and detergent.

For the package sustainability dimension (EPK vs. NEPK), the burger and detergent were appropriately perceived as sustainably and conventionally packaged with the EPK and NEPK versions, respectively. However, the frozen dessert was significantly misinterpreted. When analyzing all three products, the difference in rated package sustainability between the EPK and NEPK versions was medium (Cohen's *d* = 0.77, **Table 12**). This effect size almost doubled when excluding the frozen dessert from the analysis (Cohen's *d* = 1.30). To investigate this further, the conventionally packaged version (NEPK) of the frozen dessert has a higher mean packaging sustainability rating (*M* = 4, *SD* = 1.3) compared to the sustainably packaged version (EPK) (*M* = 3.7, *SD* = 1.3). In contrast, the EPK versions of both the burger and the detergent receive a higher mean packaging sustainability rating compared with their NEPK versions (Burger: EPK, *M* = 5.3, *SD* = 1.6; NEPK, *M* = 3.3, *SD* = 1.4. Detergent: EPK, *M* = 4.9, *SD* = 1.7; NEPK, *M* = 3.3, *SD* = 1.6, **Table 10**).

The above results indicate that the frozen dessert, on average, was misinterpreted along its package sustainability dimension and had a limited proper interpretation along its product dimension. Because of this, the frozen dessert unduly influences the results. An explanation is primarily rooted in

using a metal container for the sustainable version, with what appears to be a paperboard container for the conventional version. In the following results and discussion sections, two separate analyses will be performed, one that includes the frozen dessert and one that excludes the frozen dessert, to provide the most robust analysis possible.

This study had three dependent variables, two covariates, and one independent variable. The type of packaging and product sustainability (EPD-EPK, EPD-NEPK, NEPD-EPK, NEPD-NEPK, EPD, NEPD, EPK, and NEPK) were investigated as the independent variable to study their effect on the three dependent variables of purchase intent, rated package sustainability, and rated product sustainability. Plastic concern and environmental concern were included as two covariates in separate linear regression models to account for their moderating influence (Catlin & Wang, 2013; Magnier & Crié, 2015; Magnier & Schoormans, 2017; Mahmoud et al., 2022).

Three separate analyses were performed, one for each dependent variable of purchase intent, rated package sustainability, and rated product sustainability. For the analysis of each dependent variable, two separate data sets were used, one which included the frozen dessert and one which excluded the frozen dessert. The results are discussed by comparing the two data sets. Additionally, two groups of linear regression models were run for each dependent variable, using either plastic concern or environmental concern as the covariate. The covariates were not included simultaneously to limit over-complicating the analysis and maintain more parsimonious models.

After the linear regression models, post-hoc Tukey contrasts were reported using two different tests. The first test, conducted using Tukey's multiple comparisons of means, excluded the interaction effect of the covariate on the independent variable. The second test included the interaction effect of the covariate and the independent variable, as we calculated the estimated marginal means and conducted pairwise comparisons using the Tukey adjustment method to control for multiple

comparisons. We used the 'glht' function with 'multcomp' to perform Tukey's multiple comparisons of means, the 'emmeans' function to perform the estimated marginal means and pairwise comparisons, and 'effsize' to calculate Cohen's *d*.

III.2.c.(ii) Qualitative Coding

An iterative, qualitative content analysis was performed for the open-ended answers given to each of the three products (Iofrida, 2016; Lindgren et al., 2020). The text was first interpreted based on its manifest content – the literal subject matter – and then analyzed based on its latent content – the subtext and underlying meaning (Graneheim et al., 2017; Vaismoradi et al., 2013). Word use represented the manifest content, and I performed the sentiment analysis based on my interpretation of the latent content of the answers. Recognizing the highly subjective nature of interpreting latent content and emotional expressions from participants' responses, I have included examples to allow others to assess and verify my results (Fakis et al., 2014).

III.2.c.(ii-1) Content Analysis

Two content analyses were performed. In the first, participants responded to an open-ended question on each of the three products, "*Please explain what this product makes you think about*." This content analysis aimed to interrogate the presence of topics related to two of the pillars of sustainability – environmental and socio-ethical well-being (Vucetich & Nelson, 2010). However, the product stimuli and open-ended questions were administered with very little guidance to limit biasing the results of this experiment. Due to this, many of the responses featured extraneous and irrelevant details (e.g., "*This product makes me think about a nice summer BBQ. It looks rich in ingredients and flavour*").

In the first sweep of coding, I determined if the participant mentioned something broadly related to environmentalism. If yes, I analyzed the participant's sentence to distinguish the type of environmental comment. In doing so, I created three categories:

1. Vague and ambiguous mentions of environmental topics – for example, "*This product makes me think that it is a healthy and sustainable way to clean laundry*," as it lacks any clear environmental sentiment.
2. Plastic-specific comments – for example, "*Net zero packaging saves the environment"- reference* the benefits of reducing plastic use.
3. Specific, non-plastic environmental comments – for example, "Vegetarianism, *sustainable food that saves cows,*" because it refers to plant-based meat alternatives. I tallied the participants who made vague, plastic-focused, and non-plastic environmental comments. I used these tallies in statistical analyses and as the basis for one of the sentiment analyses.

I then coded the non-plastic responses for their subject. For example, responding to the EPD-NEPK detergent, one participant wrote: "*This makes me think about how it's probably better for the planet than traditional detergent. It probably contains fewer harmful chemicals leaking into waste water*." Another participant wrote: "*lol rustic strength so caustic and full of pollutants? Just like mom's,"* in response to the NEPD-NEPK detergent. After the initial coding, I combined these coded responses into broader themes. In the above examples, I grouped the responses into the theme of "no chemicals."

The next open-ended question about environmental activities and concerns during shopping provided more comprehensive answers. Participants were asked to reflect on "*How do you feel about, and work through, the environmental impacts of your grocery shopping*?" I coded these to note any pro-environmental action or initiative the participant mentioned, even if they might not practice it themselves.

In each sentence, I tallied the unique mentions of an environmental activity while coding the specific activity (or activities). I tracked the number of participants who made an environmental comment and the number of comments a given participant made. Activites received an initial code before I combined them into broader categories. For example, I coded "eat less red meat" and "more vegan options" into the broader category of "fewer animal products." Additionally, I noted yes or no if the participant wrote about plastic or packaging as the first environmental activity within the first sentence of their response. An example of the coding process for participant's answers is:

> "When I go shopping, *I normally drive and am concerned about my gas consumption, the wear and tear on the car etc (*1*). In the summer *I use my bike to go shopping and that reduces my reliance on fossil fuels and the wear and tear on the car. I try to purchase products that have less packaging (*2)* but the price that I pay has an impact on what I purchase. If the price is lower for a highly packaged item and the price is higher on a less packaged item for the same item I will purchase the lower priced item, but *I will always try to purchase products that are less processed (*3)*." (Italics to emphasize pro-environmental topics; and '*' to signify an instance of a unique pro-environmental topic.)

This individual has given one anti-plastic initiative (*2) and two unique non-plastic pro-environmental initiatives (*1 and *3). Altogether, these are driving less, using less packaging, and purchasing fewer processed foods. An example from another participant:

> "*I actively choose cardboard and paper packaging wherever possible (*1* Use paper-based materials, and plastic is the first concern mentioned*)*. I cry inside when I am *forced to purchase plastic packaging*. I get angry when I see so much plastic everywhere, *we need to STOP with the plastic* (*2 Use less packaging). But I have to eat! It makes me so mad. *Solutions are returnable packaging that can be washed sterilized and reused, put a deposit on them* (*3

Reusable containers). *Use more paper, cereal liners used to be paper and now are plastic*, WHY. *Reusable grocery bags are a must* (*4 Bring your own reusable bag). *I have mesh produce bags. Ban plastic milk bags* (I buy cartons even though it's more expensive). *I try to buy organic* when my budget allows (*5 Purchase organic foods) but with inflation I am having to buy less organic. *I don't buy red meat* (*6 Consume fewer animal products). I am also *concerned about our recycling winding up in landfills, the system is broken, so recyclable packaging* alone doesn't even give me peace of mind." (The information within the parentheses with * symbols are the outcomes of my coding frame.)

I used these data to establish participants' attention and focus on different pro-environmental behaviours, sorted broadly into packaging-based and product-based initiatives. These data provide evidence to assess how participants balance their pro-environmental attention between package-based and product-based activities.

III.2.c.(ii-2) Sentiment Analysis

I performed two sentiment analyses on the open-ended product questions, "*Please explain what this product makes you think about.*" I analyzed the positive and negative emotions expressed within participants' responses. The first sentiment analysis compared the generalized and non-environmental specific emotional expressions, and the second sentiment analysis compared just the emotions of the environmental-related comments. I interpreted each sentence for the latent content to understand their implicit positive and negative emotional connotations (Graneheim et al., 2017; Vaismoradi et al., 2013).

This first sentiment analysis investigated all sentences, regardless of whether they discussed an environmental topic. I rated each sentence on a 5-point scale. This scale ranged from "very positive,"

"positive," "neutral," "negative," to "very negative." An example of a "very negative" expression is: "*It looks like an egg carton, or poop. It's ugly and I don't like it from first glance. Plant power seems silly, like it's marketing to low-intelligence people. Blue and white really clash against brown, it doesn't match. The weird shape of the bottle looks unstackable and silly. Pretty much hate everything about the design*" because of the participant's strong use of 'disliking' statements. An example of a neutral sentence is: "*It makes me think of eating a Beyond Meat Burger*," because it lacks any emotionally expressive stance. An example of a sentence that I coded as "very positive" is: "*Summer BBQs with my family having burgers*," because of the connotations of family.

Participants who viewed multiple product advertisements of the same 'condition' had their results averaged. For example, if a participant viewed three EPD-EPK advertisements, and I rated their first response as "very positive," their second as "very negative," and their third as "slightly negative, they received a final coded score of "slightly negative." In the visual graph (**Figure 12**), I have smoothed the results by combining the extremes of "very positive" and "positive" together and by combining "very negative" and "negative" together.

The second sentiment analysis focuses specifically on positive and negative emotions within environmental topics. I used the list of vague, plastic, and non-plastic comments created during the first content analysis as my foundation. I coded vague and non-plastic comments into a 'generalized environmental' category and plastic-specific comments into a 'plastic-specific' category. Coding proceeded by my judgement and intuition to derive that latent meaning when the sentence had subtle inflections or what I perceived as sarcastic comments.

An example of my coding of the generalized environmentally positive dimension is: "*Environment-friendly, healthy, and plant-based*" (stated for the EPD-EPK burger). An example of the positive dimension of the plastic-specific focus is: "*First thing it makes me think of is the packaging, it*

looks more environment friendly with bright colors welcoming you in" (stated for the NEPD-EPK Burger). Along the negative dimension, a negative generalized environmental comment is: "*lol rustic strength, so caustic and full of pollutants? Just like mom's*" (stated for the NEPD-NEPK Detergent). A negative plastic-focused comment is: "*I also do not like the packaging. It is a waste of plastic to package it like that*" (stated for the NEPD-NEPK burger).

I used these data to interpret if participants' feelings changed from exposure to different product conditions (EPD-EPK, etc.). Change in the positive and negative emotional expressions provides evidence to assess the role of sustainable packaging in promoting or inhibiting consumer shopping (Catlin & Wang, 2013; Duke & Amir, 2019; B. Ma et al., 2019; Sun & Trudel, 2017).

IV. Results

IV.1. Environmental and Plastic Concern

Environmental concern and plastic concern were analyzed to determine whether they are influential as covariates for subsequent analysis, as other studies have noted their influence on consumer perceptions and decisions (Catlin & Wang, 2013; Magnier & Crié, 2015; Magnier & Schoormans, 2017; Mahmoud et al., 2022). This section contributes to answering H1: "*Higher levels of concern for plastic pollution and environmental harm will affect the results."*

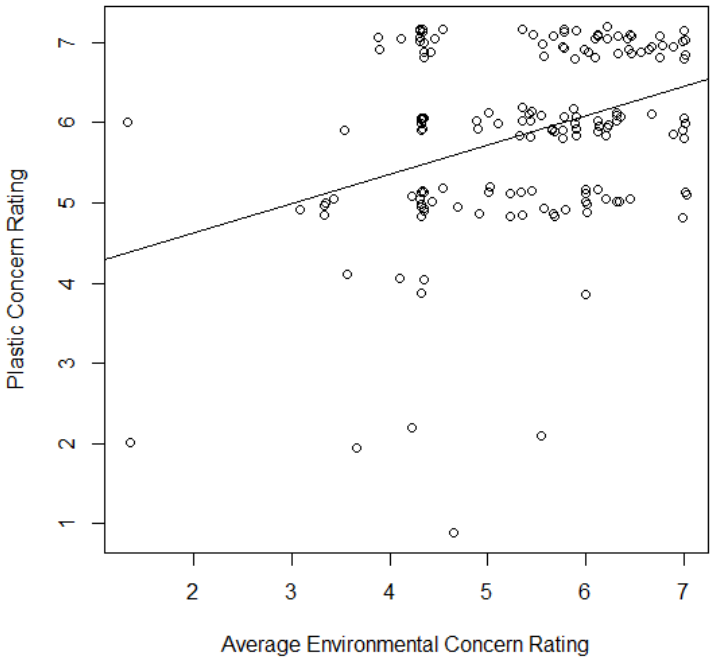
Table 3 summarizes participants' average environmental concern and plastic pollution concern. The mean environmental concern across all categories was 5.39 out of 7 (n = 154, SD = 1.11). The lowest value given was to "Plants"; the egoistic values ("My Health," "Me," and "My Future") were ranked second, third, and fourth lowest, respectively. "Children" and "Marine Life" were the first and second most highly rated environmental concerns, respectively. A Tukey Honestly Significant Difference (HSD) test revealed no statistically significant differences in the different categories amongst respondents.

Plastic concern was analyzed, and the mean result for plastic pollution concern was 5.86 out of 7 (n = 154, SD = 1.15).

A Pearson correlation between participants' average environmental concern rating and their plastic concern rating shows there was a significant correlation but low explanation, $r(152) = .35$, $p < .001$ (**Figure 4**). This indicates a slight trend that overall environmental concern and plastic concern were positively correlated.

Figure 4

Pearson Correlation Between Plastic Concern and Environmental Concern



Note: Pearson correlation, $r(152) = .35$, $p < .001$.

IV.2. Purchase Intentions

This section tested *H2: "Conventional products with sustainable packaging will have a greater purchase intent than sustainable products with conventional packaging."* The purchase intentions of each product stimulus were assessed, with plastic concern and environmental concern as covariates. Summary statistics (**Table 4**) and boxplots (**Figure 17** and **Figure 18**) are available in the appendix.

On average, purchase intents for all product conditions were above 'neutral' ambivalence to the product. Ratings for purchase intent were taken on a scale from one ("*I'm actively against purchasing this*") to seven ("*I'm very interested in purchasing this*"), with four as a 'neutral' stance ("*I'm indifferent to this product*"). On average, purchase intents ranged from 4.1 to 4.5, indicating, at the very least, an ambivalence to the item if not an active interest in it (**Table 4**). When excluding the frozen dessert, there was a small effect size between the EPK and NEPK items (Cohen's d = 0.21, 95% CI = -0.05 to 0.46) (**Table 5**), with higher purchase intents for EPK items. While NEPK items had a near-ambivalent response (M = 4.1*,* SD = 1.5), participants viewed the EPK items with a slight active interest (M = 4.5, SD = 1.8). The same effect was not seen with the product domain (EPD, M = 4.3, SD = 1.6; NEPD, M = 4.2, SD = 1.5; Cohen's d = 0.03, 95% CI = -0.23 to 0.30). A Q-test for heterogeneity suggests that the difference in effect sizes between the product and packaging domain was not significant ($Q(1) = 0.84$, $p = .36$).

IV.2.a. Plastic Concern and Purchase Intentions

The first group of analyses included the frozen dessert in the data set. With the frozen dessert included, plastic concern has a moderate influence on the impact of condition type on purchase intent. A linear regression model was created that included the main effects of both the condition type and plastic concern, as well as the interaction term of the two together (adjusted R^2 = .02, $F(7, 334) = 1.88$, p

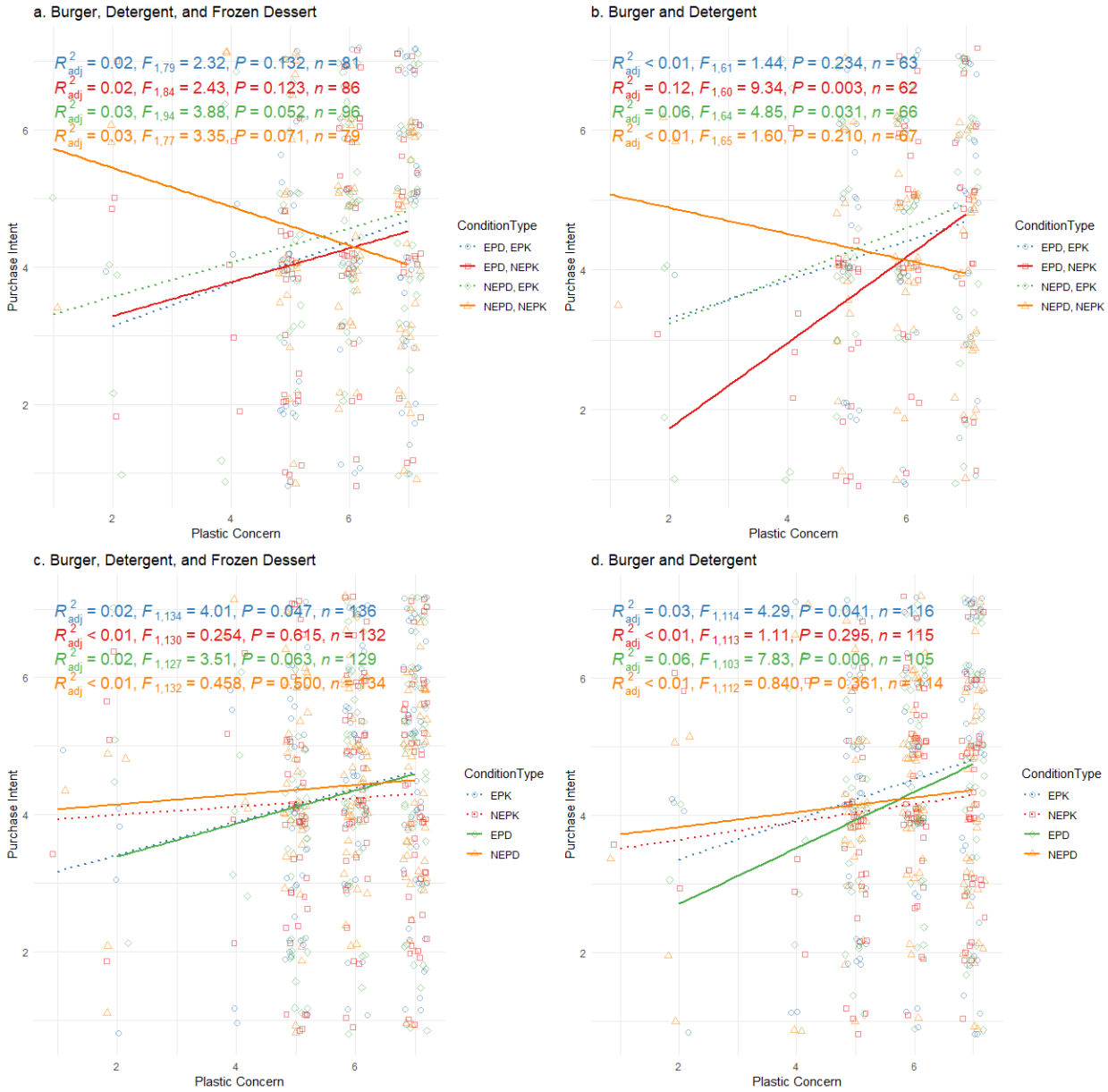
= .07). Two coefficients had significant results, NEPD-NEPK (β = 3.48, *p* = .02), and the interaction term of plastic concern with NEPD-NEPK (β = -0.59, *p* = .018). Another model compared just the conditions of EPK against NEPK as a main effect, alongside plastic concern, and their interaction term (adjusted R^2 = .006, *F(*3, 264) = 1.56, *p* = .20). Plastic concern showed a significant main effect (β = 0.24, *p* = .045). A third model compared only the product dimension (EPD and NEPD), alongside plastic concern, and their interaction term (adjusted R^2 = .006, *F(*3, 259) = 1.56, *p* = .20). Again, a main effect of plastic concern was significant (β = 0.24, *p* = .045).

The second set of linear regression models excluded the frozen dessert, and plastic concern moderately influenced the impact of condition type on purchase intent (adjusted R^2 = .05, *F*(7, 250) = 2.88, and *p* = .007). None of the coefficients were significant, and the interaction term of plastic concern on NEPD-NEPK was moderately significant (β = -0.47, *p* = .08). Another model compared just the conditions of EPK to NEPK as a main effect, alongside plastic concern, and their interaction term. The results were significant (adjusted R^2 = .04, *F(*3, 227) = 2.76, *p* = .04). Plastic concern showed a significant main effect (β = 0.29, *p* = .03). A third model compared the categories along their product dimension (EPD and NEPD), alongside plastic concern, and their interaction term (adjusted R^2 = .04, *F(*3, 215) = 2.96, *p* = .03). Again, a main effect of plastic concern was significant (β = 0.41, *p* = .005).

A scatterplot (**Figure 5**) shows the relation of purchase intent to plastic concern with each of the four main conditions (EPD-EPK, EPD-NEPK, NEPD-EPK, and NEPD-NEPK) and for the package and product dimensions independently (EPD, NEPD, EPK, and NEPK). NEPD-NEPK has the opposite slope to the other three conditions, which holds when including and excluding the frozen dessert.

Figure 5

Linear model of Plastic Concern (x) and Purchase Intent (y), Sorted by Condition



Note: Data from the frozen dessert are included in the lefthand side models (a, c) while excluded from the righthand side models (b, d). With the frozen dessert included, the NEPD-NEPK condition displayed a significant difference compared to the other three conditions (p = .018). For the data excluding the frozen dessert, the NEPD-NEPK condition had a moderately significant difference (p = .08).

Tukey's multiple comparisons of means showed no significant differences among the four conditions for the data that included the frozen dessert. The only interactions that approached

significance were for NEPD-NEPK vs. EPD-EPK (β coefficient = 3.48, *p* = .099), NEPD-NEPK vs. EPD-NEPK (β = 3.21, *p* = .07), and NEPD-NEPK vs. NEPD-EPK (β = 2.94, *p* = .09). These results indicate there is some evidence that purchase intent was higher NEPD-NEPK items compared with EPD-EPK, EPD-NEPK, and NEPD-EPK items (**Table 6**). With the Tukey adjustments including the interaction effect of plastic concern set to its mean value of 5.85, the variable 'condition' exhibited no significant differences in estimated marginal means. Although the NEPD-NEPK condition had a significant difference compared with the other conditions, post hoc comparisons indicate that these conditions may have a limited direct impact on purchase intent once the influence of plastic concern was considered. For the data including the frozen dessert, this phenomenon also held when analyzing just the EPD and NEPD items, as well as when considering just the EPK and NEPK items, with no significant results (**Table 6**). Cohen's *d*s were calculated for the effect sizes between conditions, and all results were negligible (**Table 5**).

Tukey's multiple comparisons of means without the interaction effect showed one significant difference among the four conditions for the data that excluded the frozen dessert (NEPD-NEPK vs. EPD-NEPK, β = 4.76, *p* = .01). This indicated a slightly higher purchase intent for NEPD-NEPK items compared to EPD-NEPK items (**Table 5**).

With the Tukey adjustments, including the interaction effect of plastic concern set to its mean value of 5.88, the variable 'condition' exhibited no significant differences in estimated marginal means. As with the data including the frozen dessert, the results indicate no significant influence of condition type on purchase intent when controlling for the influence of plastic concern. There was also no significant difference in purchase intent between conditions when controlling for plastic concern on the dimension of just EPD and NEPD items, nor with the EPK and NEPK items (**Table 7**). Cohen's *d*s were calculated for the effect sizes between conditions (**Table 5**).

In summary, the above results suggest that plastic concern moderates the influence that package and product sustainability have on purchase intent. This effect, however, is limited. The effect of sustainable packaging (EPK) was small for the conventional product (NEPD) and across the entire packaging dimension. Sustainable packaging is correlated with a slight increase in purchase intent, which was most prominent in conventional products. Sustainable products do not show the same increase in purchase intent.

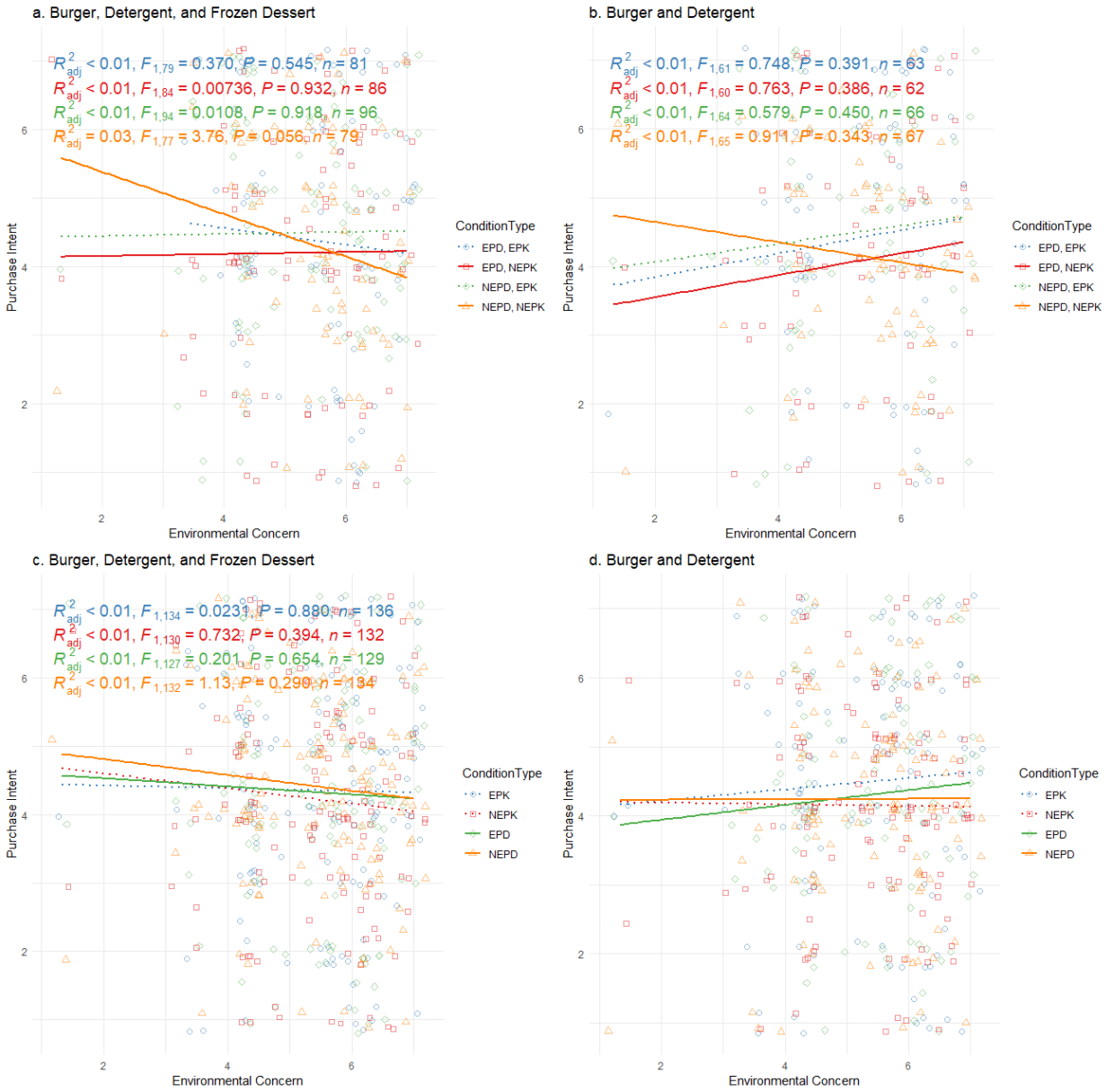
IV.2.b. Environmental Concern and Purchase Intentions

A linear regression model was created to test the influence that environmental concern has on purchase intent across condition types. The model showed no statistically significant influence of environmental concern (**Figure 6**). This was the case when including the frozen dessert (adjusted R^2 = -.005, $F(7, 334) = 0.74$, and $p = .64$) and excluding the frozen dessert (adjusted R^2 = -.005, $F(7, 250) = 0.82$, and $p = .57$). Data are available in the appendix, with no significant results using either data set (**Table 8** and **Table 9**).

As such, environmental concern will not be discussed further regarding its influence on purchase intent across condition types.

Figure 6

Linear model of Environmental Concern (x) and Purchase Intent (y), Sorted by Condition



Note: Data from the frozen dessert are included in the lefthand side models (a, c) while excluded from the righthand side models (b, d).

IV.3. Package Evaluations

This section tested *H3*: "*Conventional products with and without sustainable packaging will have the highest and lowest perceived package sustainability, respectively*." Respondents rated the sustainability of each stimulus's packaging (**Table 10** and **Figure 19**).

The average perceived sustainability of the packaging for the sustainably packaged version was assessed on a scale of one ("*Very environmentally harmful*") to seven ("*Very environmentally beneficial*"), with four as neutral ("*Neither harmful nor beneficial*"). Comparing EPK to NEPK conditions, the average perceived sustainability of the sustainably packaged (EPK) items was above the 'neutral' mark (all three products, M = 4.6, SD = 1.4; excluding the frozen dessert, M = 5.2, SD = 1.5), while the average score for the conventionally packaged (NEPK) items was below the 'neutral' mark (all three products, M = 3.6, SD = 1.3; excluding the frozen dessert, M = 3.3, SD = 1.4) (**Table 10**).

IV.3.a. Plastic Concern and Package Evaluations

Data that included the frozen dessert were analyzed first. Three linear regression models were performed to assess the necessity of including plastic concern as a covariate. The first model included the main effects of both the condition type and plastic concern, as well as the interaction term of the two together (adjusted R^2 = .12, $F(7, 334) = 7.48$, and $p < .001$). In this model, none of the individual coefficients had any significant effect, and plastic concern had no moderating influence. The second model kept the two main effects of the product condition type and plastic concern and removed the interaction term (adjusted R^2 = .12, $F(4, 337) = 12.84$, and $p < .001$). The third model included only the condition type as the independent variable (adjusted R^2 = .13, $F(3, 341) = 17.41$, and $p < .001$). While removing the interaction effect and plastic concern would make for a slightly more parsimonious model,

considering the marginal improvement of removing what is considered to be an important covariate (Catlin & Wang, 2013; Magnier & Crié, 2015; Magnier & Schoormans, 2017; Mahmoud et al., 2022), plastic concern was left in the model.

Two subsequent models were created, comparing each packaging and product dimension in isolation, with the frozen dessert included. The first model compared just the conditions of EPK against NEPK as a main effect, alongside plastic concern, and their interaction term (adjusted R^2 = .12, $F(3, 264) = 12.92$, $p < .001$). Plastic concern showed no significant main effect (β = 0.006, p = .95). The next model compared the categories only along their product dimension (EPD and NEPD), alongside plastic concern and the interaction term between the condition type and plastic concern (adjusted R^2 = -.002, $F(3, 259) = 0.85$, p = .47). None of the coefficients had significant results.

Data that excluded the frozen dessert was then analyzed. With the main condition types (EPD-EPK, EPD-NEPK, NEPD-EPK, and NEPD-NEPK), the linear regression model suggested that plastic concern had no moderating influence on the effect of condition type on rated package sustainability (adjusted R^2 = .27, $F(7, 250) = 14.52$, and $p < .001$). As with the model including the frozen dessert, removing plastic concern as an interaction term and main effect resulted in no significant change to the model's descriptive strength. Therefore, plastic concern remained included in the model.

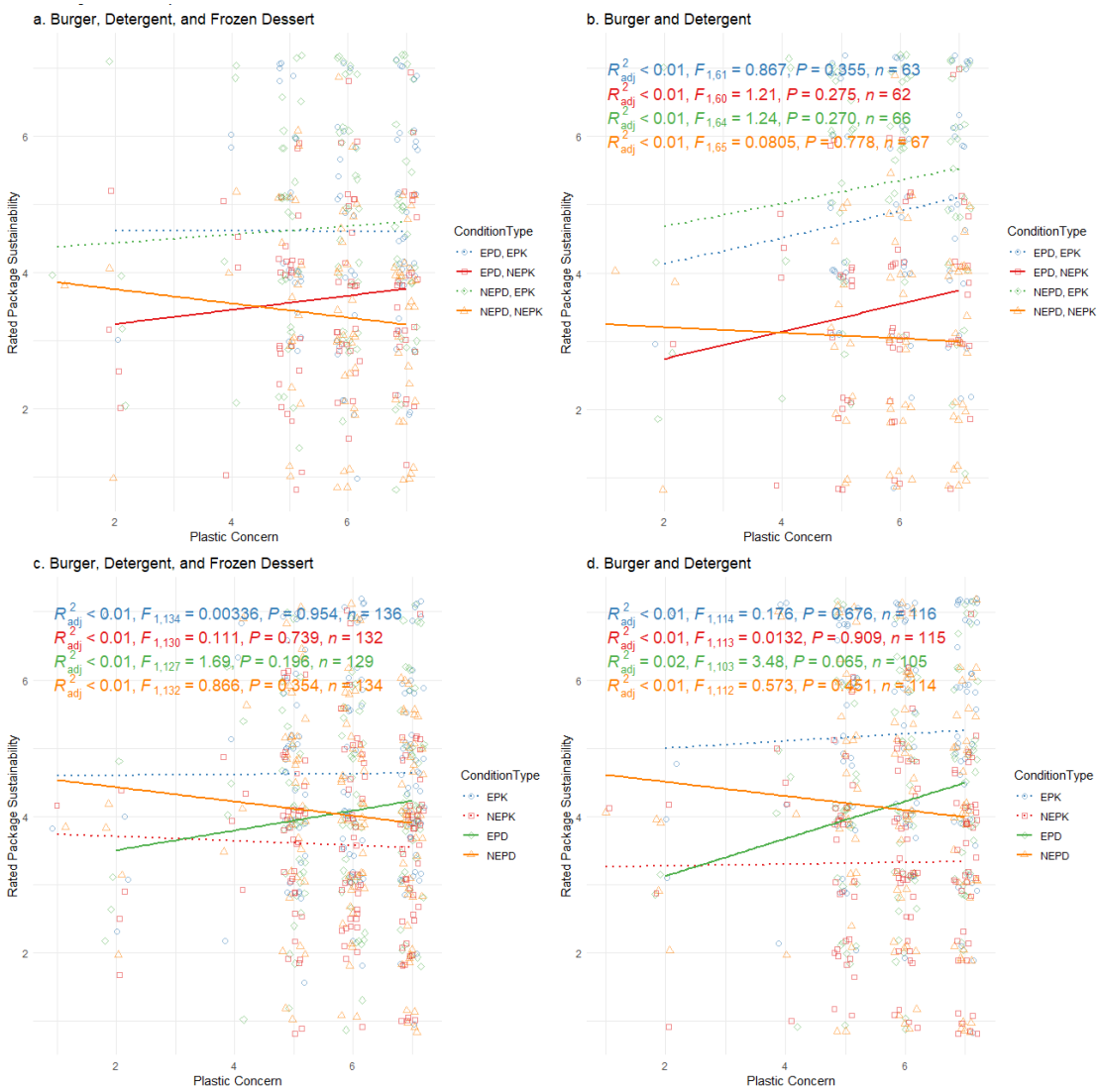
Still excluding the frozen dessert from the data, two subsequent models compared each packaging and product dimension in isolation. The first model compared just the conditions of EPK against NEPK as a main effect, alongside plastic concern, and their interaction term (adjusted R^2 = .29, $F(3, 227) = 31.19$, $p < .001$). Plastic concern showed no significant main effect (β = 0.05, p = .66) and no significant interaction effect (β = -0.04, p = .82). The next model compared the conditions only along their product dimension (EPD and NEPD), with a main effect of plastic concern, and the interaction term between condition and plastic concern (adjusted R^2 = .003, $F(3, 215) = 1.27$, p = .29). Plastic concern was

moderately significant (β = 0.27, *p* = .08), and the interaction term between plastic concern and condition was moderately significant (β = -0.38, *p* = .06).

A scatterplot (**Figure *7***) shows the relation between the rated package sustainability and plastic concern among the different condition types, comparing the data sets that include and exclude the frozen dessert.

Figure 7

Linear model of Plastic Concern (x) and Rated Package Sustainability (y), Sorted by Condition



Note: Data from the frozen dessert are included in the lefthand models (a and c) while excluded from the righthand models (b and d).

Tukey's multiple comparisons of means showed no significant differences among the four conditions for the data that included the frozen dessert. With the Tukey adjustments, including the interaction effect of plastic concern set to its mean value of 5.85, the variable 'condition' exhibited significant differences in the estimated marginal means of the rated package sustainability (**Table 11**). When analyzing the packaging dimension alone, the estimated marginal means were also significantly different, with the EPK condition viewed as significantly more sustainable than the NEPK condition. The product dimension (EPD vs. NEPD) did not show a significant difference. Cohen's *d*s effect sizes were calculated, with some small to large effect sizes (**Table 12**).

Data excluding the frozen dessert were analyzed (**Table 13**). Tukey's multiple comparisons of means without the interaction effect showed one moderately significant difference between the package dimension of EPD vs. NEPD. With the Tukey adjustments, including the interaction effect of plastic concern set to its mean value of 5.88, the variable 'condition' exhibited five significant differences in estimated marginal means. Cohen's *d*s were calculated for the eight possible comparisons, with five large effect sizes and two small effect sizes (**Table 12**). EPK items were consistently viewed as more sustainably packaged compared to NEPK items. When comparing EPD and NEPD items, the effect of sustainable packaging on rated package sustainability was greatest for the NEPD items.

In summary, for both of the data sets that included and excluded the frozen dessert, the above results suggest that plastic concern does not have a moderating influence on the effect that package and product sustainability have on purchase intent. Package sustainability was positively correlated with higher perceived package sustainability, and conventional products with sustainable packaging have the highest perceived package sustainability. This effect was strongest when the frozen dessert product was removed. The effect of product sustainability on perceived packaging sustainability was negligible (**Table 12**).

IV.3.b. Environmental Concern and Package Evaluations

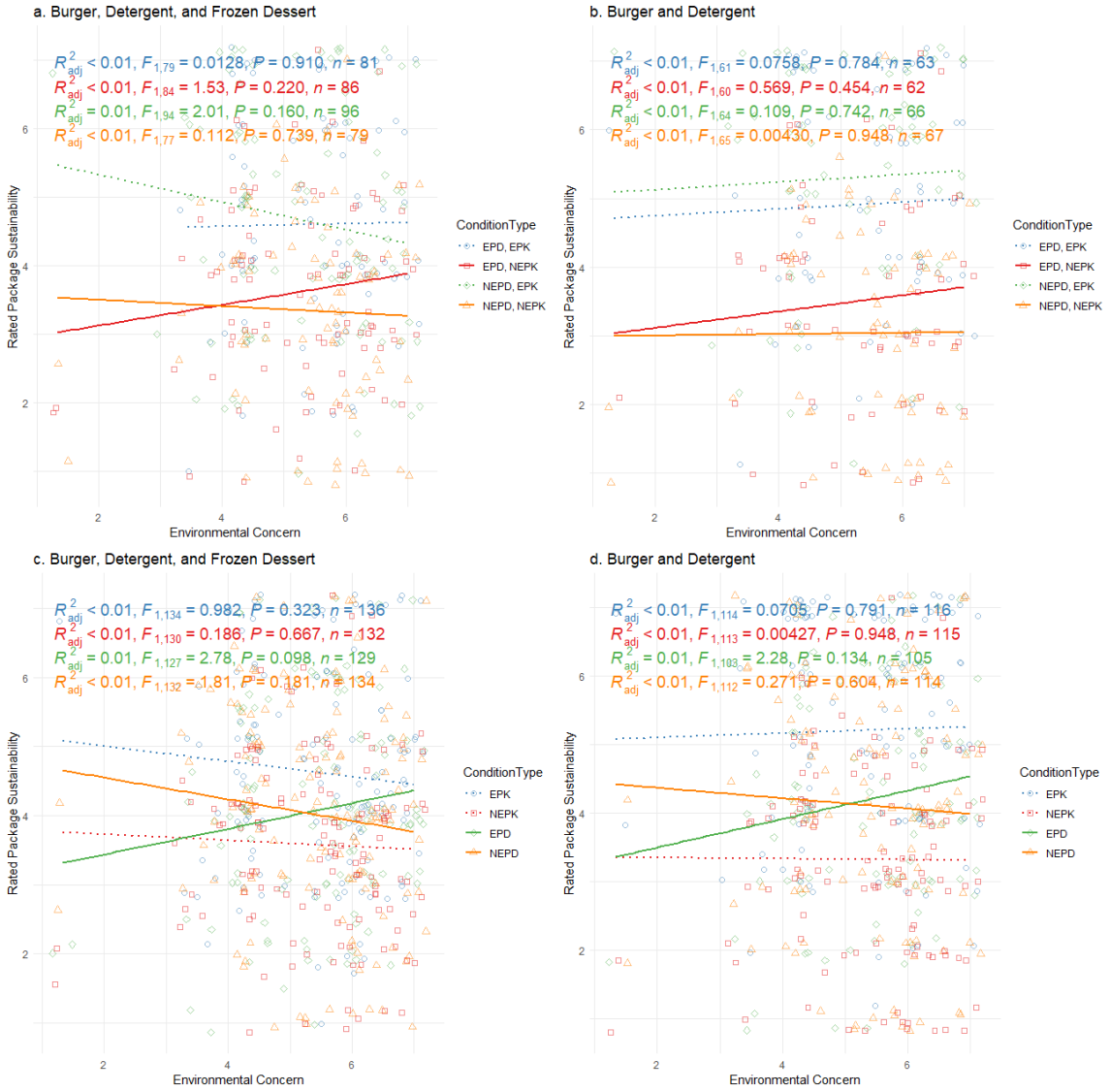
Data including the frozen dessert were analyzed first. From a full linear regression model that included the main effects of both the condition type and average environmental concern, as well as the interaction term between these two variables, results were significant (adjusted R^2 = .12, $F(7, 334)$ = 7.87, and $p < .001$). None of the individual coefficients were significant. Just the packaging dimension was analyzed with another model (adjusted R^2 = .12, $F(3, 264)$ = 13.35, and $p < .001$). The coefficient of environmental concern was not significant, and neither was the interaction term between environmental concern and the package type (EPD vs. NEPK). The coefficient of the packaging dimension as a main effect approached significance (β = 1.41, p = .09). A third model tested just the product dimension of EPD and NEPD (adjusted R^2 = .006, $F(3, 259)$ = 1.52, and $p < .21$). The coefficient of environmental concern was not significant. In contrast, the product dimension as a main effect was significant (β = 1.80, p = .04), and the interaction term between environmental concern and product type was significant (β = -0.34, p = .03).

Next, data excluding the frozen dessert were analyzed. A linear regression model included the main effects of both the condition type and average environmental concern, as well as the interaction term between these two variables. The results were significant (adjusted R^2 = .26, $F(7, 250)$ = 13.97, and $p < .001$), and yet none of the individual coefficients were significant. When analyzing just the packaging dimension, the results were significant (adjusted R^2 = .28, $F(3, 227)$ = 31.13, and $p < .001$). Neither the coefficient of environmental concern nor the interaction term between environmental concern and the package type (EPD vs. NEPK) were significant. The coefficient of the packaging dimension as a main effect was moderately significant (β = -1.67, p = .07). When testing the product dimension of EPD and NEPD, the results were not significant (adjusted R^2 = -0.003, $F(3, 215)$ = 0.82, and p = .47), and none of the coefficients were significant.

A scatterplot (**Figure 8**) shows the relation between the rated package sustainability and environmental concern between the data with and without the frozen dessert.

Figure 8

Linear model of Environmental Concern (x) and Rated Package Sustainability (y), Sorted by Condition



Note: Data from the frozen dessert are included in the lefthand models (a and c) while excluded from the righthand models (b and d). Neither data set results in significant interaction terms across the different condition types.

For the data that included the frozen dessert, Tukey's multiple comparisons of means showed only one significant difference: NEPD-EPK vs. EPD-NEPK (**Table 14**). With the Tukey adjustments,

including the interaction effect of plastic concern set to its mean value of 5.37, results mirrored that of plastic, with multiple significant pairwise comparisons. Comparing just the packaging dimension of EPK and NEPK, Tukey's multiple comparisons of means approached significance. There was a significant difference when including the interaction effect of environmental concern at its mean value of 5.37. The product dimension, EPD vs. NEPD, was significantly different during Tukey's multiple comparisons of means, while Tukey's contrasts with environmental concern at its mean value were insignificant. There were medium-sized effect estimates, as the sustainably packaged items received greater perceived package sustainability over conventionally packaged items (**Table 12**).

Data that excluded the frozen dessert were assessed (**Table 15**). Tukey's multiple comparisons of means without the interaction effect showed a significant difference between EPD-NEPK vs. NEPD-EPK, a near-significant result for EPK vs. NEPK, and a significant difference between EPD vs. NEPD. With the Tukey adjustments including the interaction effect of plastic concern set to its mean value of 5.33, the variable 'condition' exhibited five significant differences in estimated marginal means. Cohen's *d*s were calculated for the eight comparisons (**Table 12**). Effect sizes are large between the EPK and NEPK items, with EPK items receiving higher rated package sustainability ratings.

In summary, environmental concern did not significantly influence the effect of packaging type and product type on ratings of a package's sustainability. Overall, these results mirror those when plastic concern is included as the covariate, in that sustainably packaged items were, on average, accurately perceived as such. This effect was more pronounced when the frozen dessert product was excluded from the analysis.

IV.4. Product Evaluations

This section tested *H4a: "Sustainable packaging increases the perceived sustainability of the product itself."*

The perceived rating of a product's sustainability was obtained (**Figure 21**, **Figure 22**, and **Table 16**). The average perceived sustainability of the product was assessed on a scale of one ("*Very environmentally harmful*") to seven ("*Very environmentally beneficial*"), with four as neutral ("*Neither harmful nor beneficial*"). The average rating of a product's sustainability, even when including the misperceived frozen dessert item, for the sustainable product (EPD) was 4.3 out of 7 (*SD* = 1.4), and for the conventional product (NEPD) was 3.7 (*SD* = 1.3) (**Table 16**). When the frozen dessert was excluded, the gap between these values increased (EPD, *M* = 4.5, *SD* = 1.5; NEPD, *M* = 3.6, *SD* = 1.4). When comparing the product sustainability ratings between different packaging exposures, EPK's product ratings were moderately higher (all three products, *M* = 4.2, *SD* = 1.3; excluding the frozen dessert, *M* = 4.5, *SD* = 1.5) than NEPK's product ratings (all three products, *M* = 3.9, *SD* = 1.4; excluding the frozen dessert, *M* = 3.8, *SD* = 1.5). The difference was supported by small effect sizes (all three products, Cohen's *d* = 0.24, 95% CI = -0.01, 0.48; excluding the frozen dessert, Cohen's *d* = 0.41, 95% CI = 0.15, 0.67).

IV.4.a. Plastic Concern and Product Evaluations

Data including the frozen dessert were analyzed first, with a linear regression model that included the main effects of the condition type and average plastic concern and the interaction term between these two variables. The results were significant (adjusted R^2 = .09, $F(7, 334) = 6.05$, and $p < .001$). None of the individual coefficients were significant. The packaging dimension (EPK vs. NEPK) was

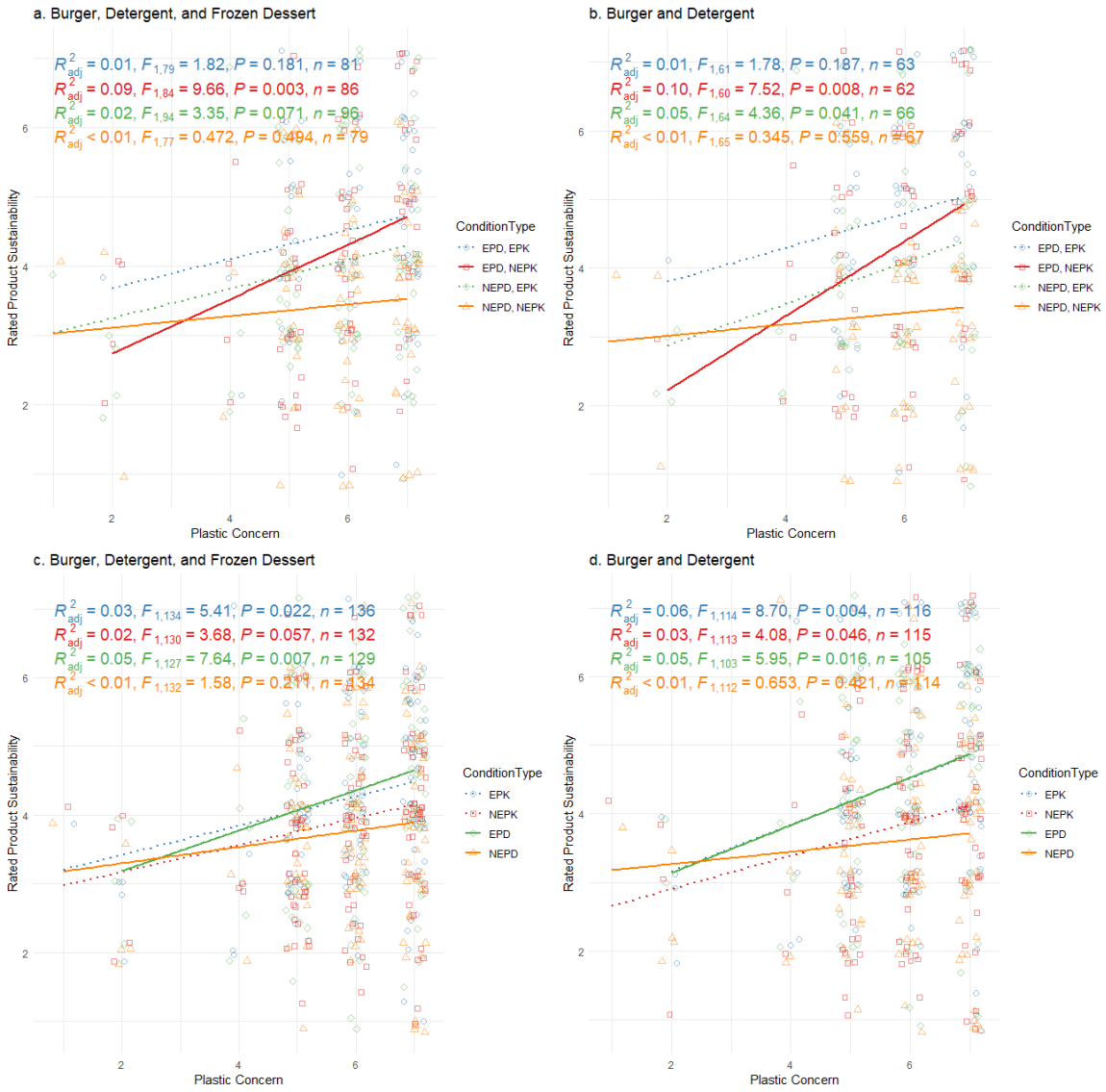
analyzed with another model, and the results were significant (adjusted R^2 = .04, $F(3, 264) = 4.30$, and p = .006). The coefficient of plastic concern was significant (β = 0.21, p = .02), while the condition type and the interaction term between plastic concern and the package type were not. A third model tested the product dimension of EPD vs. NEPD and yielded significant results (adjusted R^2 = .07, $F(3, 259) = 7.30$, and $p < .001$). The coefficient of plastic concern was significant (β = 0.29, p = .004), while like above, condition type (EPD vs. NEPD) and its interaction term with plastic concern were not significant.

Next, data excluding the frozen dessert were analyzed. A linear regression model included the main effects of the condition type and plastic concern, and the interaction term between these two variables. The results were significant (adjusted R^2 = .14, $F(7, 250) = 13.97$, and $p < .001$), and none of the individual coefficients were significant. When analyzing just the packaging dimension (EPK vs. NEPK), the results were also significant (adjusted R^2 = .08, $F(3, 227) = 7.67$, and $p < .001$). The coefficient of plastic concern was significant (β = 0.34, p = .004), while the condition type as a main effect and its interaction term with plastic concern showed no significant results. A third model tested the product dimension of EPD vs. NEPD, and the results were not significant (adjusted R^2 = .10, $F(3, 215) = 8.94$, and $p < .001$). The coefficient of plastic concern was significant (β = 0.34, p = .01), and the product type and its interaction term with plastic concern were not significant.

A scatterplot (**Figure 9**) shows the relation between the rated product sustainability and plastic concern between the data with and without the frozen dessert product.

Figure 9

Linear model of Plastic Concern (x) and Rated Product Sustainability (y), Sorted by Condition



Note: Data from the frozen dessert are included in the lefthand models (a and c) while excluded from the righthand models (b and d).

Tukey contrasts were used to analyze the data set that included the frozen dessert. Tukey's multiple comparisons of means showed no significant differences. With the Tukey adjustments that included the interaction effect of plastic concern set to its mean value of 5.85, there were multiple significant pairwise comparisons (**Table 17**). Comparing the packaging dimension of EPK vs. NEPK,

Tukey's multiple comparisons of means were not significant, and when including the interaction effect of plastic concern at its mean value of 5.85, the results were moderately significant (p = .052). The product dimension, EPD vs. NEPD, was not significantly different during Tukey's multiple comparisons of means. In contrast, the pairwise comparison of estimated marginal means from Tukey contrasts were significant when plastic concern was set to its mean value of 5.87. Cohen's *d*s showed small to large differences in effect sizes between conventional (NEPD) and sustainable (EPD) products, and EPD items received higher ratings of perceived product sustainability (**Table 18**). Small effect sizes were present between EPK and NEPK items, indicating an increased perceived product sustainability associated with sustainably packaged items (EPK).

Data excluding the frozen dessert were analyzed (**Table 19**). Tukey's multiple comparisons of means showed no significant differences in any of the four primary condition types (EPD-EPK, EPD-NEPK, NEPD-EPK, and NEPD-NEPK), no significant differences along just the EPK vs. NEPK package domains, and showed no significant differences when comparing just the product dimensions (EPD vs. NEPD). With the Tukey adjustments that included the interaction effect of plastic concern set to its mean value of 5.85, there were multiple significant pairwise comparisons. Comparing just the packaging dimension of EPK vs. NEPK, including the interaction effect of plastic concern at its mean value of 5.88, the difference between EPK and NEPK was significant. The product dimension, EPD vs. NEPD, with plastic concern set at the mean value of 5.87, had significantly different pairwise comparisons of the estimated marginal means. Cohen's *d*s ranged from small to large in effect sizes between conventional (NEPD) and sustainable (EPD) products, and EPD items received higher ratings of perceived product sustainability (**Table 18**). Small effect sizes were present between EPK and NEPK items, indicating an increased perceived product sustainability associated with sustainably packaged items (EPK). The effect size of EPK vs. NEPK was twice as large when the frozen dessert was removed (for EPK vs. NEPK, with all three products included, d = 0.24; with the frozen dessert excluded, d = 0.41).

In summary, the influence of plastic concern remained low, although plastic concern was generally positively correlated with slightly higher ratings of perceived product sustainability. Participants accurately perceived sustainably produced (EPD) items as such, and these EPD items received significantly higher ratings for the products' perceived sustainability. This effect was strongest when the frozen dessert was removed from the analysis. Sustainably packaged (EPK) items also received significantly higher ratings for the product's sustainability, with small Cohen's *d* effect sizes, indicating that sustainably packaged items are perceived as more sustainably produced.

IV.4.b. Environmental Concern and Product Evaluations

Data including the frozen dessert were analyzed first. From a linear regression model that included the main effects of both the condition type and average environmental concern, as well as the interaction term between these two variables, results were significant (adjusted R^2 = .07, $F(7, 334)$ = 4.44, and $p < .001$). None of the individual coefficients were significant. When just the packaging dimension was analyzed, the results were significant (adjusted R^2 = .02, $F(3, 264)$ = 2.74, and p = .04). Neither of the coefficients of environmental concern and package type nor their interaction effect were significant. A third model tested just the product dimension of EPD and NEPD, and the results were significant (adjusted R^2 = .06, $F(3, 259)$ = 6.41, and $p < .001$). The coefficient of environmental concern was significant (β = 0.28, p = .008), while product type (EPD vs. NEPD) and its interaction term with environmental concern were not significant.

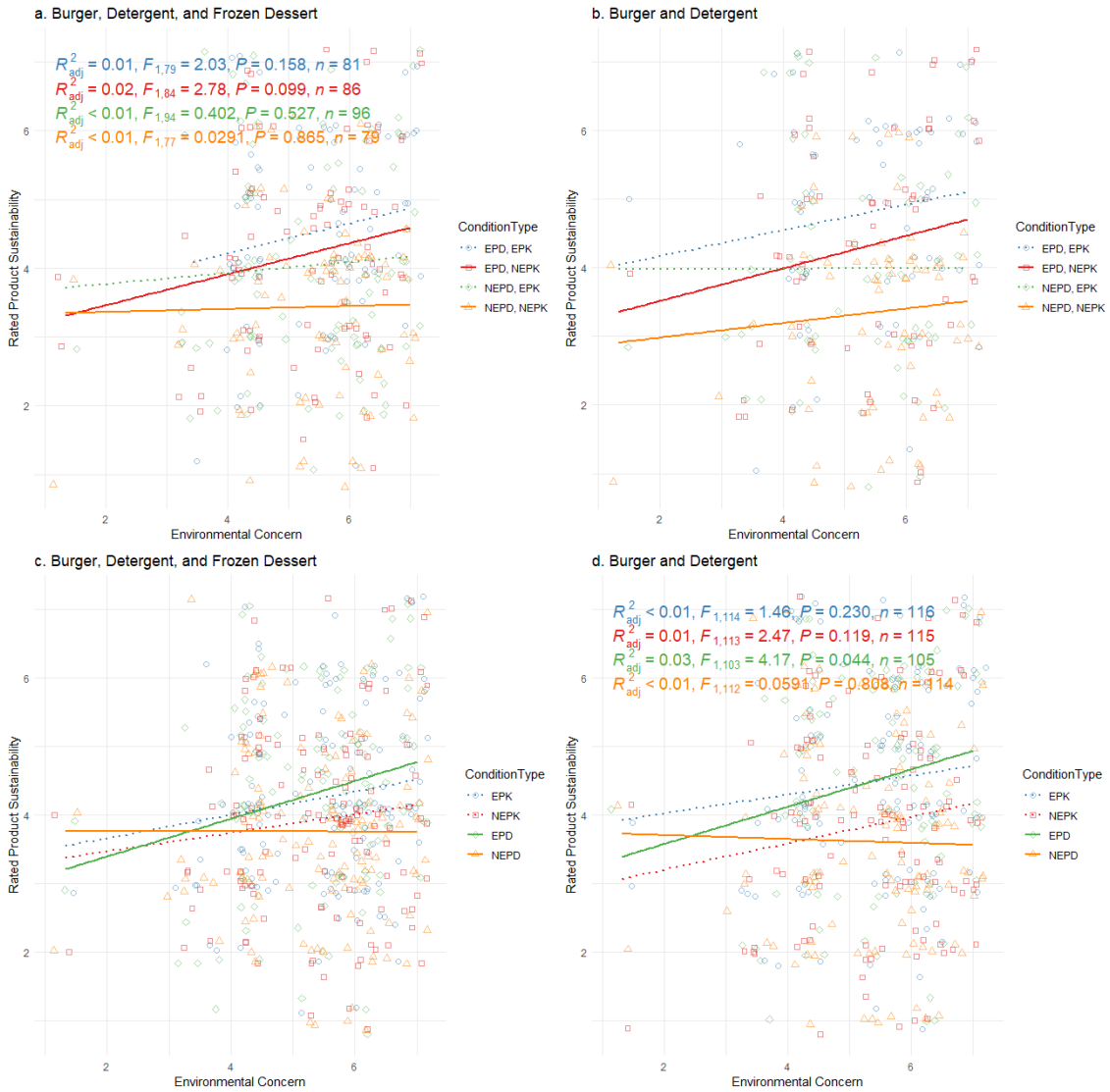
Next, data excluding the frozen dessert were analyzed. A linear regression model included the main effects of both the condition type and environmental concern, as well as the interaction term between these two variables, and the results were significant (adjusted R^2 = .10, $F(7, 250)$ = 5.04, and $p < .001$). None of the individual coefficients were significant. When analyzing just the packaging dimension,

the results were significant (adjusted R^2 = .05, $F(3, 227) = 4.68$, and p = .003). Neither of the coefficients of environmental concern or package type nor their interaction term were significant. A third model tested the product dimension of EPD vs. NEPD, and the results were not significant (adjusted R^2 = .09, $F(3, 215) = 8.06$, and $p < .001$). The coefficient of environmental concern was significant ($\beta = 0.27$, p = .04), and product type and its interaction term with environmental concern were not significant.

A scatterplot (**Figure 10**) shows the relation between the rated product sustainability and environmental concern between the data with and without the frozen dessert product.

Figure 10

Linear model of Environmental Concern (x) and Rated Product Sustainability (y), Sorted by Condition



Note: Data from the frozen dessert are included in the lefthand models (a and c) while excluded from the righthand models (b and d).

Data including the frozen dessert were analyzed (**Table 20**). For the four main condition types, Tukey's multiple comparisons of means showed no significant differences. With the Tukey adjustments that included the interaction effect of environmental concern set to its mean value of 5.37, there were multiple significant pairwise comparisons. The difference between the product sustainability ratings of sustainably packaged conventional products (NEPD-EPK) and conventionally packaged conventional

products (NEPD-NEPK) was significant (p = .026). Tukey's multiple comparisons of means were insignificant when comparing just the packaging dimension of EPK vs. NEPK. However, when including the interaction effect of environmental concern at its mean value of 5.4, the difference between EPK vs. NEPK was significant. Along the product dimension, Tukey's multiple comparisons of means showed no significant difference between EPD vs. NEPD. However, as with the packaging dimension, with environmental concern set to its mean value of 5.38, the product dimension had a significant difference in its estimated marginal means.

Data excluding the frozen dessert were analyzed (**Table 21**). Tukey's multiple comparisons of means showed no significant differences in any category regarding the four main condition types, just the package dimension (EPK vs. NEPK), and just the product dimension (EPD vs. NEPD). With the Tukey adjustments that included the interaction effect of environmental concern set to its mean value of 5.33, there were multiple significant pairwise comparisons. The difference between the product sustainability ratings of sustainably packaged conventional products (NEPD-EPK) and conventionally packaged conventional products (NEPD-NEPK) approached significance (p = .069). Comparing just the packaging dimension of EPK and NEPK, including the interaction effect of environmental concern at its mean value of 5.35, the difference between EPK and NEPK was significant. When testing the product dimension, EPD vs. NEPD, with environmental concern set to its mean value of 5.38, there were significant differences in the pairwise comparisons of their estimated marginal means.

In summary, the influence of environmental concern remained low, although environmental concern was generally positively correlated with slightly higher ratings of perceived product sustainability. Participants accurately perceived sustainably produced items as such and received significantly higher ratings for the product's perceived sustainability. This effect was strongest when the frozen dessert was removed from the analysis. Sustainable packaging significantly increased the perception of a product's sustainability.

IV.5. Thematic Analysis of Product Advertisements

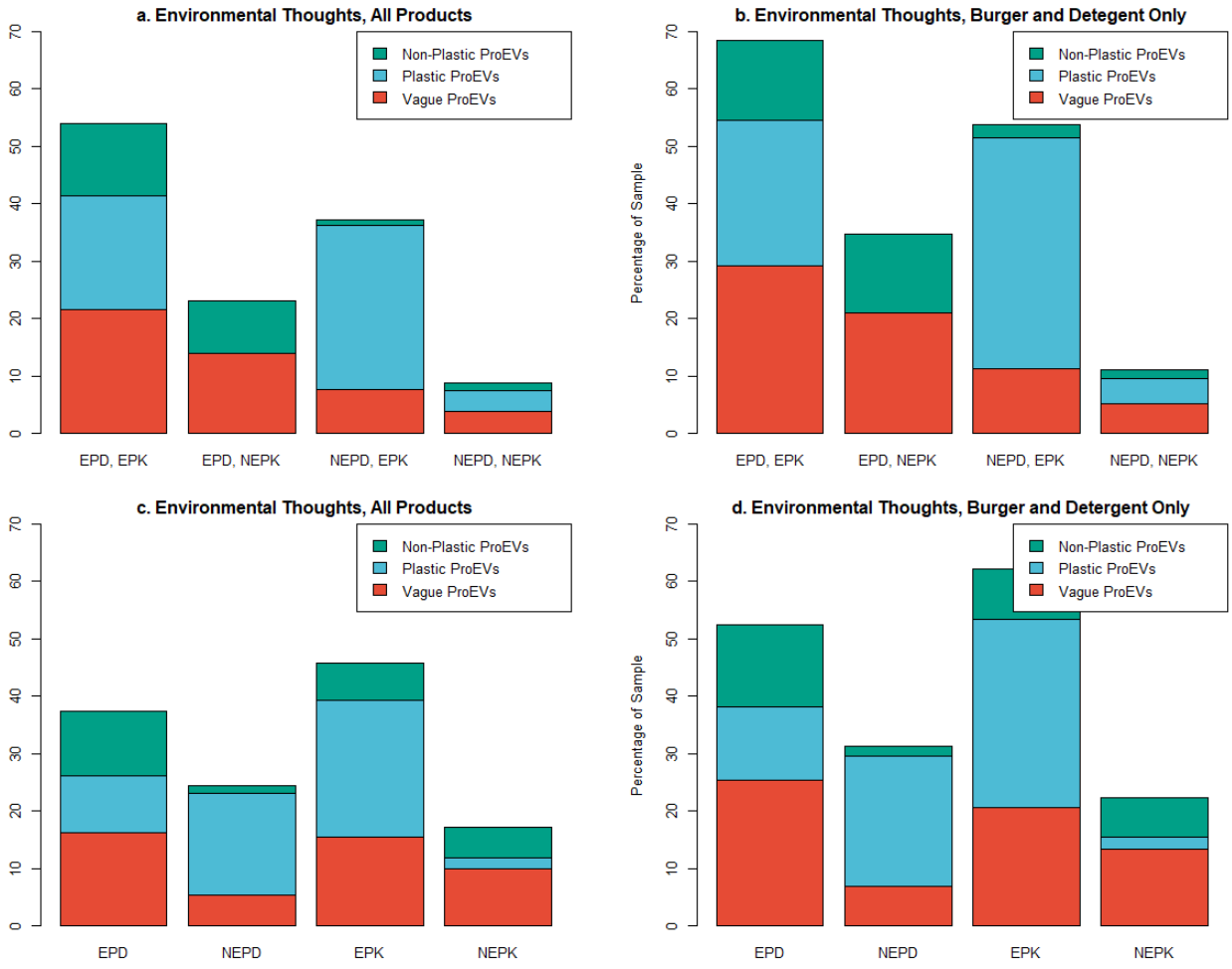
This section performs a content analysis and a sentiment analysis on the open-ended responses from participants during the product advertisements to help answer the second overarching research question: "*What are the implications of sustainable packaging on the environmental conscientiousness of consumer habits?*" Participants viewed a product ad and responded to the question, "*Please explain what this product makes you think about.*" The different types of environmental comments and their positive and negative emotional sentiments were analyzed.

IV.5.a. Content Analysis

This section tested *H4b: "Consumers express fewer environmental comments for sustainably packaged items compared to conventionally packaged items,"* and *H5b: "Exposure to sustainable packaging will increase the amount of plastic-focused concerns, and decrease the amount of non-plastic-based concerns consumers have about shopping*." Content analysis was performed (**Figure 11**).

Figure 11

Environmental Comments from Open-Ended Responses During Advertisement Exposure



Note: Proportion of environmental comments raised by participants in the open-ended response section of each product advertisement within the A/B test stimuli. The top charts show the proportion of comments for each condition participants viewed, and the bottom charts show the disaggregated domains. On the left-hand side are data for the burger, detergent, and frozen dessert, and on the right-hand side are just data from the burger and frozen dessert.

Environmental comments increased with sustainable versions (**Table 22**). When including the frozen dessert, the sum of environmental comments provided by participants ranged from 9% with NEPD-NEPK items, 23% with EPD-NEPK items, 37% with NEPD-EPK items, and 54% with EPD-EPK items. When excluding the frozen dessert, the proportion of participants who gave any environmental comment increased. These comments ranged from 11% for NEPD-NEPK items, 35% for NEPD-EPK items,

54% for NEPD-EPK items, and 68% for EPD-EPK items. In summary, both the sustainable packaging and the sustainable products showed a statistically significant increase in the overall environmental comments they received compared to their conventional counterparts (**Table 23** and **Table 24**). This result held when including and excluding the frozen dessert.

Environmental (EV) comments were coded as 'vague,' 'plastic-based,' and 'non-plastic-based. The non-plastic-based EV comments were coded for their themes. In total, there were *n* = 29 other environmental initiatives provided. These were avoiding animal products (*n* = 12), being concerned about the sourcing of ingredients (*n* = 8), avoiding the use of chemicals (*n* = 5), and consuming organic foods (*n* = 4). ANOVAs with post-hoc Tukey HSDs were performed on the different types of comments (**Table 23**, **Table 24**, **Table 25**, **Table 26**).

Sustainable products received significantly more vague EV comments than conventional products (with frozen dessert, diff = 0.11, *p* adj < .001, Cohen's *d* = 0.45; without frozen dessert, diff = 0.19, *p* adj < .001, Cohen's *d* = 0.60). In contrast, sustainable packaging did not receive significantly more vague EV comments than conventional packaging (with frozen dessert, diff = 0.06, *p* adj = .12, Cohen's *d* = 0.19; without frozen dessert, diff = 0.07, *p* adj = .11, Cohen's *d* = 0.21). Sustainable products received significantly fewer plastic-based EV comments than conventional products (with frozen dessert, diff = -0.08, *p* adj = .03, Cohen's *d* = -0.27; without frozen dessert, diff = -0.10, *p* adj = .03, Cohen's *d* = -0.29), while, in contrast, sustainable packaging received significantly more plastic-based EV comments than conventional packaging (with frozen dessert, diff = 0.23, *p* adj < .001, Cohen's *d* = 0.81; without frozen dessert, diff = 0.31, *p* adj < .001, Cohen's *d* = 0.95). Finally, sustainable products received significantly more non-plastic EV comments than conventional products (with frozen dessert, diff = 0.10, *p* adj < .001, Cohen's *d* = 0.48; without frozen dessert, diff = 0.12, *p* adj < .001, Cohen's *d* = 0.52), while sustainable packaging did not receive significantly more non-plastic EV comments than conventional packaging (with

frozen dessert, diff = 0.01, *p* adj = .61 0.06, Cohen's *d* =; without frozen dessert, diff = 0.02, *p* adj = .55, Cohen's *d* = 0.08).

These results suggest that sustainable products increased the broad- and non-plastic-based environmental comments and decreased the number of plastic-specific environmental comments compared to conventional products. In contrast, sustainable packaging did not affect the broad- and non-plastic-based environmental comments, while it significantly increased the plastic-based environmental comments compared to conventional packaging.

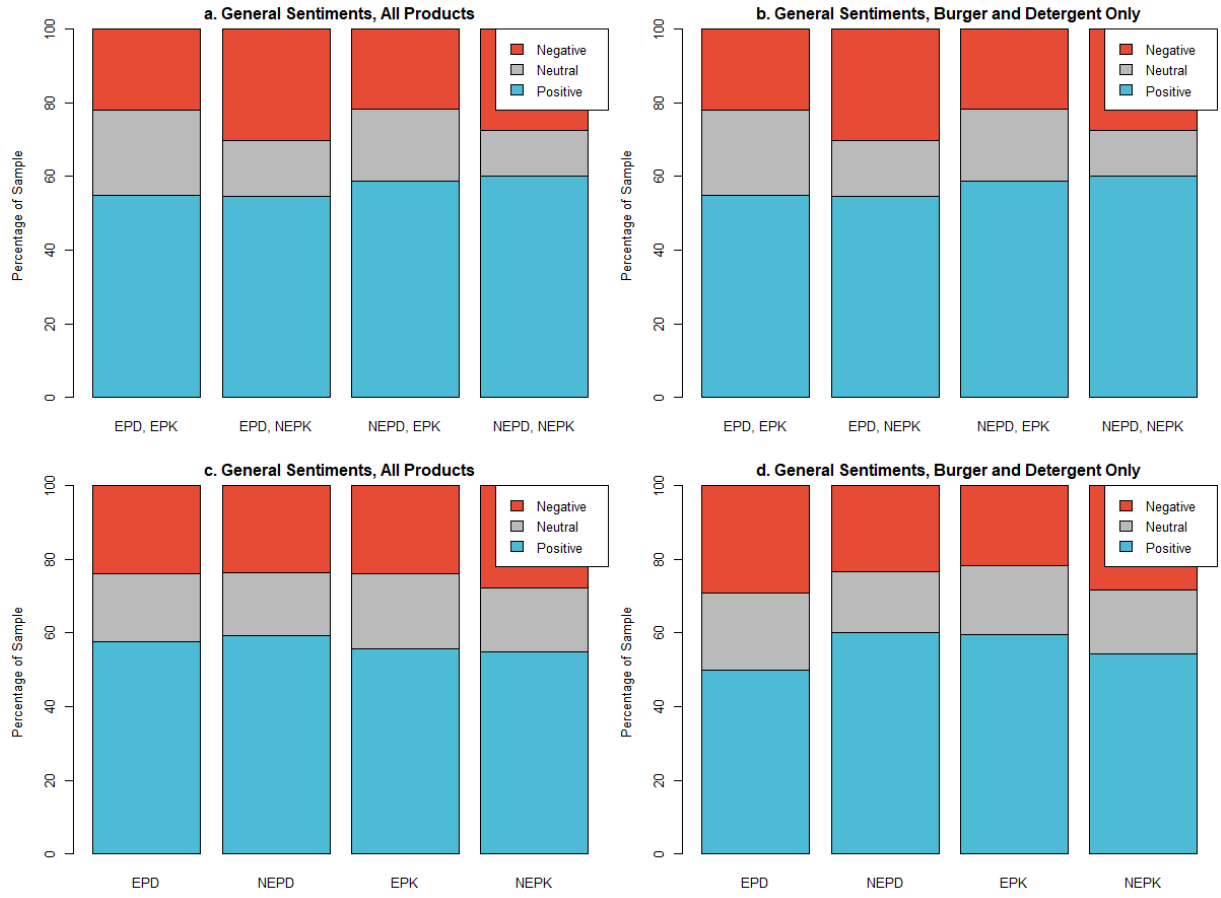
IV.5.b. Sentiment Analysis

This section tested *H4c*, that *"consumers express more positive environmental sentiments for sustainably packaged items compared to conventionally packaged items."* Two sentiment analyses were performed on the responses to the product advertisements. The first analysis assessed the general emotional expressions indifferent to environmental topics, and the second analysis assessed the emotional expressions specific to environmental comments.

From the generalized sentiment analysis, the majority of responses are positive for all products and conditions (**Figure 12** and **Table 27**). None of the positive, neutral, or negative comments differed significantly between the conditions (**Table 28** and **Table 29**).

Figure 12

Non-Environmentally-Related Emotional Responses

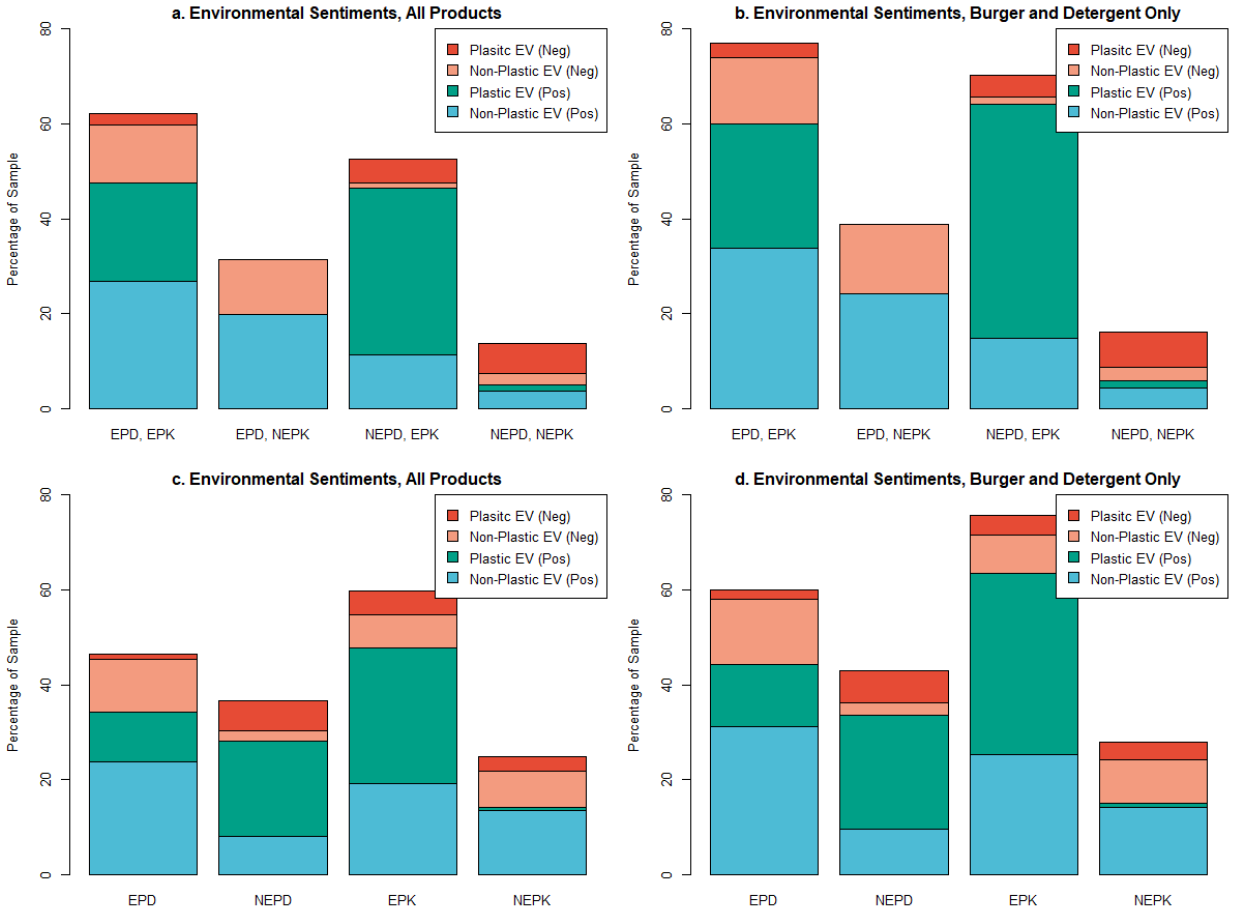


Note: Affective responses (positive, neutral, and negative) from participants' open-ended submissions within the A-B test, separated by version. The responses are general and non-environmentally related.

The second sentiment analysis focused only on environmental-related comments and was coded to distinguish positive and negative sentiments within plastic-focused comments and all other non-plastic environmental (EV) comments (**Figure 13** and **Table 30**).

Figure 13

Positive and Negative Environmental Sentiments from Open-Ended Responses During Advertisement Exposure



Note: Emotional responses (positive and negative) from participants' open-ended submissions within the A-B test, separated by version and data sets. The four main conditions are on the top (a and b), and each disaggregated condition is on the bottom (c and d). The left column (a and c) are data including frozen dessert), and the right column (b and d) are data excluding the frozen dessert.

ANOVAs with post-hoc Tukey HSDs were performed (**Table 31** and **Table 32**), along with Cohen's *d*s to corroborate the results (**Table 33** and **Table 34**). Sustainable products received significantly more positive non-plastic EV comments than conventional products (EPD vs. NEPD: with frozen dessert, diff = 0.16, *p* adj < .001, Cohen's *d* = 0.46; without frozen dessert, diff = 0.22, *p* adj < .001, Cohen's *d* = 0.58).

Similarly, sustainable packaging received significantly more positive non-plastic EV comments, but only when excluding the frozen dessert (EPK vs. NEPK: with frozen dessert, diff = 0.06, *p* adj < .19, Cohen's *d* = 0.16; without frozen dessert, diff = 0.11, *p* adj < .03, Cohen's *d* = 0.28). Sustainable products received significantly more negative non-plastic EV comments than conventional products (EPD vs. NEPD: with frozen dessert, diff = 0.09, *p* adj < .002, Cohen's *d* = 0.38; without frozen dessert, diff = 0.11, *p* adj < .002, Cohen's *d* = 0.42), while sustainable packaging received the same amount of negative non-plastic EV comments as conventional packaging (EPK vs. NEPK: with frozen dessert, diff = 0.01, *p* adj < .83, Cohen's *d* = -0.03; without frozen dessert, diff = -0.01, *p* adj < .76, Cohen's *d* = -0.04). While non-significant, sustainable packaging received one fewer negative non-plastic EV comments than conventional packaging.

Sustainable products received significantly fewer positive plastic-specific comments (EPD vs. NEPD: with frozen dessert, diff = -0.10, *p* adj < .02, Cohen's *d* = -0.29; without frozen dessert, diff = -0.10, *p* adj < .002, Cohen's *d* = -0.29). In contrast, sustainable packaging received significantly more positive plastic-specific comments compared to conventional packaging (EPK vs. NEPK: with frozen dessert, diff = 0.28, *p* adj < .001, Cohen's *d* = 0.92; without frozen dessert, diff = 0.37, *p* adj < .001, Cohen's *d* = 1.08). Finally, sustainable products received significantly fewer negative plastic-specific comments compared to conventional products, but this effect was only marginally significant when the frozen dessert was removed (EPD vs. NEPD: with frozen dessert, diff = -0.05, *p* adj < .02, Cohen's *d* = -0.29; without frozen dessert, diff = -0.05, *p* adj < .07, Cohen's *d* = -0.24). Sustainable packaging did not receive a significantly different amount of negative plastic-specific comments compared to conventional packaging (EPK vs. NEPK: with frozen dessert, diff = 0.02, *p* adj < .38, Cohen's *d* = 0.11; without frozen dessert, diff = 0.003, *p* adj < .90, Cohen's *d* = 0.02).

These results show that both types of sustainable items (packaging and products) elicited more positive non-plastic comments. However, only sustainable products prompted more negative non-

plastic comments. While sustainable products elicited fewer negative plastic comments compared to conventional products, proportionally, the sustainable products elicited more negative comments overall. In contrast, sustainable packaging showed no change in the amount of broad- and plastic-based negative EV comments. These results suggest that while sustainable items increased the overall amount of positive environmental comments, sustainable packaging did not increase negative environmental comments. In contrast, sustainable products increased the number of negative environmental comments.

In addition to the above, the sentiment analysis explored how participants perceived the truthfulness of each item's sustainability claims to assess participants' concern for 'greenwashing' (Kassinis & Panayiotou, 2018) (**Table 35**). The study received *n* = 468 total responses. There were *n* = 35 negative environmental comments; of these, *n* = 19 referred to some form of disingenuousness or skepticism about the sustainability claims of the product or packaging. There was only one explicit mention of 'greenwashing' (stated when viewing the EPD-EPK detergent). All but one of these comments were directed towards the detergent product. Of the *n* = 19 skeptical comments, *n* = 13 (67%) were related to the product dimension. For example, one participant responded to the EPD-NEPK detergent: "*This makes me think about eco friendly products. I wonder how detergent can be plant based and that makes me feel like the claim isn't true. There are several claims in this label and I am not sure what to believe. How is it plant powered? What does that mean??*" The product states "Plant-Power formula" in the advertisement (see **Survey**). There were *n* = 4 participants (21%) who were skeptical of the packaging, and *n* = 2 (11%) who expressed skepticism at both the packaging and the product.

An exact binomial test was used to assess this difference. For the purposes of the test, the *n* = 2 submissions that were skeptical of both the product and the packaging were converted to represent *n* = 4 submissions, with *n* = 2 skeptical of the product and *n* = 2 skeptical of the packaging. The results suggest a moderately significant increase in skepticism of the product rather than the packaging (15 out

of 21 participants were skeptical of the product versus the packaging, expected difference = 0.5, 95% CI = 0.48 and 0.89, p = .08).

Overall, only 4% of the responses raised concerns about 'greenwashing.' When participants did mention greenwashing, the product dimension received more criticism of greenwashing than the packaging dimension, although this difference is not statistically significant.

IV.6. Pro-Environmental Behaviours

This section tested *H5a*: "*Package-focused pro-environmental behaviours will be more common than product-focused pro-environmental behaviours," and H5b*: "*Exposure to sustainable packaging will increase the amount of plastic-focused concerns, and decrease the amount of non-plastic-based concerns consumers have about shopping*."

IV.6.a. Content Analysis of Hypothetical Shopping Scenario

To assess the correlation between plastic packaging and pro-environmental behaviours, participants reflected on the question, "*How do you feel about, and work through, the environmental impacts of your grocery shopping? What concerns and solutions come to mind?"* These data were coded for the environmental topics they discussed.

In total, *n* = 155 participants completed the open-ended shopping question, and 76% (*n* = 117) of participants provided a specific pro-environmental initiative or behaviour (**Table 36**). Half of all the participants who made pro-environmental comments (51%, *n* = 60, or 39% of the entire sample) listed only plastic pollution behaviours. Participants who made both a plastic and a non-plastic comment were less frequent (*n* = 40, 26% of the entire sample), and *n* = 17 participants listed only non-plastic pro-environmental behaviours. Of the entire sample, including those who listed no pro-environmental behaviour, 41% (*n* = 63) listed plastic packaging as the first pro-environmental behaviour or concern in the first sentence of their response.

In total, participants responded with n = 205 pro-environmental behaviours, averaging 1.3 per person (*SD* = 1.1) (**Table 37**). Plastic-specific pro-environmental behaviours comprised 65% of the

comments (n = 133), and all non-plastic-based environmental comments comprised the remaining 35% (*n* = 72).

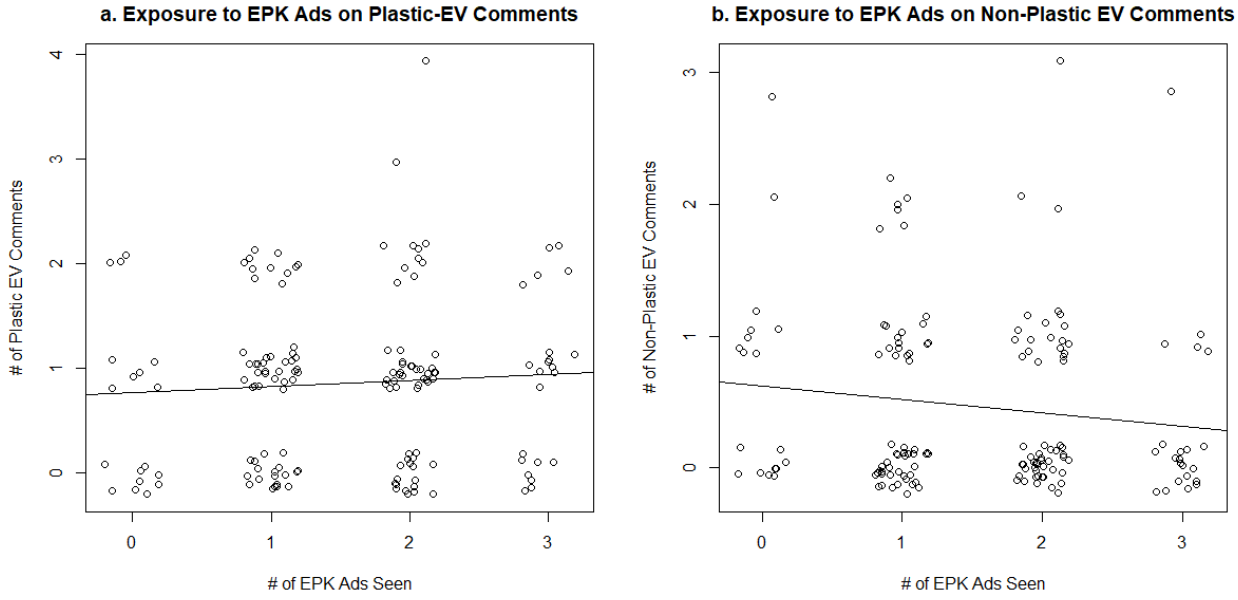
Coding the specific responses revealed eight categories of pro-environmental interventions participants thought of regarding their shopping. In decreasing order, these categories were: reducing plastic packaging (*n* = 133, 65%), shopping locally (*n* = 19, 9%), consuming fewer animal products (*n* = 15, 7%), changing food production methods (*n* = 15, 7%), reducing food waste (*n* = 10, 5%), reducing vehicle use when shopping (*n* = 9, 4%), consuming less overall (*n* = 3, 1%), and practicing civic engagement by lobbying (*n* = 1, 0.5%). In the category of plastic packaging, participants stated they try to use less plastic (*n* = 83, 40%), bring their own bags to the grocery store (*n* = 23, 1%), try to recycle more (*n* = 8, 4%), and wanted to have access to more reusable, paper-based, or recyclable packaging (*n* = 19, 9%). The category of food production method was comprised of participants who suggested purchasing non-GMO foods (*n* = 1, 0.5%), organic food (*n* = 8, 4%), fairtrade (*n* = 1, 0.5%), sustainably farmed items (*n* = 2, 1%), and fewer processed items (*n* = 3, 1%). Additionally, eight participants mentioned needing more systemic changes to the food system or felt the responsibility for change landed on the producers and retailers. For example, one participant wrote: "*We as consumers want to do the right thing for the environment, but big companies generally care about the profits, we are at their mercy*." However, none of these participants made direct reference to an actionable response. Only one participant mentioned civic action through direct government and corporate lobbying.

Plastic pro-environmental behaviours comprised the majority of participants' comments, whether based on the number of participants who suggested them or the number of pro-environmental behaviours listed. These results indicate that relative to other pro-environmental behaviours when shopping, plastic and packaging are the most salient and highest-priority concerns to most participants.

Pearson correlations were performed to test whether exposure to products with sustainable packaging correlated with the number of environmental comments made during the open-ended 'shopping' question (**Figure 14**). The number of non-plastic environmental comments did not significantly change, yet visually show a weak negative correlation ($r(153) = -.13$, $p = .11$. The number of plastic-based environmental comments did not significantly change, yet visually show a weak positive correlation ($r(153) = .07$, $p = .41$).

Figure 14

Pearson Correlation Tests Comparing Exposure to EPK Ads with Environmental Comments



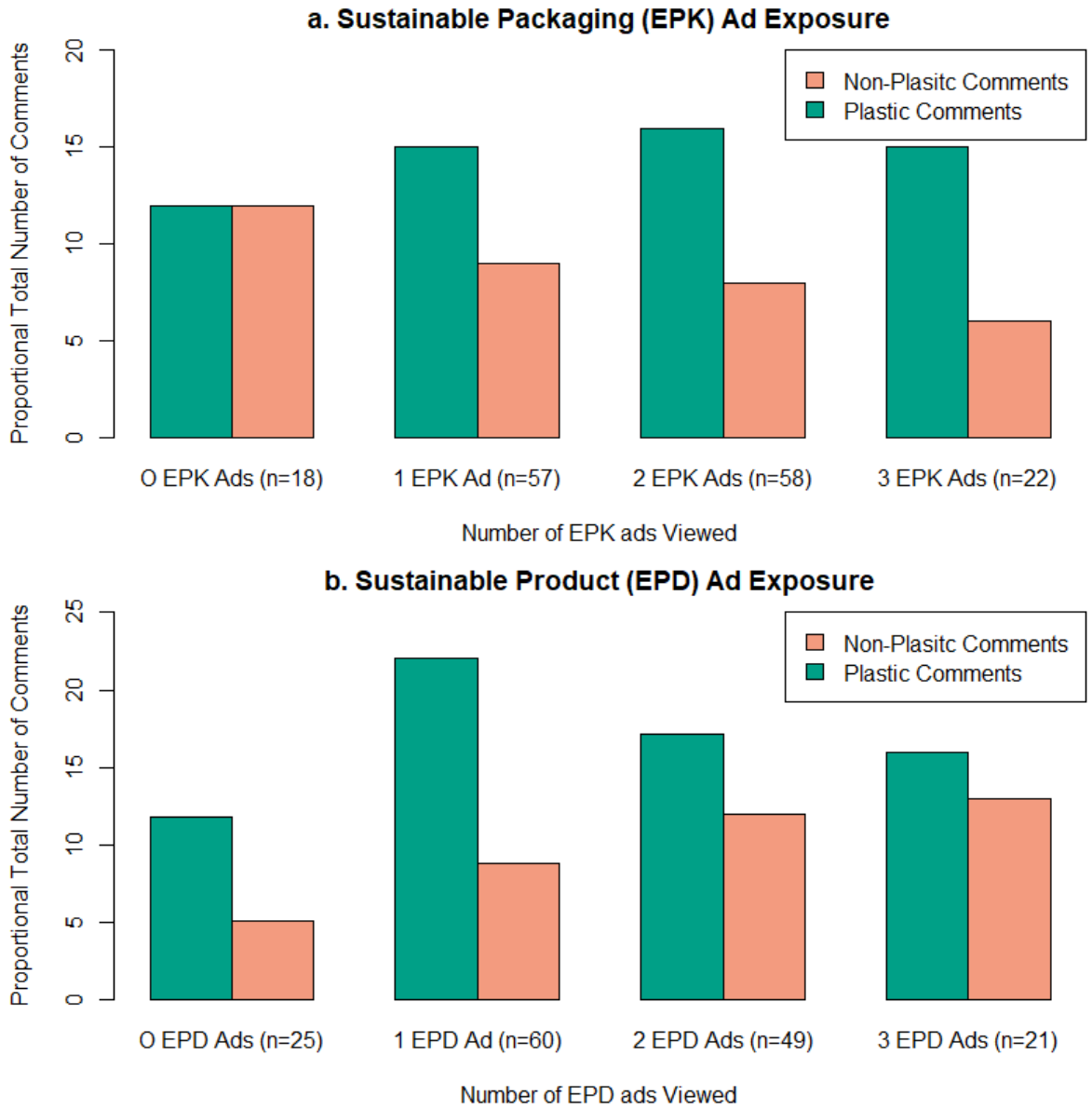
Note: Pearson correlation tests compare the number of EPK ads participants were exposed to against the number of environmental comments they made in the open-ended 'shopping' question.

In addition to the Pearson correlation tests above, graphs (**Figure 15**) display the proportion of comments that participants gave during the hypothetical shopping scenario, distinguished by the number of EPK ads they saw, and the number of EPD ads they saw. A visual trend is evident, with increasing 'plastic-focused' comments, and simultaneously decreasing 'non-plastic-focused' comments, associated with an increase in the number of EPK ads viewed. However, as the Pearson correlations

suggest, this result is not statistically significant. Because of the small sample sizes, and the lack of a control group – as all participants were simultaneously viewing some combination of the EPD products – firm conclusions cannot be drawn. This may indicate a phenomenon to investigate with future studies.

Figure 15

Type and Number of Environmental Comments Provided in Open-Ended Shopping Question, Based on Exposure Condition to EPK and EPD Advertisements



Note: To create representable and comparable values, the number of comments for each graph has been made proportionate to the smallest sample size. Therefore, for each case in the top graph (a.), the original number of comments was multiplied by 18/*n*. For the values in the bottom graph (b.), the original summed totals were multiplied by 21/*n*.

Additionally, Pearson correlations were performed to test the relationship between exposure to EPK advertisements and participants' rating of plastic concern and environmental concern. Plastic concern and environmental concern measures were used as dependent variables against exposure to sustainable packaging advertisements as the independent variable. In the survey, participants viewed zero to three ads with EPK items, and at the end of the survey, they rated their environmental and plastic concern. There was no correlation found between the number of EPK ads viewed and the participants' environmental concern ($r(153) = .06$, $p = .46$) and plastic concern ($r(153) = -.12$, $p = .14$).

IV.6.b. Hypothetical Coffee Scenario

The package-focus versus product-focus for participants' pro-environmental behaviours was assessed. Participants were asked to select their choice of cup, coffee beans, and creamer. In total, *n* = 127 participants answered "Yes" to the question of whether or not they drink coffee, and completed the hypothetical scenario. **Table 38** describes the different proportions of participants who chose the sustainable and conventional versions for each question.

The majority of respondents (*n* = 89, 70%) chose the purportedly sustainable options for the container – either a ceramic mug, a thermos, or a corn-starch compostable cup. Inversely, a majority (78%, *n* = 99) chose the conventionally produced coffee bean rather than the sustainably produced coffee bean, and 62% (*n* = 79) chose the conventional option of milk or cream rather than the sustainable option of non-dairy alternative or black coffee (38%, *n* = 48). This proportion of participants who chose the sustainable option of non-dairy milk is conservative because some participants selected this choice not for environmental or ethical reasons but stated that it was due to lactose intolerance.

Chi-squared tests with Yates' correction for continuity show a significant difference in the expected and observed results between the choice of container and the choice of coffee bean, and between the choice of container and the choice of coffee add-on (**Table 38**). These results suggest that while a majority of participants chose the package-based pro-environmental behaviour, significantly fewer chose the product-based pro-environmental behaviours.

V. Discussion

The first research objective was to investigate the following research question: *What is the relationship between sustainable packaging and purchase intent, package and product sustainability evaluations, and consumer pro-environmental behaviours*? After discussing the results of each section, I will address the overarching objective to consider: *What are the implications of sustainable packaging on the environmental conscientiousness of consumer habits*?

V.1. Environmental and Plastic Concern

The influence of environmental concern and plastic concern were assessed to answer H1, that "*higher levels of concern for plastic pollution and environmental harm will affect the results*." For all three variables of purchase intent, ratings of package sustainability, and ratings of product sustainability, the influence of environmental and plastic concern was marginal to insignificant.

For the variable of purchase intent, plastic concern was only a significant influence on the NEPD-NEPK item. The NEPD-NEPK conventional product with conventional packaging negatively correlated with plastic concern. All other data conditions trended with weak and non-significant positive correlations between purchase intent and plastic concern. The effect of these relations was more substantial when the frozen dessert product was removed from the analysis. Environmental concern showed even less of an influence on purchase intent. None of the product and packaging categories, including and excluding the frozen dessert, showed any significant relation between purchase intent and environmental concern.

For the variable of perceived package sustainability, there was generally no significant relation with plastic concern, nor with environmental concern. The only significant effect of plastic concern was

on the product domain, where the EPD category had a weak positive correlation of higher perceived package sustainability with higher levels of plastic concern, and the NEPD category had a weak negative correlation of lower perceived package sustainability with higher levels of plastic concern. Arguably, this may be explained by an increased sensitivity against non-sustainable products, wherein people with a heightened concern for plastic are more critical of conventional products and yet simultaneously more liberal in accepting sustainable products. That this phenomenon is present in the product dimension when looking at ratings of the packaging's sustainability is intriguing. The relation of rated package sustainability to environmental concern mirrors that of plastic concern, with a significant interaction of environmental concern only among the product (EPD vs. NEPD) dimension. The EPD item shows a slight positive correlation between perceived product sustainability and environmental concern, and the NEPD item shows no correlation between package sustainability ratings and levels of concern.

Finally, no substantial influence of plastic or environmental concern was seen for the variable of perceived product sustainability. The EPD-NEPK condition received the strongest positive correlation, while even so, the explanatory power is low (adj R^2 = .10, p = .008). The trends over all the categories are slightly sloped in a positive correlation between rated product sustainability and plastic concern, although this was neither robust nor significant. Overall, little significant variation is present between environmental concern and rated product sustainability. However, the product dimension shows a significant positive correlation for the sustainable product and no correlation for the conventional product.

A caveat for all these correlations is that while some are significant, they lack robust explanatory power, as their adjusted R^2-values are low. This may point to a limitation of the study in that the sample size was small, thus limiting the ability to fully explore the relations between each variable. As such, it is pre-emptive to definitively state if there are any significant influences from concern for plastic pollution or environmental concern, while the results suggest it is limited.

V.2. Purchase Intentions

The second hypothesis, *H2, stated that* "*conventional products with sustainable packaging will have a greater purchase intent than sustainable products with conventional packaging*." There are no statistically significant findings to support this hypothesis. However, although not statistically significant, the data display trends where sustainably packaged items receive more purchase intent than conventionally packaged items and sustainably produced items have an equal amount of purchase intent compared to conventional products. This result holds for the burger and detergent products, and small effect sizes support this interpretation (**Table 5**). The conventional product with sustainable packaging (NEPD-EPK) receives the highest purchase intent for all products, and this holds for all products except the frozen dessert, where the purchase intent for NEPD-EPK is second to the conventional product with conventional packaging (NEPD-NEPK).

The caveat is that the frozen dessert shows the inverse trend and has higher purchase intents towards the conventional product and packaging (NEPD and NEPK). Regarding the higher purchase intent for the NEPD version, the frozen dessert represents a 'vice' product (Magnier et al., 2016). As some of the participants disparaged coconut-made desserts while lauding traditional milk ice creams, participants may have had a lower willingness to sacrifice quality and taste for a more sustainable version without animal products. Additionally, the preference towards the conventionally packaged (NEPK) frozen dessert may be attributed to the misinterpretation of the NEPK version as being constructed from paper, while the metal container was not interpreted as 'reusable.' The frozen dessert was thoroughly misinterpreted in its packaging domain, which may have contributed to the inconsistent and inappropriate responses for purchase intent.

On average, purchase intents for all product conditions were above a 'neutral' ambivalence. Therefore, on average, all of the products – including the conventional product with conventional packaging – garnered a passing interest. The type of packaging made the most considerable difference in purchase intent, while the product's sustainability made comparatively little difference (**Table 4**). For both the sustainable and conventional products, the conventionally packaged versions (EPD-NEPK and NEPD-NEPK) received an average purchase intent just above neutral (*M* = 4.1, *SD* = 1.5). This result suggests that a product's sustainability ranks unimportant for consumers. In contrast, the sustainably packaged versions received higher purchase intents, *M* = 4.4 for EPD-NEPK (*SD* = 1.8) and *M* = 4.5 for NEPD-EPK (*SD* = 1.7). Consumers are interested in sustainable packaging, indifferent to whether the product itself is sustainable.

These increases in purchase intent provide a loose proxy to consider purchase behaviours (Frommeyer et al., 2022; Nekmahmud & Fekete-Farkas, 2020; Rausch & Kopplin, 2021; Wee et al., 2014). When translated into actual purchase behaviour, these results indicate that consumption of sustainably packaged items would increase. These results suggest that any increase in sustainable packaging would be uncoupled from an increase in purchasing sustainable products.

If consumers are interested in sustainable packaging but not sustainable products, then FMCG corporations only need to change their packaging to draw in customers. Furthermore, if all it takes is the simple presence of a paperboard appearance to convey sustainability and increase the perception of corporate responsibility (Magnier & Schoormans, 2017), corporations would not need to change any of their fundamental manufacturing practices to draw in consumers (Monbiot, 2018; Smith & Brisman, 2021). Given that packaging makes up only a fraction of a product's total footprint (Kan & Miller, 2022; Licciardello, 2017; Silvenius et al., 2014), impeding these shifts to the product's manufacturing methods implies that large environmental harms would continue unfettered.

V.3. Package Evaluations

H3 stated that "*conventional products with and without sustainable packaging will have the highest and lowest perceived package sustainability, respectively,*" and the results support this. Excluding the frozen dessert, sustainable packaging received significantly higher ratings of perceived package sustainability. While both product and packaging dimensions received significant differences, conventional products with sustainable packaging (NEPD-EPK) received the highest packaging sustainability ratings, and conventional products with conventional packaging (NEPD) received the lowest packaging sustainability ratings. This corroborates the results found by Magnier et al. (2016), who found that the perceived benefit of sustainable packaging is less significant when the product itself is already sustainable. Steenis et al. (2017) found that the perceived sustainability of packaging is increased when the product itself is sustainable. The results here provide no robust evidence of this, with only negligible effect size differences between EPD and NEPD items (**Table 12**).

These results suggest that conventional products that switch to sustainable packaging may be able to gain more perceived credibility as being environmentally conscientious through their packaging choice than products that are already sustainably produced.

V.4. Product Evaluations

Regarding product evaluations, *H4a* stated that "*sustainable packaging increases the perceived sustainability of the product itself*," and the results support this hypothesis. Excluding the frozen dessert, statistically significant differences were found between the rated product sustainability of the EPK and NEPK items. The frozen dessert shows almost no change in the median or mean values for the product

sustainability between EPK and NEPK versions, as the EPK version was viewed as being a less sustainable product than the NEPK version by 0.1 (EPK, *M* = 3.9, *SD* = 1.4; NEPK, *M* = 4, SD = 1.3).

Between the EPK and NEPK versions, there is an increased perceived product sustainability by 18% (excluding the frozen dessert, EPK, *M* = 4.5, *SD* = 1.5; NEPK, *M* = 3.8, *SD* = 1.5; Cohen's *d* = 0.41; estimated marginal means = 0.63, *p*-adj = .001). These results indicate that the products with sustainable packaging (EPK) were interpreted as more sustainable than the products with conventional packaging (NEPK). To assess the robustness of this claim, the survey carefully instructed the participants first to state the perceived footprint of the packaging for the item. Then, on a separate page of the survey, ensuring they could not go back to change their previous answer, participants were instructed to answer, "What do you think is the environmental footprint of these PRODUCTS, as separate from their packaging?" This ensured the participants were not conflating the package and product dimensions.

There is a positive correlation between sustainably packaged items and the perceived sustainability of the product itself, therefore supporting *H4a* and other studies (Magnier et al., 2016; Magnier & Schoormans, 2017). Participant comments confirm this conclusion. In response to the EPD-EPK burger, one participant wrote: "*The packaging also makes me think it's not meat, but plant-based*." A few participants shared similar sentiments, suggesting that these participants associate sustainable packaging with sustainable products. This implicit association that sustainable packaging goes with sustainable products may strengthen the bias of inflating the perceived sustainability of a product simply because of the presence of sustainable packaging.

The next hypothesis, *H4b*, stated that "*consumers express fewer environmental comments for sustainably packaged items compared to conventionally packaged items*," and the results do not support this. The sustainably packaged (EPK) versions received almost three times the overall environmental discussions compared to the conventionally packaged (NEPK) versions, twice as many non-plastic

comments, and twelve times more plastic comments. Statistical analyses support the significance of these differences. Sustainable products (EPD) also yielded more environmental discussions compared to conventional products (NEPD). This holds for all environmental comments and non-plastic-based comments, while plastic-based environmental comments are more frequent for the NEPD versions.

In contrast to the expected result of *H4b*, exposure to both sustainable packaging and sustainable products invokes more environmental discussions. However, not all these comments are of the same import. Viewing sustainable products increased the broad- and non-plastic-based environmental comments and decreased the number of plastic-specific comments compared to conventional products. In contrast, sustainable packaging elicited no effect on the broad- and non-plastic-based environmental comments and significantly increased the plastic-based environmental comments compared to conventional packaging. Overall, these results suggest that while sustainable packaging invoked more environmental discussions, these environmental discussions rarely transcended issues beyond plastic packaging.

The third hypothesis on product evaluations, *H4c*, stated that "*consumers express more positive environmental sentiments for sustainably packaged items than conventionally packaged item*s." The results support this. Both sustainable packaging and sustainable products elicited significantly more positive environmental comments than their conventional counterparts. While sustainable products also received significantly more negative environmental comments, sustainable packaging showed no change in the number of negative comments.

In the open-ended 'hypothetical shopping' content analysis (IV.6.a), some participants expressed feelings of sadness or guilt when they are exposed to plastic or contribute to plastic waste. For example, one participant wrote, "*I always bring my own bags because I feel guilty using plastic bags, and if i was in a rush and forgot them i end up putting my groceries in the car with no bags and then*

simply unloading them at home." Other comments are, "*I cry inside when I am forced to purchase plastic packaging. I get angry when I see so much plastic,*" "*It stresses me out how much useless packaging is used*," and "*Sometimes I feel a sense of dread when I'm at the grocery store. I look around and see so much waste, so much unnecessary plastic packaging."* This generalized, negative attitude towards plastic may bias individuals towards having very positive feelings when 'plastic-free' packaged options are available, and the results of the sentiment analysis support this conclusion.

The increase in positive emotions without a corresponding increase in negative emotions – as observed with sustainable products – suggests that sustainable packaging is liable to reduce guilt and enable consumers to subconsciously increase their consumption (Catlin & Wang, 2013; Duke & Amir, 2019; B. Ma et al., 2019; Sun & Trudel, 2017). Other studies show that emotionally positive comments toward a product are correlated with increased purchase intentions and purchasing behaviours (Koenig-Lewis et al., 2014; Magnier & Schoormans, 2015). In contrast, having emotionally negative feelings, such as guilt, is negatively correlated with consumption (Catlin & Wang, 2013; Duke & Amir, 2019; B. Ma et al., 2019; Sun & Trudel, 2017). This study showed that sustainable packaging only increased positive sentiments, unlike sustainable products that concomitantly increased positive and negative sentiments. These results suggest that sustainable packaging may reduce feelings of guilt and, therefore, increase overall consumption levels. The increased purchase intentions towards products with sustainable packaging corroborate this.

Furthermore, participants infrequently questioned the integrity of the environmental merits of the products. Only a minor proportion (n = 19, 4%) of the entire sample referenced a concern of 'greenwashing' on the product. When participants did, most of the comments were directed toward skepticism about the product's environmental claims rather than the environmental impacts of the packaging. One participant even expressed an interest in the product despite perceiving it as greenwashed. They wrote, "*I feel manipulated with the "plant - power" wording, but I lean towards*

buying it over tide or other products that have stronger dyes and fragrances" (written in response to viewing the EPD-EPK detergent).

Some participants displayed a conflation of package attributes to that of the company itself. As stated for the NEPD-EPK burger, a participant expressed that they believed the business was more environmentally responsible because of its use of paper packaging. "*Although this product is a hamburger, the package background colour scheme and text makes me think that this is a more 'good for you' product, especially since it seems like the company makes an effort to be green and tries to avoid plastic in their packaging*." Similarly, in reference to the EPD-EPK detergent, another participant wrote: "*The fact that the bottle is made out of 70% paper fibre makes me think the company cares for the environment*." Another participant expressed this for the NEPD-EPK burger, writing: "*It looks like it is made with natural ingredients and since it says zero plastic it probably was made with the environment in mind so there should be a very small carbon footprint buying this item*." These quotes corroborate other studies: sustainable packaging increases a company's perceived social and environmental responsibility (Magnier & Schoormans, 2017). These quotes are also emblematic of the "package focus" that could be exploited by corporations, as they suggest consumers will lack a robust interrogation of corporations' manufacturing processes (Gunderson, 2020; Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019a).

V.5. Pro-Environmental Behaviours

H5a stated that "*package-focused pro-environmental behaviours will be more common than product-focused pro-environmental behaviours*," and the results support this hypothesis. When asked about their choices for purchasing a cup of coffee, 70% of respondents (n = 89) chose the pro-environmental behaviour when it was related to a package-based domain (i.e., their choice of

'container'). However, only 22% (*n* = 28) and 38% (*n* = 48) chose the pro-environmental options when it related to a product-based domain (i.e., their choice of coffee beans and their choice of creamer addition). There was a statistically significant difference between the number of participants who chose the sustainable option only for the container type – along the 'packaging' domain – and those who did not select the sustainable options for the coffee bean and coffee addition – along the 'product' domain.

These results suggest that the willingness to engage in package-based pro-environmental initiatives is more common than product-based initiatives. This preference could prevail unless it becomes as simple and relatively undisruptive to change a person's own product-based consumption habits as it is with package-based consumption habits (Smith & Brisman, 2021; Stafford & Jones, 2019a). Package-based changes cause only marginal lifestyle disruptions, for example, shifting from a regular take-away cup to a cornstarch compostable cup. However, opting for animal-free milk substitutes requires accepting a different aesthetic quality and taste, which may be less popularly endorsed (Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019a).

When participants reflected on the environmental impacts of their grocery shopping, out of all the possible responses, 39% (*n* = 60) of participants focused solely on plastic-based impacts, with 26% (*n* = 40) listing both a plastic- and non-plastic-based pro-environmental suggestion, and only 11% (*n* = 17) providing only non-plastic-based comments. Of the number of pro-environmental initiatives participants gave, 65% (*n* = 133) were related to plastic packaging, while only 35% (*n* = 72) were about topics unrelated to plastic packaging. There were 11 non-plastic-based initiatives, each contributing 0.5%-9% of the total environmental initiatives.

To further analyze the importance of plastic packaging, 41% (*n* = 63) of participants listed plastic as the first issue in their first sentence (54% when only including the participants that provided pro-environmental suggestions). The open-ended shopping question was designed as a free list, where the

frequency of a mentioned topic and the order in which it is written signifies the relative importance and salience of the topic in the participants' minds (Chaves et al., 2019). Therefore, the prominence of plastic as the first issue listed in the first sentence of 41% of responses is suggestive that plastic holds a priority position in the participants' minds. Furthermore, one participant stated that they do not consider the impacts of their grocery shopping and implicitly listed 'packaging' as the only subject they would consider. They write, "*I wish I was more thoughtful when selecting the grocery items I purchase. I generally purchase an item regardless of how environmentally friendly its packaging is*."

These results suggest that plastic-based pro-environmental behaviours are likely to dominate, while non-plastic pro-environmental initiatives are sparse and infrequent. The focus on plastic-based pro-environmental actions should be tempered with the understanding that other pro-environmental actions can significantly reduce one's ecological footprint (Dubois et al., 2019; Ivanova et al., 2020; Miller, 2020). Considering the above, when asked about navigating the impacts of their grocery shopping, 65% (n = 133) of responses focused on eliminating plastic and packaging waste, whereas only 7% (*n* =15) discussed eating fewer animal products. In context, reducing one's meat consumption by only 30% represents a three-fold reduction potential in CO_2e emissions compared to reducing plastic packaging (Dubois et al., 2019).

To address the impacts of consumerism, a diversity of solutions is needed. Yet, these results suggest that within the consumer domain, at least concerning grocery shopping, the package focus is stronger than other pro-environmental initiatives. What these results allude to is the possibility that the field of pro-environmental initiatives is being constrained towards the limited and peripheral domain of packaging choices, in contrast to challenging consumerism outright (Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019a; Stanton et al., 2021).

Regarding *H5b*, "*exposure to sustainable packaging will increase the amount of plastic-focused concerns, and decrease the amount of non-plastic-based concerns consumers have about shopping*," the results are mixed. As discussed in Section IV.5.a, there was a significant increase in the amount of plastic-focused comments given to the sustainably packaged items compared to the conventionally packaged items, and there was no change in the amount of vague and non-plastic-based comments between these two groups. However, Section IV.6.a. shows there was no relationship between those exposure trials with sustainable packaging advertisements and the number of comments participants gave when prompted about the impacts of their shopping. Considering the small sample size and that the maximum exposure to sustainable packaging was three ads, further research is needed. Future studies could analyze this relation with more experimental trials to test if this influences participants' priority to plastic-based pro-environmental behaviours.

V.6. Defining Sustainability

Another result of this study is understanding how consumers define sustainability. This research recorded measures of how 'sustainable' participants perceived different items. Explicitly, each item received a ranking from one ("Very environmentally harmful") to seven ("very environmentally beneficial"), with four as a neutral stance ("Neither harmful nor beneficial"). Associating a sustainability rank with an explicit word also allows for an interrogation of how participants define sustainability.

The average perceived sustainability of the EPK items was above the 'neutral' mark (for all three products, $M = 4.6$, $SD = 1.4$; excluding the frozen dessert, $M = 5.2$, $SD = 1.5$), while the average score for the conventionally packaged version was below the 'neutral' mark (for all three products, $M = 3.6$, $SD = 1.3$; excluding the frozen dessert, $M = 3.3$, $SD = 1.4$) (**Table 10**).

Perception of the product's sustainability mirrored these results. The average perceived sustainability of the EPD items was also above the 'neutral' mark, even when including the misperceived frozen dessert item (for all three products, *M* = 4.3 out of 7, *SD* = 1.4; excluding the frozen dessert, *M* = 4.5, *SD* = 1.5). For the conventional product, the results were just below the neutral mark (for all three products, *M* = 3.7, *SD* = 1.5; excluding frozen dessert, *M* = 3.6, *SD* = 1.4) (**Table 16**).

These results imply that, while conventional packaging and products were perceived as somewhat harmful, participants viewed sustainable packaging and sustainable products as actively beneficial to the environment. All of these items harm the environment, only to different degrees (Boz et al., 2020; Herberz et al., 2020; Miller, 2020). More than just a pedantic difference in word choices, it is critical to analyze this subtle expression of how consumers evaluate the impacts of their consumption. Participants' interpretations that 'sustainable' items have a net-positive effect on the environment could decrease the feelings of guilt that regulate and limit excessive consumption, and it could also reduce the amount that consumers challenge corporations to be more sustainable (Catlin & Wang, 2013; Duke & Amir, 2019; Gunderson, 2020; B. Ma et al., 2019; Monbiot, 2018; Stafford & Jones, 2019a; Sun & Trudel, 2017).

V.7. *Implications*

The discussion thus far has been based on an analysis of consumer perceptions and their self-described behaviours. I have argued that sustainable packaging is central to consumers' environmental concerns and that exposure to sustainable packaging will likely increase consumers' positive feelings while reducing their negative feelings when shopping. Similar to the increase in consumption when recycling is available (Catlin & Wang, 2013; B. Ma et al., 2019; Sun & Trudel, 2017), I have argued that sustainable packaging may similarly cause an increase in consumption, particularly towards conventional

products with sustainable packaging. Additionally, I have argued that by dominating consumers' environmental focus, sustainable packaging enables consumers to become passive spectators and may limit the degree to which consumers challenge corporations to become more environmentally conscientious. I will now situate these results within a broader analysis of aggregated, global impacts on the economic system, corporate profiteering, and environmental harms. I will argue that corporations may co-opt sustainable packaging as a market strategy to serve their own corporate financial interests, and, therefore, I will argue that sustainable packaging may represent a new stage of greenwashing.

Corporations have learned to leverage public concern for the environment to accumulate capital (Gunderson, 2020; MacDonald, 2013). The promise of ecologically benign – if not ecologically beneficial – consumption "relies upon the capture and translation of the transformative oppositional potential offered by environmentalism" (MacDonald, 2013, p. 47). From recycling initiatives to the organics movement, what were once progressive and liberatory projects to benefit the environment have been subsumed and appropriated by corporate agendas (Ekers & Prudham, 2017; Gunderson, 2020; Guthman, 2008; Liboiron & Lepawsky, 2022; Mulvihill & Milan, 2007). These initiatives now serve little ecological benefit, if not undermining large-scale radical transformation of the market by instilling passive spectatorship among consumers (Choudhury et al., 2023; Gunderson, 2020; Guthman, 2004, 2008; Liboiron & Lepawsky, 2022; MacBride, 2019; Rogers, 2007; Smith & Brisman, 2021; Stafford & Jones, 2019a).

By appropriating 'green' discourses, corporations are homogenizing "ecological and economic epistemologies that not only privileg[e] the use of market devices in attaining environmental objectives but also actively redefines what those objectives should be" (MacDonald, 2013, p. 47). For example, consider how stores, cities, and even entire countries are beginning to phase out plastic grocery bags (Buchholz, 2021; Canada, 2022; UNEP, 2018). In doing so, there appears to be a narrowing focus. Many places substitute plastic for paper, forgetting that paper bags still have significant environmental costs

(Monbiot, 2018; Ritchie, 2018; Smith & Brisman, 2021). The domain of ecological contestation has gone from topics such as climate change, environmental destruction, and biodiversity loss to paper versus plastic shopping bags (Brock & Dunlap, 2018; Gunderson, 2020; Krupar, 2018; Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019a).

One prominent form of the corporate appropriation of environmentalism is termed 'greenwashing,' creating a false or misleading impression about the positive environmental performance of a product, type of packaging, or entity (de Freitas Netto et al., 2020; De Jong et al., 2020; Kassinis & Panayiotou, 2018). Corporations use multiple 'greenwashing' strategies to boost a product's perceived environmental friendliness (de Freitas Netto et al., 2020). A business may hide trade-offs about the product's impact, make grandiose claims without proof, and use misleading or vague claims. Additionally, products may carry labels with meaningless certifications, and give irrelevant or distracting claims that are comparatively unimportant. Finally, corporations may provide outright false claims about their environmental performance (de Freitas Netto et al., 2020).

By employing those 'greenwashing' tactics, corporations have attempted to draw in consumer support while limiting the amount of genuine transformational change required of the corporations (Alves, 2009, 2009; Gunderson, 2020; Kopnina, 2019). However, pushing against the adoption of ingenuine 'green' tactics from businesses, over the last decade, consumers have increased their skepticism towards the 'green' claims found on products (de Freitas Netto et al., 2020; De Jong et al., 2018, 2020). Businesses are now receiving mixed results from employing obvious and apparent 'greenwashing' tactics. Consumers who feel that a corporation is greenwashing their products are less inclined to purchase the item, and this can significantly decrease the perceived integrity of the brand (Chen et al., 2019; De Jong et al., 2018, 2020; C. Santos et al., 2023; Setiawan & Yosephani, 2022; Urbański & ul Haque, 2020). It, therefore, behooves corporations to adapt to new, subtle forms of greenwashing. These new forms must be 'genuine' enough in their appearance not to raise the suspicion

of consumers while still maintaining the original ideological and social foundations that enable consumerism and corporate profiteering (Gunderson, 2020; Kassinis & Panayiotou, 2018; C. Santos et al., 2023; Smith & Brisman, 2021). Across the economic sphere, critiques are arising about corporate social responsibility as well as the 'green' and 'circular economy' as emblematic of business-as-usual practices despite their intended transformative appearance (Alves, 2009; Brock & Dunlap, 2018; Friant et al., 2020; Furlow, 2010; Kassinis & Panayiotou, 2018; MacDonald, 2013).

I argue that sustainable packaging makes a perfect vehicle for a new wave of corporate greenwashing. The social salience of plastic pollution is high, and the issue of plastic waste is perceived as one of the most pressing global environmental threats alongside climate change, biodiversity loss, and water pollution (Dilkes-Hoffman et al., 2019; Eurobarometer, 2019; D. Kennedy et al., 2022; WWF International et al., 2020). In a seemingly revelatory manner, 'sustainable packaging' is entering the market as a solution to the problem of plastic pollution, and corporations stand to turn the environmental crisis of plastic pollution into an economic opportunity (Mulvihill & Milan, 2007; Smith & Brisman, 2021; Stafford & Jones, 2019a; Valenzuela & Böhm, 2017).

In entering the market, there is a potential for sustainable packaging to act as a mechanism that maintains environmental harms, promotes consumerism under the guise that it is environmentally benign, and 'greenwashes' or misleads the public into false impressions of a product's positive environmental performance (Boz et al., 2020; Gunderson, 2020; Kassinis & Panayiotou, 2018).

For multiple reasons, I argue that sustainable packaging embodies a new, subtle greenwash technique. The results of this study corroborate with other studies, suggesting that consumers have an interest in sustainable packaging, and this is indifferent to whether or not the product itself is sustainably produced (Magnier & Schoormans, 2015; Monnot et al., 2015; Nguyen et al., 2020; V. Santos et al., 2021). In corroboration with other studies, this study revealed that when a product has

sustainable packaging, the product itself is viewed as more sustainable (Magnier & Schoormans, 2017). Additionally, in this study and others, sustainable packaging is perceived more favourable when on conventional products compared to sustainable products (Magnier & Schoormans, 2017). Altogether, this may mislead consumers into false beliefs about a product's high environmental performance – especially if it is a conventional product – and this may simultaneously reduce the negative feelings associated with consuming the product, and this may limit how much consumers challenge corporations to changing their production processes.

In this study, exposure to sustainable packaging significantly increased the number of positive emotional expressions, and unlike with sustainable products, this increase in positive expressions occurred without any increase in negative expressions. From the open-ended shopping question, participants never reflected positively on plastic packaging, and some participants expressed very strong negative emotions associated with using plastic packaging while shopping. Participants used phrases like "I feel guilty using plastic bags," "I cry inside when I am forced to purchase plastic packaging," and "It stresses me out how much useless packaging is used." This suggests that the absence of plastic packaging would reduce these negative emotions. Increased positive emotion and fewer negative feelings of guilt are correlated with overall heightened rates of consumption (Catlin & Wang, 2013; Koenig-Lewis et al., 2014; B. Ma et al., 2019; Magnier & Schoormans, 2015; Sun & Trudel, 2017; Winterich, Reczek, & Makov, 2023).

From this study, consumers focused their discussion primarily on the environmental impacts of plastic packaging, with comparatively little attention given to concerns about the ecological or social impacts of the product itself. When provided with options for different pro-environmental behaviours in a hypothetical scenario with coffee, participants in this study disproportionately chose a packaging-based activity while avoiding the pro-environmental choice when it pertained to a product domain.

When asked to reflect on how they navigate the impacts of their grocery shopping, a majority of respondents focused on plastic packaging as their most salient concern.

Previous studies highlight how consumers view sustainable packaging primarily on end-of-life disposal stages while generally discounting the impacts in production and transport stages (Boesen et al., 2019; Norton et al., 2022). This can lead consumers to erroneously believe that paper-based materials are the most ecologically benign option. This may explain why the tin container used with the frozen dessert advertisement was misjudged as environmentally harmful. Furthermore, participants in this study viewed sustainable packaging and products as having a net positive effect on the environment rather than a lesser degree of environmental harm (Boz et al., 2020). This suggests that consumers may misunderstand the relative costs of their consumption and could easily be misled into believing that a sustainable item is ecologically beneficial rather than harmful (Boz et al., 2020).

Finally, this study corroborates other research that suggests consumers view corporations and brands as more socially responsible when they use sustainable packaging (Choudhury et al., 2023; Magnier & Schoormans, 2015). Previous studies show that greenwashing decreases perceived brand integrity (De Jong et al., 2018; C. Santos et al., 2023), and therefore, this suggests that sustainable packaging makes for an effective greenwashing technique. Considering the pushback against corporations if they employ an overt form of greenwashing, in this study, issues of greenwashing were infrequent and primarily directed toward the product dimension. Of 468 responses, 15 participants expressed skepticism about the product's environmental performance, and only 6 expressed worry about greenwashing regarding the packaging domain. Furthermore, sustainable packaging significantly increased the number of positive non-plastic- and plastic-based comments, with no change in negative comments, which suggests that sustainable packaging was not being perceived skeptically or critically among participants.

In summary, using sustainable packaging risks enabling uncritical consumerism, potentially increasing the amount of consumerism outright, and limiting the deeper interrogation of a product's or company's impacts. The second objective of this research was to answer the question, "*What are the implications of sustainable packaging on the environmental conscientiousness of consumer habits?*" I argue that sustainable packaging provides corporations with a means of appeasing social concerns about the corporation's ecological impacts while problem-shifting the issue without offering any systemic interrogation of consumerism and corporate growth (Monbiot, 2018, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019a).

Some examples of corporations using plastic-free packaging as a greenwashing tactic are provided (**Figure 16**). Coca-Cola is beginning to transition to plastic-free bottles and is doing so without disclosing the impacts of these new bottles or the rest of its supply chain (Coca-Cola European Partners, 2019; Jones & Comfort, 2018; Krithivasan, 2023). As one of the world's largest companies, Coca-Cola produces an inexorable number of plastic bottles. Yet 79% of their overall environmental emissions are from transport and refrigerant equipment, which paper bottles will not change (Coca-Cola European Partners, 2019; Jones & Comfort, 2018). In the photo below, HiFly promotes its plastic-free inflight meals (LSKY, 2020). An economy-class transatlantic return trip has an environmental footprint of 3.4 tons of CO_2e, whereas the plastic wrap on an inflight meal accounts for approximately 1/100,000 of the impact (Berners-Lee, 2022). Similarly, Royale is promoting its shift to plastic-free packaging on its toilet paper without interrogating the impact of paper products – recycled, let alone from virgin-sourced trees (Amazon Canada, 2022; Jordan, 2023). The plastic wrap around a roll of toilet paper represents about 10g of CO_2e, whereas an individual roll of virgin toilet paper is 730g (or 450g if recycled, which is not even present in this product) (Berners-Lee, 2022). The package of toilet paper pictured below, therefore, represents 6,570g of CO_2e compared to the 90g of CO_2e savings by avoiding plastic, and this is without including the footprint of the paper packaging (Kan & Miller, 2022; Miller, 2020; Ritchie, 2018).

Figure 16

Examples of Reduced- or Plastic-Free Initiatives That Do Not Interrogate Their Systemic Injustices

Note: Pictures provided by Amazon Canada, 2022; Coca-Cola Europe, 2020; LSKY, 2020.

I now want to situate this risk of 'greenwashing' within the context of Canada. On June 10, 2019, the government of Canada signed off on an initiative to reduce plastic pollution by banning "harmful single-use plastics… where supported by scientific evidence and warranted" (Trudeau, 2019a, para. 4). Only eight days later, on June 18, 2019, the Canadian government approved the Trans Mountain Expansion project, a multi-billion dollar pipeline to increase Canada's export of crude oil (Meyer, 2023; Trudeau, 2019b). Considering the direct use of fossil fuels as the feedstock for synthetic polymers – of which single-use plastic packaging is one result (Geyer, 2020; Hamilton et al., 2019) – this decision

directly contradicts a robust anti-plastic pledge (MacBride, 2019; Nielsen et al., 2020; Stafford & Jones, 2019a). Fossil fuel dependence – of which all plastic makes up only a fraction of the globe's fossil fuel use – is the central issue, but the Canadian government is sidestepping it through the flash of promising to reduce a portion of the visible plastic waste (Hawken, 2017; IPCC, 2014; MacBride, 2019; Rockström et al., 2009; Smith & Brisman, 2021; Stafford & Jones, 2019a). Furthermore, as of November 2023, the Canadian government has overturned the single-use plastic ban while the Trans Mountain pipeline continues (Nickel, 2023; Stober, 2023).

As Nielsen (2020, p. 14) writes: "*As long as media and public attention remains fixed on plastics, governments and corporations can score considerable goodwill and appear "green" by addressing the plastic issue alone, foregoing action in other areas of urgent environmental need."* The Canadian government's pledge for a nationwide ban on a narrow scope of packaging types, while avoiding any interrogation of the systems of power that exploit the environment and marginalized communities, exposes the insincerity that I argue props up much of the sustainable packaging initiatives from large corporations and the government of Canada alike.

Let us now consider the implications of sustainable packaging for the fast-moving consumer goods sector. As dominant global corporations such as Coca-Cola, McDonalds, and Kraft-Heinz pledge to make recyclable, recycled, and even compostable packaging, the amount of plastic packaging this would reduce is profound (Boz et al., 2020; Jones & Comfort, 2018; Sauven, 2017). However, first off, skepticism is warranted because large companies like these have been making ambitious climate pledges for years, only to fall short and pledge more stringent goals for the future (Day et al., 2022; Hocevar, 2020; Krithivasan, 2023). Second, even if these companies achieve 'full compostability' of their packaging, this does not change the fact that every package will still have a negative ecological cost. Again, we are arguing over the lesser of two evils rather than something outright beneficial (Boz et al., 2020).

I have attempted to show that there will be consequences of sustainable packaging. It warrants deep consideration whether or not the shift toward sustainable packaging will interrogate the systemic structures of large-scale corporate profiteering and consumerism that cause a majority of the globe's ecological destruction (Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019a).

Finally, I would like to consider what solutions can be taken from this discussion. Broadly, I refer to the question of paper versus plastic, then think through the implications of what is beyond that question, and finally, consider waste management implications for global well-being.

First, the question of paper or plastic is not straightforward. Detailed and context-specific life-cycle analyses are needed to fully understand the nuances of when and where different packaging materials are the most beneficial (Herberz et al., 2020; Miller, 2022). There is a need to recognize that every single-use item will impact the environment with different trade-offs that need to be considered (Boz et al., 2020; UNEP, 2021). If consumers view paper packaging as outright beneficial, this suggests they are not considering the actual ecological costs of their consumption. Carbon labelling is one potential solution, met with mixed success after failed attempts over a decade ago, highlighting the different impacts of the foods consumers purchase (Ang et al., 2024; Kühne et al., 2023; Vaughan, 2012).

A holistic and thoughtful approach is needed to address the harms of plastic pollution, one that goes beyond total eradication (Kitz et al., 2021; Liboiron, 2019; Miller, 2020; Stafford & Jones, 2019a). Paper packaging can provide the best option in some circumstances, while in others, the use of plastic is the most ecologically benign (Abejón et al., 2020; Fetner & Miller, 2021; Herberz et al., 2020). Using more packaging per product is counterintuitively the most ecologically beneficial action when it reduces food waste (Heller et al., 2019). Finally, in other circumstances, a combination of plastic and paper can be the most ecologically prudent choice (Ferrara & De Feo, 2020; Khan et al., 2021). Therefore, for the question of paper or plastic, it is essential to recognize that "it is the application of a material that can

make it sustainable—no material is sustainable itself" (Herberz et al., 2020, p. 14; Stanton et al., 2021), and that "a single-minded focus on plastics reduction creates a real risk of adverse, unintended consequences" (Kitz et al., 2021, p. 435).

Second, the focus on packaging must be held relative to the impacts of products, and therefore, sustainable packaging should not be focused on to the detriment of considering the impacts consumption has throughout the value chain (Kan & Miller, 2022; Miller, 2020; Monbiot, 2018; Stafford & Jones, 2019a). For many consumers, focusing on the products they consume rather than the product's packaging may give them more agency to effect positive ecological change (Miller, 2020). For relatively affluent consumers, the environmental impacts of their packaging are negligible relative to the impact of the food they eat, how they power their home, and their transportation choices (Fetner & Miller, 2021).

Some participants in this study wrote with anguish about the impacts of their plastic consumption while not giving themselves due credit for their positive environmental actions. For example, one participant wrote: "*Sometimes I feel a sense of dread when I'm at the grocery store. I look around and see so much waste, so much unnecessary plastic packaging… It makes me angry that corporations are so profit-driven, they refuse to offer us environmentally friendly packaging options… I do my best to shop in ways that are more environmentally friendly, but I can only do so much. I don't have the money to buy all green, package-free foods. I avoid meat, and I try to limit my dairy/animal product consumption. I opt for goods with less packaging, or more environmentally friendly packages when I can, but those options are few and far apart, and I just don't have the time, money or emotional bandwidth to feel like I'm really making much of a difference."* Very innocuously, this participant mentioned limiting their meat and dairy consumption, nested within lamentations about their use of plastic. In doing so, it appears they do not appreciate how environmentally conscientious their actions are. Relatively speaking, reducing their meat consumption will likely yield greater ecological benefits than their plastic reduction and reduce the burden on their emotional well-being (Kelsey, 2017; Miller,

2020; Solnit, 2016). Pragmatically as well, it is unrealistic to pressure consumers to avoid plastic when the consumer system is designed around convenience and single-use packaging. Therefore, this requires broadscale institutional change – and change that happens beyond simply substituting one type of packaging for another material (Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019a).

Third, even while systems of power that support oil and gas extraction – and thus synthetic polymer production and single-use plastic packaging – are still in place and limit transitions to dramatically lower-carbon consumer lifestyles, a few waste management solutions are available. The majority of the globe's mismanaged plastic wastes leaking into the environment are from East Asian and Southeast Asian countries (Jambeck et al., 2015; Lebreton et al., 2017; Lebreton & Andrady, 2019). However, this statistic fails to account for the massive proportion of waste exports that affluent, global north countries send to those same nations (Abbott & Sumaila, 2019; Heller et al., 2020; Herberz et al., 2020). Reducing waste exports to countries that lack sufficient infrastructure to deal with waste and have high rates of mismanaged waste is one immediate solution (Herberz et al., 2020). The impacts of this, however, will not be straightforward nor felt equally (Lepawsky & Billah, 2011; Liboiron, 2018b). A more responsible waste management system that factors in externalities and incorporates extended producer responsibility is needed (Liboiron & Lepawsky, 2022; Walker et al., 2021).

V.8. Limitations and Future Directions

This research has practical limitations, and further investigations could simultaneously address these limitations while building on the phenomena described here.

A primary strength of this research was the novel use of a four-way typology, distinguishing the dimensions of sustainable vs. conventional products and sustainable vs. conventional packaging. Using this typology, this study considered the two covariates of plastic concern and environmental concern as they influenced the results. While yielding significant results, the linear regression models explained a low amount of variance. Subsequent studies could expand the number of covariates as influencing factors and should incorporate other demographic, emotional, and psychological variables into the analysis as covariates.

Similarly, utilizing other predefined variables and metrics is advisable. This research found a lack of appraisal of 'greenwashing' from the sustainable packaging items in comparison to the sustainable products. However, 'greenwashing' was not explicitly explored by participants. A subsequent study could explore how consumer attitudes differ about products while using the four-way typology. Corporate social responsibility ratings were inferred based on open-ended responses, and subsequent studies could use the four-way typology to corroborate this and previous research about the influence of sustainable packaging versus sustainable products on perceived brand integrity (Magnier & Schoormans, 2017).

Regarding demographics, this study utilized a Canadian population obtained through Amazon MTurk. Although more representative than a student sample, future studies could be made more robust with other samples from within and beyond the Canadian population (Gerlich et al., 2018; Landers & Behrend, 2015; McEwan, 2020). The demographic distribution of the present study tended towards

individuals with higher education levels (Statistics Canada, 2022) and with greater left-leaning and liberal political stances than average Canadians (Coletto, 2023; Dawson, 2023). Therefore, more studies are required to extrapolate these results to the broader Canadian sample.

Increasing the sample size would provide more leverage and statistical power to interpret the results. Many results showed emerging trends, although their significance was masked by low statistical power due to the small sample size. This study opted to blend quantitative and qualitative components, which implies that part of the research's focus was devoted to the qualitative, open-ended components, and this pragmatically limited the depth the study could take for its quantitative components. An area of opportunity for subsequent studies is to explore these quantitative phenomena more deeply. Considering the misinterpretation of the frozen dessert product, when these data were included, they led to erroneous and contradictory conclusions, and when removed, they further reduced the sample size by one-third.

By employing a mixed methodology, this study pragmatically opted to use an online survey. There is a limit to the depth captured by qualitative investigations through a survey, and this deserves more exploration. Subsequent studies could further investigate the rich details of how individuals work through their consumerism by using in-depth, semi-structured interviews. For example, many participants wrote about feelings of grief when they use plastic and seemingly discounted the other pro-environmental behaviours they engage in. These dialectical consumer expressions represent a rich area for study, to meet with people and discuss how they orient and understand themselves within the impacts of their consumption habits.

This study used self-reported expressions and perception-based metrics to assess the likelihood of behavioural changes. The use of in-person experiments or case studies would be a worthy next step to complement and corroborate this study's results. Within a controlled condition, experiments would

provide actual behavioural results, while similarly, case studies could be based on observational data from grocery stores. Both of these lines of evidence would dovetail nicely with this present study and provide more data types to triangulate the results.

Purposefully, this study utilized three products – a burger, laundry detergent, and frozen dessert – each of which represented one of a virtue, utilitarian, and vice product, respectively (van Doorn & Verhoef, 2011). It is important to recognize that the results of this study may be most applicable to these specific products. The study by Magnier and Schoormans (2017) similarly used laundry detergent. While the results of this current study open discussions to other products, conclusions should be cautiously applied to other products without subsequent testing. Additionally, it is important to consider why the participants misinterpreted the frozen dessert. Using the paper-like container for the conventionally packaged frozen dessert and the metal container for the sustainable packaging option goes against common public perceptions about what defines conventional and sustainable packaging (Oloyede & Lignou, 2021). These material choices may have contributed to the frozen dessert's misinterpretation. However, participants also misinterpreted the product dimension. This suggests that there are potentially more factors to consider for why the participants did not interpret the frozen dessert as intended. Therefore, this case may be evidence that some of the phenomena described in this study do not apply to this product, and this warrants subsequent research.

A final alternative direction for future studies is to look at the implications of the shift to sustainable packaging for post-consumer waste. Consumers attempt to recycle food-soiled paper products in recycling bins, which contaminate the recycling process, and consumers put heavily food-soiled paper products into the trash and landfill – especially if composting facilities are not adequately available (Catlin et al., 2021; Donnelly et al., 2023; Winterich, Reczek, & Bollinger, 2023). Therefore, considering the shift to adopt paper-based 'sustainable' packaging for food products – as is encouraged by Canada's new plastics ban (Canada, 2022) – questions arise as to how many will become soiled with

food, how much food-soiled paper packaging will end up contaminating the recycling stream, and how much methane-producing organic material like paper-packaging will end up in the landfill (Semple et al., 2022). Future research could investigate some of these unintended consequences of the sustainable packaging movement.

VI. Conclusions

In conclusion, this study found that: 1. The presence of sustainable packaging positively influences perceptions of the product's sustainability; 2. The environmental footprint of sustainable packaging is viewed disproportionately more favourable when it is on a conventional product; 3. Products with sustainable packaging receive a higher purchase intent, indifferent to whether or not the product itself is sustainable; 4. Sustainable packaging elicited significantly more emotionally-positive, plastic-specific comments, without a concomitant increase in non-plastic-based environmental or negative comments; and 5. Consumers show a preference for pro-environmental behaviours that focus on plastic and packaging, with less focus given to product-focused behaviours and initiatives.

Other literature has written about the negative consequences of purportedly beneficial climate solutions and cautions on the widespread public interest in sustainable packaging (Gifford, 2011; Laurenti et al., 2016; B. Ma et al., 2019; Monbiot, 2018; Stafford & Jones, 2019a). Consumerism is the heart of the issues raised by many of these authors. This study's trends allude to a risk of maintaining, if not increasing, environmentally unconscientious and misinformed consumerism due to the effect of sustainable packaging on consumer perceptions. I argue sustainable packaging represents a new stage of greenwashing that corporations may co-opt as a market strategy unless consumers recognize the subtle influence that sustainable packaging has on them.

As Stafford and Jones (2019a) warn, sustainable packaging may be a 'distraction' that detracts from achieving environmental well-being. This is not to say that sustainable packaging should be avoided and that the continued profligate use of plastic is recommended, because it is an understatement to write that plastic is associated with deep ecological, economic, and social harms (Halden, 2010; Hamilton et al., 2019; Liboiron, 2021).

The overarching purpose of this research is to suggest that there are likely to be unintended consequences if consumers myopically fixate on ‘eradicating plastic’ and substituting sustainable packaging in plastic’s place. Deeper consideration is needed into the specific materials used in packaging, recognizing the costs and benefits of all packaging material types (Herberz et al., 2020; Miller, 2020). The main risk of sustainable packaging only occurs if consumers focus on their packaging to the detriment of considering their overall consumer habits or become manipulated by corporations exploiting the use of sustainable packaging (Monbiot, 2018; Smith & Brisman, 2021; Stafford & Jones, 2019a). Therefore, the takeaway of this current research is to encourage us to be curious about our consumption: Single-use or re-useable, plastic or paper, packaging or product – no matter what we use, we require critical reflection about what we're consuming. To obtain a more ecologically and socially sustainable world, we must interrogate our consumption practices and remember to think inside the box.

VII. References

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VIII. Appendix

VIII.1. Tables and Figures

VIII.1.a. Methods, Sample, and Analysis

Table 1

A/B Test Distribution for Different Products and Versions

	Total Sample	Burger		Detergent		Frozen Dessert	
Condition	*n*	*n*	%	*n*	%	*n*	%
EPD-EPK	108	40	37%	35	32%	33	31%
EPD-NEPK	114	33	29%	39	34%	42	37%
NEPD-EPK	134	45	34%	38	28%	51	38%
NEPD-NEPD	112	38	34%	44	39%	30	27%
Test distribution when averaging participants that viewed the same version more than once, including all three products: Burger, Detergent, and Frozen Dessert							
EPD-EPK	82	40	37%	35	32%	33	31%
EPD-NEPK	86	33	29%	39	34%	42	37%
NEPD-EPK	97	45	34%	38	28%	51	38%
NEPD-NEPD	80	38	34%	44	39%	30	27%
EPD	130						
NEPD	135						
EPK	138						
NEPK	133						
Test distribution when averaging participants that viewed the same version more than once, including only the Burger and Detergent							
EPD-EPK	64	40	37%	35	32%		
EPD-NEPK	62	33	29%	39	34%		
NEPD-EPK	67	45	34%	38	28%		
NEPD-NEPD	68	38	34%	44	39%		
EPD	106						
NEPD	115						
EPK	118						
NEPK	116						

Note: Total sample size for each product is *n* = 156

Table 2

Summary Statistics on Participant Demographics

			Education Level			
	> high school	High school or equivalent	College/university without a degree	Bachelor degree	Graduate degree	Other
n	1	18	33	67	31	4
%	1%	12%	21%	44%	20%	3%
			Political Orientation			
	Extremely Liberal	Liberal	Moderate	Conservative	Extremely Conservative	Other
n	10	66	54	18	1	5
%	6%	43%	35%	12%	1%	3%
			Gender Identity			
	Woman	Man	Self-described as Mostly male	Prefer not to say		
n	61	90	1	2		
%	40%	58%	1%	1%		
			Dietary Preferences			
	Traditional omnivore	No red meat (but yes to fish, poultry)	Vegetarian (but yes to dairy products)	Vegan		
n	127	12	13	2		
%	82%	8%	8%	1%		
			Age			
	M	*SD*	Min	Pctl. 25	Pctl. 75	Max
	40	12	19	31	48	73
			Annual Household Income			
	M	*SD*	Min	Pctl. 25	Pctl. 75	Max
	$89,763	$61,103	$0	$50,000	$120,000	$450,000

VIII.1.b. Environmental and Plastic Concern

Table 3

Environmental Concern and Plastic Pollution Concern

Environmental Concern

Domain	*M*	*SD*
Animals	5.56	1.68
Birds	5.41	1.57
Children	5.75	1.80
Marine Life	5.69	1.59
All People	5.32	1.91
Me	5.21	1.85
My Future	5.27	1.75
My Health	5.18	1.79
Plants	5.16	1.77

Environmental Concern Averaged Across All Domains

n	*M*	*SD*	Min	Pctl. 25	Pctl. 75	Max
154	5.39	1.11	1.33	4.33	6.22	7

Plastic Pollution Concern

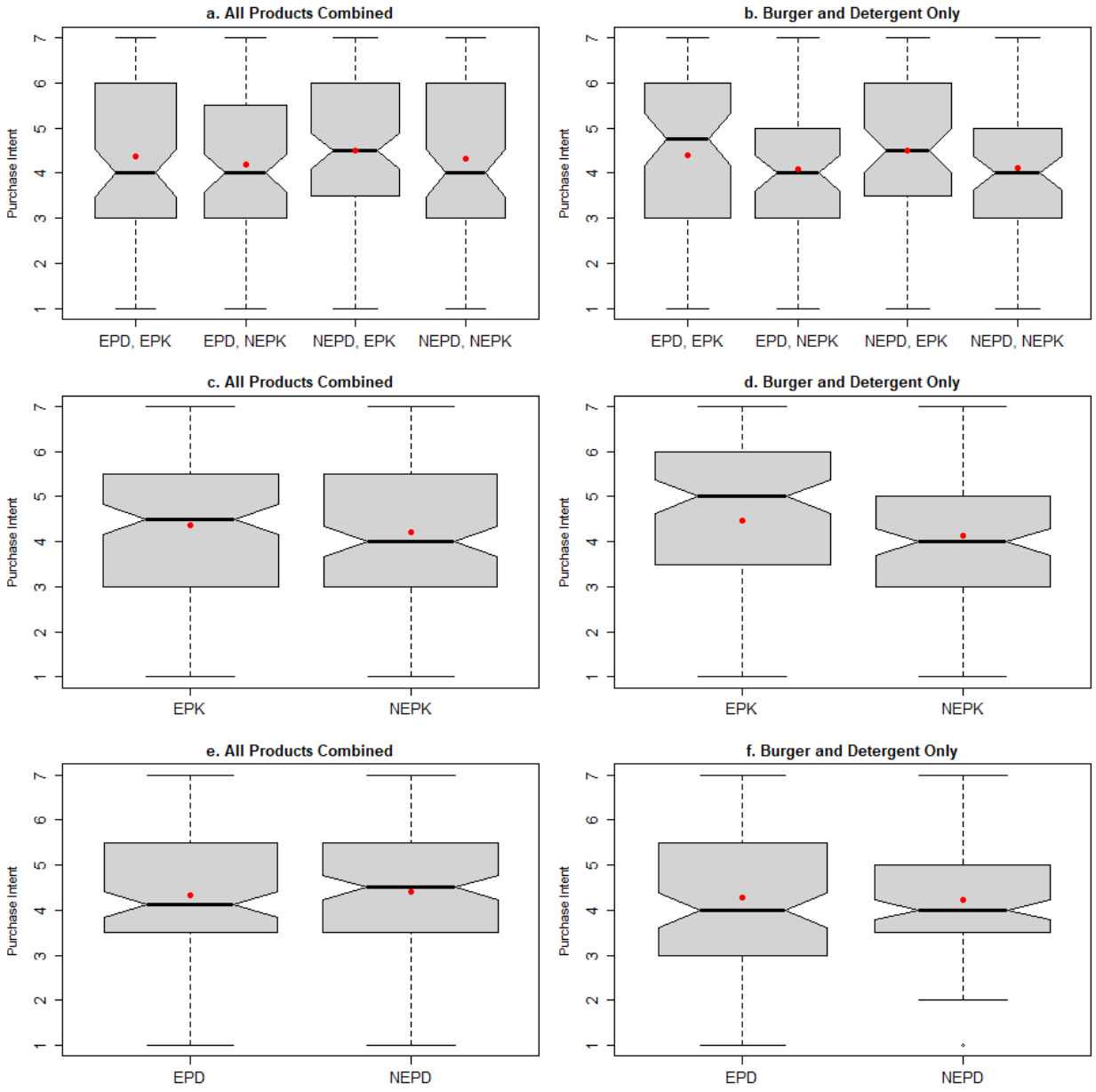
n	*M*	*SD*	Min	Pctl. 25	Pctl. 75	Max
154	5.86	1.15	1	5	7	7

Note: Environmental Concern adapted from Schultz's SC scale. Results are based on a 7-point scale.

VIII.1.c. Purchase Intentions

Figure 17

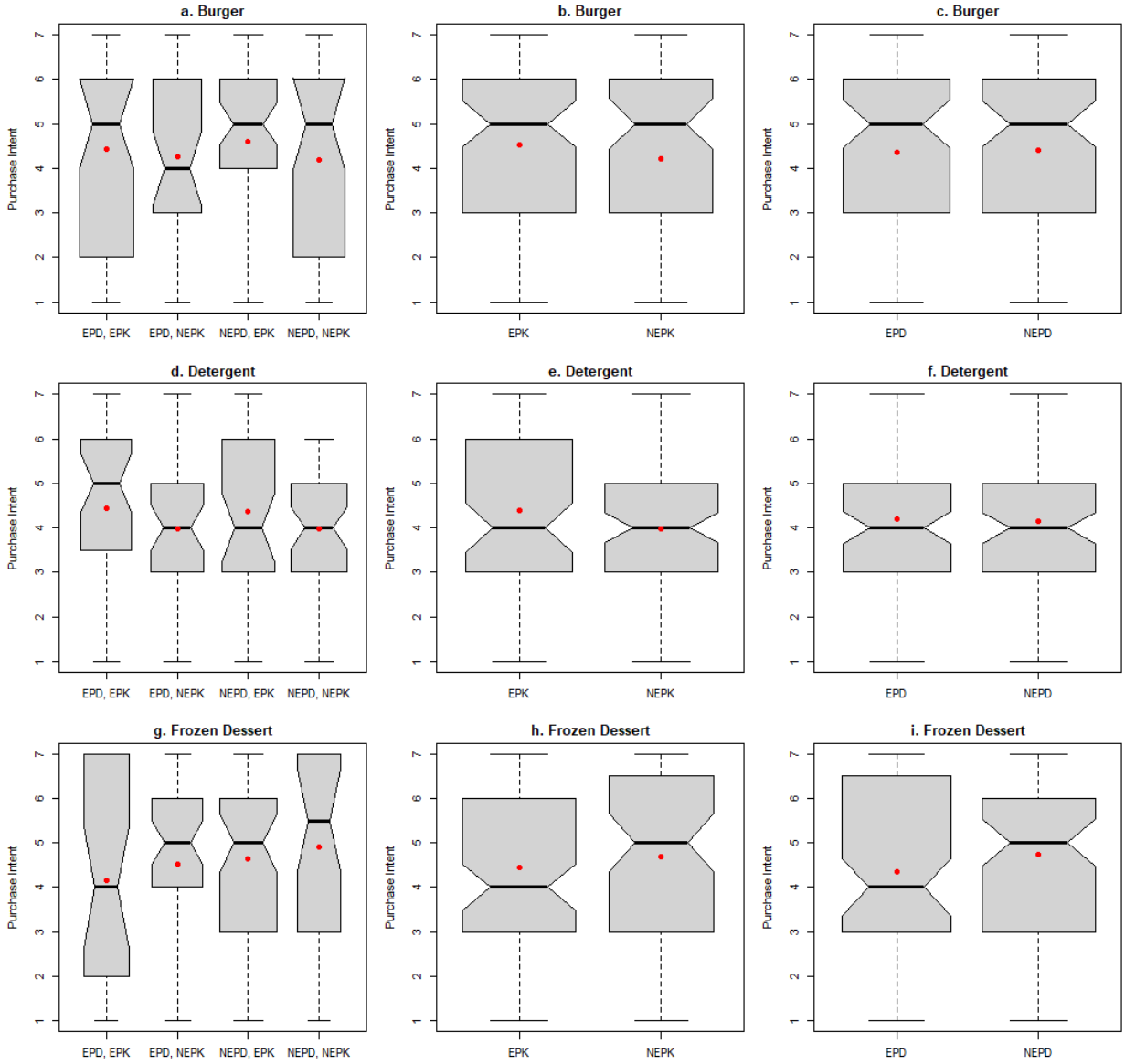
Boxplots of Purchase Intent Across All Products (Burger, Detergent, and Frozen Dessert), and for Burger and Detergent Only



Note: From top to bottom, plots show all versions, compare the sustainable packaged versions (EPK and NEPK), and compare the sustainable product versions (EPD and NEPD). Whiskers indicate the minimum and maximum outliers, box region indicates the bounds of the 1st and 3rd quartile range, lines represent the median, notches represent the 95% confidence interval of the median, and red dots indicate the mean value.

Figure 18

Boxplots of Purchase Intent for Burger, Detergent, and Frozen Dessert Products



Note: Boxplots of purchase intent for each product separately. From left to right, plots show all versions, compare the sustainable packaged versions (EPK and NEPK), and compare the sustainable product versions (EPD and NEPD). Whiskers indicate the minimum and maximum outliers, box region indicates the bounds of the 1st and 3rd quartile range, lines represent the median, notches represent the 95% confidence interval of the median, and red dots indicate the mean value.

Table 4

Summary Information of Purchase Intent

Version	*n*	*M*	*SD*	Min	Pctl. 25	Pctl. 75	Max
Burger, Detergent, and Frozen Dessert							
EPD-EPK	82	4.4	1.8	1	3	6	7
EPD-NEPK	86	4.2	1.8	1	3	5.5	7
NEPD-EPK	97	4.5	1.6	1	3.5	6	7
NEPD-NEPK	80	4.3	1.6	1	3	6	7
EPD	130	4.3	1.7	1	3.5	5.5	7
NEPD	135	4.4	1.4	1	3.5	5.5	7
EPK	138	4.4	1.7	1	3	5.5	7
NEPK	133	4.2	1.6	1	3	5.5	7
Burger and Detergent							
EPD-EPK	64	4.4	1.8	1	3	6	7
EPD-NEPK	62	4.1	1.7	1	3	5	7
NEPD-EPK	67	4.5	1.7	1	3.5	6	7
NEPD-NEPK	68	4.1	1.4	1	3	5	7
EPD	106	4.3	1.6	1	3	5.5	7
NEPD	115	4.2	1.5	1	3.5	5	7
EPK	118	4.5	1.8	1	3.5	6	7
NEPK	116	4.1	1.5	1	3	5	7
Burger							
EPD-EPK	40	4.4	2	1	2	6	7
EPD-NEPK	33	4.3	1.8	1	3	6	7
NEPD-EPK	45	4.6	1.8	1	4	6	7
NEPD-NEPK	38	4.2	2	1	2.2	6	7
EPD	73	4.4	1.9	1	3	6	7
NEPD	83	4.4	1.9	1	3	6	7
EPK	85	4.5	1.9	1	3	6	7
NEPK	71	4.2	1.9	1	3	6	7
Detergent							
EPD-EPK	35	4.4	1.8	1	3.5	6	7
EPD-NEPK	39	4	1.7	1	3	5	7
NEPD-EPK	38	4.4	1.7	1	3	6	7
NEPD-NEPK	44	4	1.4	1	3	5	6
EPD	74	4.2	1.7	1	3	5	7
NEPD	82	4.2	1.6	1	3	5	7
EPK	73	4.4	1.7	1	3	6	7
NEPK	83	4	1.5	1	3	5	7
Frozen Dessert							
EPD-EPK	33	4.2	2.3	1	2	7	7
EPD-NEPK	42	4.5	2	1	4	6	7
NEPD-EPK	51	4.6	1.7	1	3	6	7

NEPD-NEPK	30	4.9	2	1	3	7	7
EPD	75	4.4	2.1	1	3	6.5	7
NEPD	81	4.7	1.8	1	3	6	7
EPK	84	4.5	1.9	1	3	6	7
NEPK	72	4.7	2	1	3	6.2	7

Note: Mean values are based on a 7-point scale, where 4 = 'neutral'.

Table 5

Results of Cohen's d Effect Size for Purchase Intent

	Cohen's d estimate		95% CI (lower – upper)	
Burger, Detergent, and Frozen Dessert				
EPD-EPK vs. EPD-NEPK	0.09	negligible	-0.21	0.40
EPD-EPK vs. NEPD-EPK	-0.08	negligible	-0.37	0.22
EPD-EPK vs. NEPD-NEPK	0.03	negligible	-0.28	0.34
EPD-NEPK vs. NEPD-EPK	-0.18	negligible	-0.48	0.11
EPD-NEPK vs. NEPD-NEPK	-0.09	negligible	-0.38	0.24
NEPD-EPK vs. NEPD-NEPK	0.12	negligible	-0.18	0.42
EPD vs. NEPD	-0.07	negligible	-0.31	0.18
EPK vs. NEPK	0.08	negligible	-0.16	0.32
Burger and Detergent				
EPD-EPK vs. EPD-NEPK	0.18	negligible	-0.17	0.53
EPD-EPK vs. NEPD-EPK	-0.05	negligible	-0.40	0.30
EPD-EPK vs. NEPD-NEPK	0.17	negligible	-0.18	0.51
EPD-NEPK vs. NEPD-EPK	-0.24	small	-0.60	0.11
EPD-NEPK vs. NEPD-NEPK	-0.03	negligible	-0.38	0.32
NEPD-EPK vs. NEPD-NEPK	0.23	small	-0.11	0.56
EPD vs. NEPD	0.03	negligible	-0.23	0.30
EPK vs. NEPK	0.21	small	-0.05	0.46
Burger				
EPD-EPK vs. EPD-NEPK	0.08	negligible	-0.39	0.55
EPD-EPK vs. NEPD-EPK	-0.09	negligible	-0.52	0.34
EPD-EPK vs. NEPD-NEPK	0.12	negligible	-0.33	0.57
EPD-NEPK vs. NEPD-EPK	-0.18	negligible	-0.64	0.27
EPD-NEPK vs. NEPD-NEPK	0.05	negligible	-0.43	0.52
NEPD-EPK vs. NEPD-NEPK	0.22	small	-0.22	0.66
EPD vs. NEPD	-0.03	negligible	-0.35	0.29
EPK vs. NEPK	0.15	negligible	-0.16	0.47
Detergent				
EPD-EPK vs. EPD-NEPK	0.26	small	-0.21	0.73
EPD-EPK vs. NEPD-EPK	0.03	negligible	-0.43	0.50
EPD-EPK vs. NEPD-NEPK	0.28	small	-0.18	0.73

EPD-NEPK vs. NEPD-EPK	-0.24	small	-0.69	0.22
EPD-NEPK vs. NEPD-NEPK	0.00	negligible	-0.44	0.44
NEPD-EPK vs. NEPD-NEPK	0.25	small	-0.19	0.69
EPD vs. NEPD	0.02	negligible	-0.30	0.34
EPK vs. NEPK	0.26	small	-0.06	0.58
Frozen Dessert				
EPD-EPK vs. EPD-NEPK	-0.17	negligible	-0.64	0.29
EPD-EPK vs. NEPD-EPK	-0.26	small	-0.70	0.19
EPD-EPK vs. NEPD-NEPK	-0.35	small	-0.86	0.16
EPD-NEPK vs. NEPD-EPK	-0.07	negligible	-0.48	0.35
EPD-NEPK vs. NEPD-NEPK	-0.19	negligible	-0.67	0.29
NEPD-EPK vs. NEPD-NEPK	-0.14	negligible	-0.60	0.32
EPD vs. NEPD	-0.20	negligible	-0.51	0.12
EPK vs. NEPK	-0.12	negligible	-0.43	0.20

Table 6

Results of Linear Regression Models of Plastic Concern, Condition, and Purchase Intent; Using All Three Products: Burger, Detergent, and Frozen Dessert

Comparison	Estimate	lwr	upr	*p* adj
Tukey's multiple comparison of means, without accounting for interaction effect				
EPD-EPK – EPD-NEPK	-0.27	-4.03	3.49	.99
EPD-EPK – NEPD-EPK	-0.54	-4.18	3.10	.98
EPD-EPK – NEPD-NEPK	-3.48	-7.39	0.41	.10
EPD-NEPK – NEPD-EPK	-0.27	-3.34	2.80	.99
EPD-NEPK – NEPD-NEPK	-3.21	-6.59	0.17	.07**
NEPD-EPK – NEPD-NEPK	-2.94	-6.18	0.30	.09**
EPD – NEPD	-1.10	-3.05	0.95	.27
EPK – NEPK	-0.95	-2.97	1.08	.36
Estimated marginal means, with interaction effect, plastic concern at mean of 5.85				
EPD-EPK – EPD-NEPK	0.09	-0.60	0.78	.99
EPD-EPK – NEPD-EPK	-0.20	-0.87	0.47	.87
EPD-EPK – NEPD-NEPK	-0.03	-0.72	0.67	.99
EPD-NEPK – NEPD-EPK	-0.29	-0.94	0.36	.66
EPD-NEPK – NEPD-NEPK	-0.12	-0.80	0.56	.96
NEPD-EPK – NEPD-NEPK	0.17	-0.50	0.83	.91
EPD – NEPD	-0.09	-0.47	0.28	.60
EPK – NEPK	0.12	-0.28	0.52	.55

Note: ** denotes two results with marginally significant *p*-values.

Table 7

Results of Linear Regression Models of Plastic Concern, Condition, and Purchase Intent; Using Only Two Products: Burger and Detergent

Comparison	Estimate	lwr	upr	*p* adj
Tukey's multiple comparison of means, without accounting for interaction effect				
EPD-EPK – EPD-NEPK	2.23	-2.30	6.77	.58
EPD-EPK – NEPD-EPK	0.20	-3.84	4.25	.99
EPD-EPK – NEPD-NEPK	-2.52	-6.77	1.72	.41
EPD-NEPK – NEPD-EPK	-2.03	-5.88	1.82	.52
EPD-NEPK – NEPD-NEPK	-4.76	-8.81	0.70	.01*
NEPD-EPK – NEPD-NEPK	-2.72	-6.23	0.78	.19
EPD – NEPD	-1.72	-3.92	0.49	.13
EPK – NEPK	-0.61	-2.82	1.60	.59
Estimated marginal means, with interaction effect, plastic concern at mean of 5.885				
EPD-EPK – EPD-NEPK	0.26	-0.50	1.02	.81
EPD-EPK – NEPD-EPK	-0.18	-0.93	0.57	.93
EPD-EPK – NEPD-NEPK	0.22	-0.53	0.96	.88
EPD-NEPK – NEPD-EPK	-0.44	-1.19	0.31	.42
EPD-NEPK – NEPD-NEPK	-0.05	-0.79	0.70	.99
NEPD-EPK – NEPD-NEPK	0.39	-0.34	1.13	.51
EPD – NEPD	0.04	-0.37	0.45	.84
EPK – NEPK	0.34	-0.09	0.77	.12

Note: * denotes a result with a significant *p*-value.

Table 8

Results of Linear Regression Models of Environmental Concern, Condition, and Purchase Intent; Using All Three Products: Burger, Detergent, and Frozen Dessert

Comparison	Estimate	lwr	upr	*p* adj
Tukey's multiple comparison of means, without accounting for interaction effect				
EPD-EPK – EPD-NEPK	-0.93	-2.55	4.40	.90
EPD-EPK – NEPD-EPK	-0.63	-2.78	4.05	.96
EPD-EPK – NEPD-NEPK	0.95	-4.57	2.67	.91
EPD-NEPK – NEPD-EPK	0.29	-3.32	2.74	.99
EPD-NEPK – NEPD-NEPK	1.88	-5.14	1.38	.44
NEPD-EPK – NEPD-NEPK	1.59	-4.78	1.60	.57
EPD – NEPD	-0.39	-2.23	1.44	.67
EPK – NEPK	-0.36	-2.37	1.65	.73
Estimated marginal means, with interaction effect, environmental concern at mean of 5.37				
EPD-EPK – EPD-NEPK	0.19	-0.49	0.88	.87
EPD-EPK – NEPD-EPK	-0.10	-0.77	0.57	.98
EPD-EPK – NEPD-NEPK	0.05	-0.65	0.75	.99
EPD-NEPK – NEPD-EPK	-0.29	-0.95	0.37	.66
EPD-NEPK – NEPD-NEPK	-0.14	-0.83	0.55	.95
NEPD-EPK – NEPD-NEPK	0.15	-0.52	0.82	.94
EPD – NEPD	-0.09	-0.47	0.29	.63
EPK – NEPK	0.13	-0.28	0.53	.53

Table 9

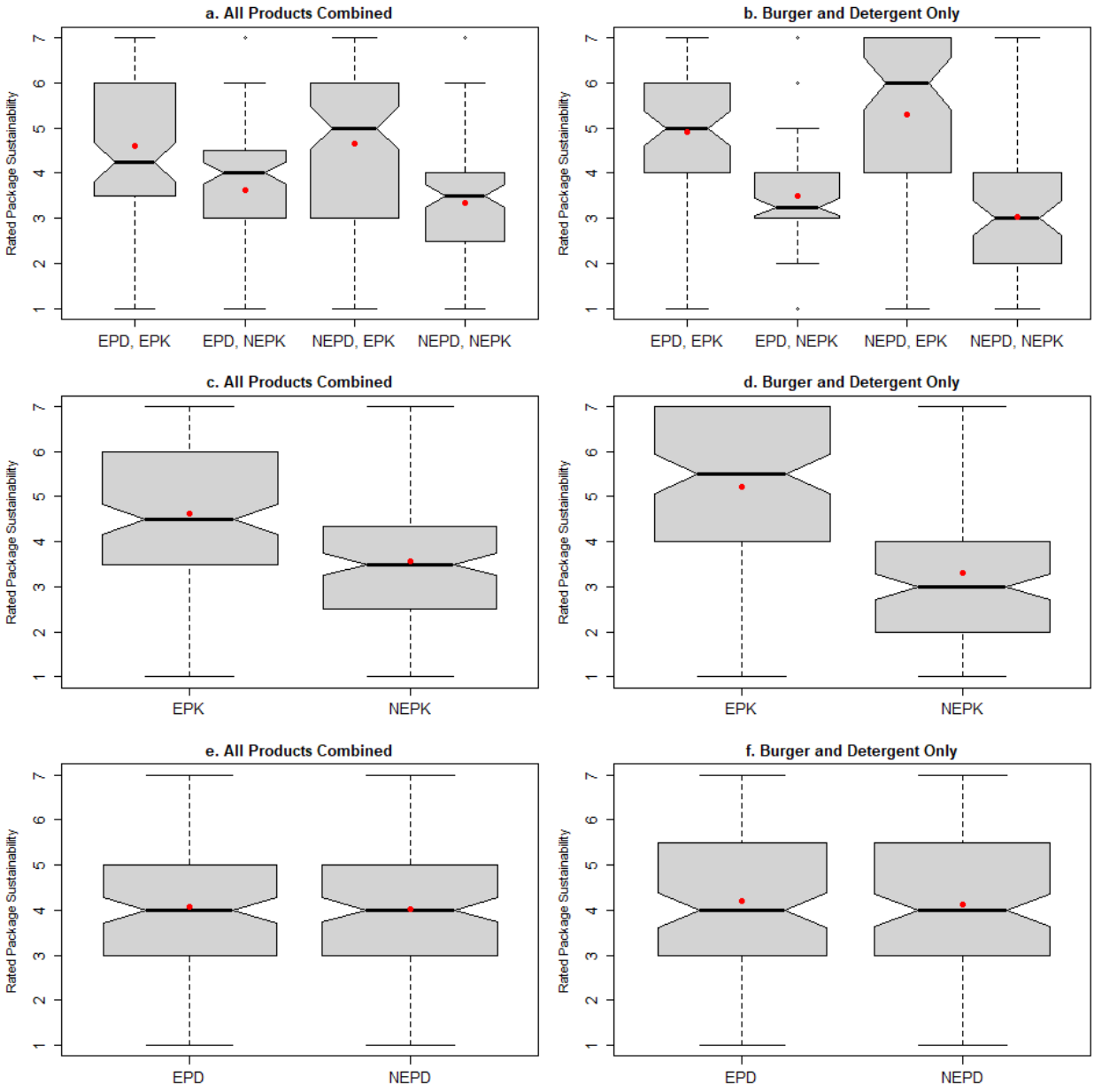
Results of Linear Regression Models of Environmental Concern, Condition, and Purchase Intent; Using Only Two Products: Burger and Detergent

Comparison	Estimate	lwr	upr	*p* adj
Tukey's multiple comparison of means, without accounting for interaction effect				
EPD-EPK – EPD-NEPK	0.27	-3.35	3.89	.99
EPD-EPK – NEPD-EPK	-0.29	-3.82	3.23	.99
EPD-EPK – NEPD-NEPK	-1.44	-5.10	2.21	.74
EPD-NEPK – NEPD-EPK	-0.57	-4.00	2.87	.97
EPD-NEPK – NEPD-NEPK	-1.71	-5.29	1.86	.60
NEPD-EPK – NEPD-NEPK	-1.15	-4.63	2.33	.83
EPD – NEPD	-0.50	-2.53	1.53	.63
EPK – NEPK	-0.16	-2.17	1.86	.88
Estimated marginal means, with interaction effect, environmental concern at mean of 5.33				
EPD-EPK – EPD-NEPK	0.33	-0.45	1.10	.70
EPD-EPK – NEPD-EPK	-0.09	-0.86	0.68	.99
EPD-EPK – NEPD-NEPK	0.26	-0.51	1.02	.82
EPD-NEPK – NEPD-EPK	-0.42	-1.19	0.35	.50
EPD-NEPK – NEPD-NEPK	-0.07	-0.84	0.69	.99
NEPD-EPK – NEPD-NEPK	0.35	-0.41	1.10	.64
EPD – NEPD	0.06	-0.35	0.48	.77
EPK – NEPK	0.34	-0.09	0.78	.12

VIII.1.d. Package Evaluations

Figure 19

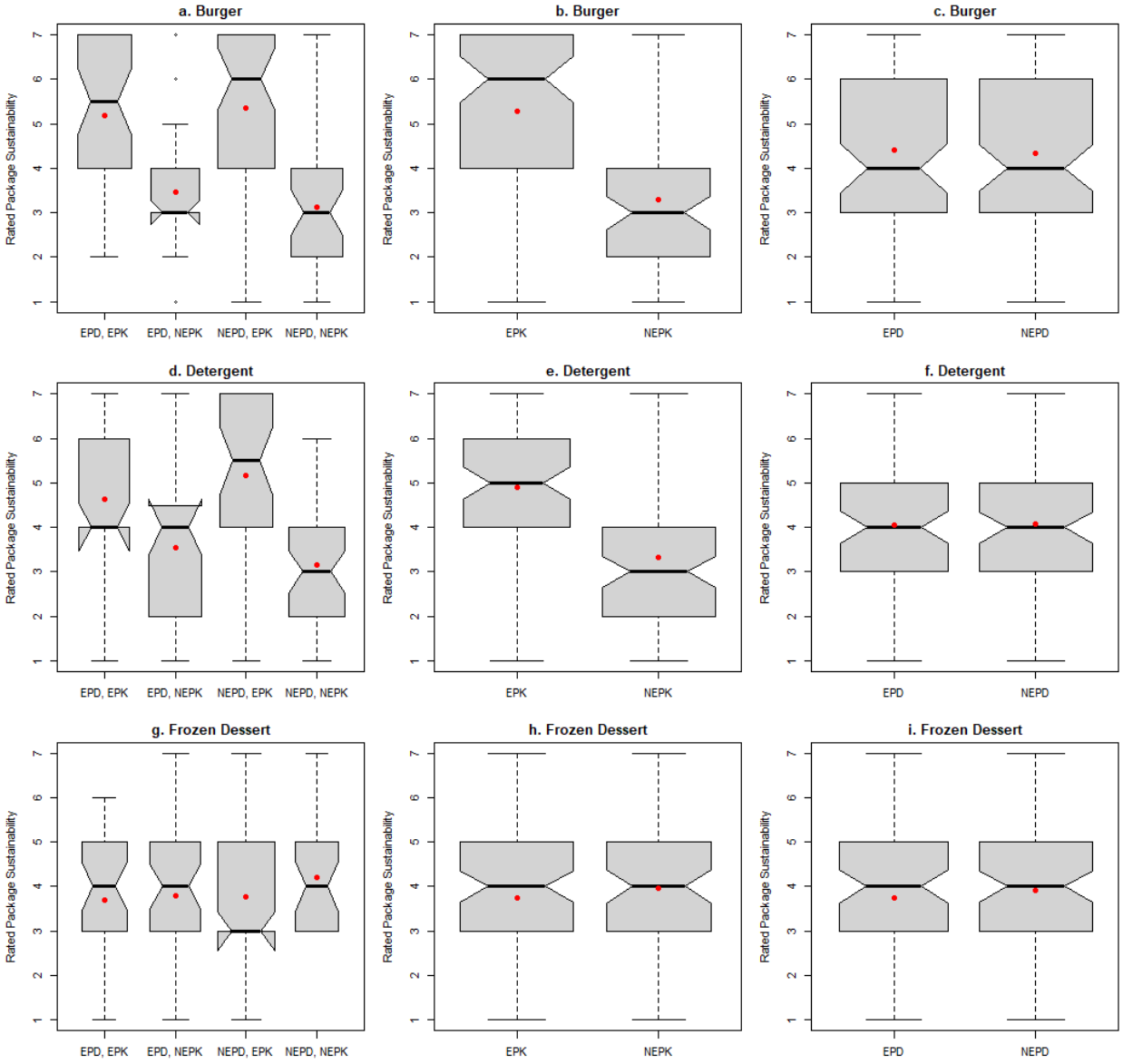
Boxplots of Rated Package Sustainability Across All Products (Burger, Detergent, and Frozen Dessert), and for Burger and Detergent Only



Note: From top to bottom, plots show all versions, compare the sustainable packaged versions (EPK and NEPK), and compare the sustainable product versions (EPD and NEPD). Whiskers indicate the minimum and maximum outliers, box region indicates the bounds of the 1st and 3rd quartile range, lines represent the median, notches represent the 95% confidence interval of the median, and red dots indicate the mean value.

Figure 20

Boxplots of Rated Package Sustainability for Burger, Detergent, and Frozen Dessert Products



Note: Boxplots of rated package sustainability for each product separately. From left to right, plots show all versions, compare the sustainable packaged versions (EPK and NEPK), and compare the sustainable product versions (EPD and NEPD). Whiskers indicate the minimum and maximum outliers, box region indicates the bounds of the 1st and 3rd quartile range, lines represent the median, notches represent the 95% confidence interval of the median, and red dots indicate the mean value.

Table 10

Summary Information of Perceived Package Sustainability

Version	*n*	*M*	*SD*	Min	Pctl. 25	Pctl. 75	Max
Burger, Detergent, and Frozen Dessert							
EPD-EPK	82	4.6	1.5	1	3.6	6	7
EPD-NEPK	86	3.6	1.3	1	3	4.5	7
NEPD-EPK	97	4.6	1.6	1	3	6	7
NEPD-NEPK	80	3.3	1.4	1	2.5	4	7
EPD	130	4.1	1.4	1	3	5	7
NEPD	135	4	1.5	1	3	5	7
EPK	138	4.6	1.4	1	3.5	5.9	7
NEPK	133	3.6	1.3	1	2.5	4.3	7
Burger and Detergent							
EPD-EPK	64	4.9	1.6	1	4	6	7
EPD-NEPK	62	3.5	1.5	1	3	4	7
NEPD-EPK	67	5.3	1.6	1	4	7	7
NEPD-NEPK	68	3	1.4	1	2	4	7
EPD	106	4.2	1.6	1	3	5.4	7
NEPD	115	4.1	1.8	1	3	5.5	7
EPK	118	5.2	1.5	1	4	7	7
NEPK	116	3.3	1.4	1	2	4	7
Burger							
EPD-EPK	40	5.2	1.6	2	4	7	7
EPD-NEPK	33	3.5	1.2	1	3	4	7
NEPD-EPK	45	5.4	1.6	1	4	7	7
NEPD-NEPK	38	3.1	1.6	1	2	4	7
EPD	73	4.4	1.7	1	3	6	7
NEPD	83	4.3	1.9	1	3	6	7
EPK	85	5.3	1.6	1	4	7	7
NEPK	71	3.3	1.4	1	2	4	7
Detergent							
EPD-EPK	35	4.6	1.6	1	4	6	7
EPD-NEPK	39	3.5	1.7	1	2	4.5	7
NEPD-EPK	38	5.2	1.8	1	4	7	7
NEPD-NEPK	44	3.2	1.4	1	2	4	6
EPD	74	4.1	1.7	1	3	5	7
NEPD	82	4.1	1.9	1	3	5	7
EPK	73	4.9	1.7	1	4	6	7
NEPK	83	3.3	1.6	1	2	4	7
Frozen Dessert							
EPD-EPK	33	3.7	1.4	1	3	5	6
EPD-NEPK	42	3.8	1.4	1	3	5	7

NEPD-EPK	51	3.8	1.7	1	3	5	7
NEPD-NEPK	30	4.2	1.1	3	3.2	5	7
EPD	75	3.7	1.4	1	3	5	7
NEPD	81	3.9	1.5	1	3	5	7
EPK	84	3.7	1.6	1	3	5	7
NEPK	72	4	1.3	1	3	5	7

Note: Mean values are based on a 7-point scale, where 4 = 'neutral'.

Table 11

Results of Linear Regression Models of Plastic Concern, Condition, and Rated Package Sustainability; Using All Three Products: Burger, Detergent, and Frozen Dessert

Comparison	Estimate	lwr	upr	*p* adj
Tukey's multiple comparisons of means, without accounting for interaction effect				
EPD-EPK – EPD-NEPK	1.59	-1.75	4.92	.61
EPD-EPK – NEPD-EPK	0.31	-2.91	3.53	.99
EPD-EPK – NEPD-NEPK	0.66	-2.79	4.12	.96
EPD-NEPK – NEPD-EPK	-1.28	-4.00	1.45	.62
EPD-NEPK – NEPD-NEPK	-0.92	-3.92	2.07	.86
NEPD-EPK – NEPD-NEPK	0.35	-2.52	3.22	.99
EPD – NEPD	-1.42	-3.30	0.45	.14
EPK – NEPK	0.82	-0.85	2.50	.34
Estimated marginal means, with interaction effect, plastic concern at mean of 5.85				
EPD-EPK – EPD-NEPK	0.96	0.36	1.57	< .001*
EPD-EPK – NEPD-EPK	-0.06	-0.66	0.53	.99
EPD-EPK – NEPD-NEPK	1.25	0.63	1.87	< .001*
EPD-NEPK – NEPD-EPK	-1.03	-1.61	-0.45	< .001*
EPD-NEPK – NEPD-NEPK	0.29	-0.32	0.89	.61
NEPD-EPK – NEPD-NEPK	1.31	0.72	1.90	< .001*
EPD – NEPD	0.04	-0.32	0.40	.82
EPK – NEPK	1.05	0.72	1.38	< .001*

Note: * denotes results with significant *p*-values.

Table 12

Results of Cohen's d Effect Size for Rated Package Sustainability

	Cohen's d estimate		95% CI (lower – upper)	
Burger, Detergent, and Frozen Dessert				
EPD-EPK vs. EPD-NEPK	0.69	medium	0.37	0.99
EPD-EPK vs. NEPD-EPK	-0.02	negligible	-0.32	0.27
EPD-EPK vs. NEPD-NEPK	0.87	large	0.54	1.19
EPD-NEPK vs. NEPD-EPK	-0.68	medium	-0.98	-0.38
EPD-NEPK vs. NEPD-NEPK	0.21	small	-0.10	0.52
NEPD-EPK vs. NEPD-NEPK	0.85	large	0.53	1.16
EPD vs. NEPD	0.04	negligible	-0.20	0.28
EPK vs. NEPK	0.77	medium	0.52	1.01
Burger and Detergent				
EPD-EPK vs. EPD-NEPK	0.92	large	0.55	1.29
EPD-EPK vs. NEPD-EPK	-0.24	small	-0.59	0.10
EPD-EPK vs. NEPD-NEPK	1.25	large	0.87	1.63
EPD-NEPK vs. NEPD-EPK	-1.16	large	-1.54	-0.79
EPD-NEPK vs. NEPD-NEPK	0.33	small	-0.02	0.68
NEPD-EPK vs. NEPD-NEPK	1.50	large	1.12	1.87
EPD vs. NEPD	0.06	negligible	-0.21	0.32
EPK vs. NEPK	1.30	large	1.00	1.58
Burger				
EPD-EPK vs. EPD-NEPK	1.18	large	0.67	1.68
EPD-EPK vs. NEPD-EPK	-0.11	negligible	-0.55	0.32
EPD-EPK vs. NEPD-NEPK	1.27	large	0.77	1.76
EPD-NEPK vs. NEPD-EPK	-1.32	large	-1.83	-0.82
EPD-NEPK vs. NEPD-NEPK	0.22	small	-0.25	0.70
NEPD-EPK vs. NEPD-NEPK	1.41	large	0.92	1.90
EPD vs. NEPD	0.03	negligible	-0.28	0.35
EPK vs. NEPK	1.31	large	0.96	1.66
Detergent				
EPD-EPK vs. EPD-NEPK	0.66	medium	0.19	1.14
EPD-EPK vs. NEPD-EPK	-0.31	small	-0.78	0.16
EPD-EPK vs. NEPD-NEPK	0.98	large	0.50	1.45
EPD-NEPK vs. NEPD-EPK	-0.93	large	-1.41	-0.45
EPD-NEPK vs. NEPD-NEPK	0.24	small	-0.20	0.68
NEPD-EPK vs. NEPD-NEPK	1.24	large	0.76	1.72
EPD vs. NEPD	-0.02	negligible	-0.33	0.30
EPK vs. NEPK	0.96	large	0.63	1.30
Frozen Dessert				
EPD-EPK vs. EPD-NEPK	-0.06	negligible	-0.53	0.40
EPD-EPK vs. NEPD-EPK	-0.04	negligible	-0.49	0.40
EPD-EPK vs. NEPD-NEPK	-0.40	small	-0.91	0.11
EPD-NEPK vs. NEPD-EPK	0.01	negligible	-0.40	0.43

EPD-NEPK vs. NEPD-NEPK	-0.33	small	-0.81	0.15
NEPD-EPK vs. NEPD-NEPK	-0.30	small	-0.76	0.17
EPD vs. NEPD	-0.12	negligible	-0.44	-.19
EPK vs. NEPK	-0.15	negligible	-0.47	0.16

Table 13

Results of Linear Regression Models of Plastic Concern, Condition, and Rated Package Sustainability; Using Only Two Products: Burger and Detergent

Comparison	Estimate	lwr	upr	*p* adj
Tukey's multiple comparisons of means, without accounting for interaction effect				
EPD-EPK – EPD-NEPK	1.40	-2.88	5.68	.83
EPD-EPK – NEPD-EPK	-0.60	-4.42	3.22	.98
EPD-EPK – NEPD-NEPK	0.45	-3.55	4.46	.99
EPD-NEPK – NEPD-EPK	-2.00	-5.64	1.64	.49
EPD-NEPK – NEPD-NEPK	-0.95	-4.78	2.88	.92
NEPD-EPK – NEPD-NEPK	1.05	-2.26	4.36	.84
EPD – NEPD	-2.14	-4.55	0.27	.08**
EPK – NEPK	1.65	-0.34	3.64	.10
Estimated marginal means, with interaction effect, plastic concern at mean of 5.88				
EPD-EPK – EPD-NEPK	1.36	0.65	2.08	< .001*
EPD-EPK – NEPD-EPK	-0.46	-1.17	0.25	.35
EPD-EPK – NEPD-NEPK	1.84	1.14	2.55	< .001*
EPD-NEPK – NEPD-EPK	-1.82	-2.53	-1.11	< .001*
EPD-NEPK – NEPD-NEPK	0.48	-0.23	1.18	.30
NEPD-EPK – NEPD-NEPK	2.30	1.60	2.99	< .001*
EPD – NEPD	0.08	-0.36	0.53	.72
EPK – NEPK	1.88	1.50	2.26	< .001*

Note: * denotes results with significant *p*-values. ** denotes a result with a marginally significant *p*-value.

Table 14

Results of Linear Regression Models of Environmental Concern, Condition, and Rated Package Sustainability; Using Data with All Three Products: Burger, Detergent, and Frozen Dessert

Comparison	Estimate	lwr	upr	*p* adj
Tukey's multiple comparisons of means, without accounting for interaction effect				
EPD-EPK – EPD-NEPK	1.67	-1.36	4.70	.49
EPD-EPK – NEPD-EPK	-1.23	-4.21	1.75	.71
EPD-EPK – NEPD-NEPK	0.90	-2.26	4.06	.88
EPD-NEPK – NEPD-EPK	-2.91	-5.55	-0.26	.02*
EPD-NEPK – NEPD-NEPK	-0.77	-3.61	2.07	.90
NEPD-EPK – NEPD-NEPK	2.13	-0.65	4.92	.20
EPD – NEPD	-1.80	-3.55	-0.05	.04*
EPK – NEPK	1.41	-0.24	3.06	.09**
Comparison	Estimate	lwr	upr	*p* adj
Estimated marginal means, with interaction effect, environmental concern at mean of 5.37				
EPD-EPK – EPD-NEPK	0.96	0.36	1.56	< .001
EPD-EPK – NEPD-EPK	-0.05	-0.63	0.53	.99
EPD-EPK – NEPD-NEPK	1.25	0.64	1.87	< .001
EPD-NEPK – NEPD-EPK	-1.02	-1.59	-0.44	< .001
EPD-NEPK – NEPD-NEPK	0.29	-0.31	0.89	.60
NEPD-EPK – NEPD-NEPK	1.31	0.72	1.89	< .001
EPD – NEPD	0.04	-0.32	0.40	.81
EPK – NEPK	1.05	0.72	1.38	< .001

Note: * denotes results with significant *p*-values. ** denotes a result with a marginally significant *p*-value.

Table 15

Results of Linear Regression Models of Environmental Concern, Condition, and Rated Package Sustainability; Using Only Two Products: Burger and Detergent

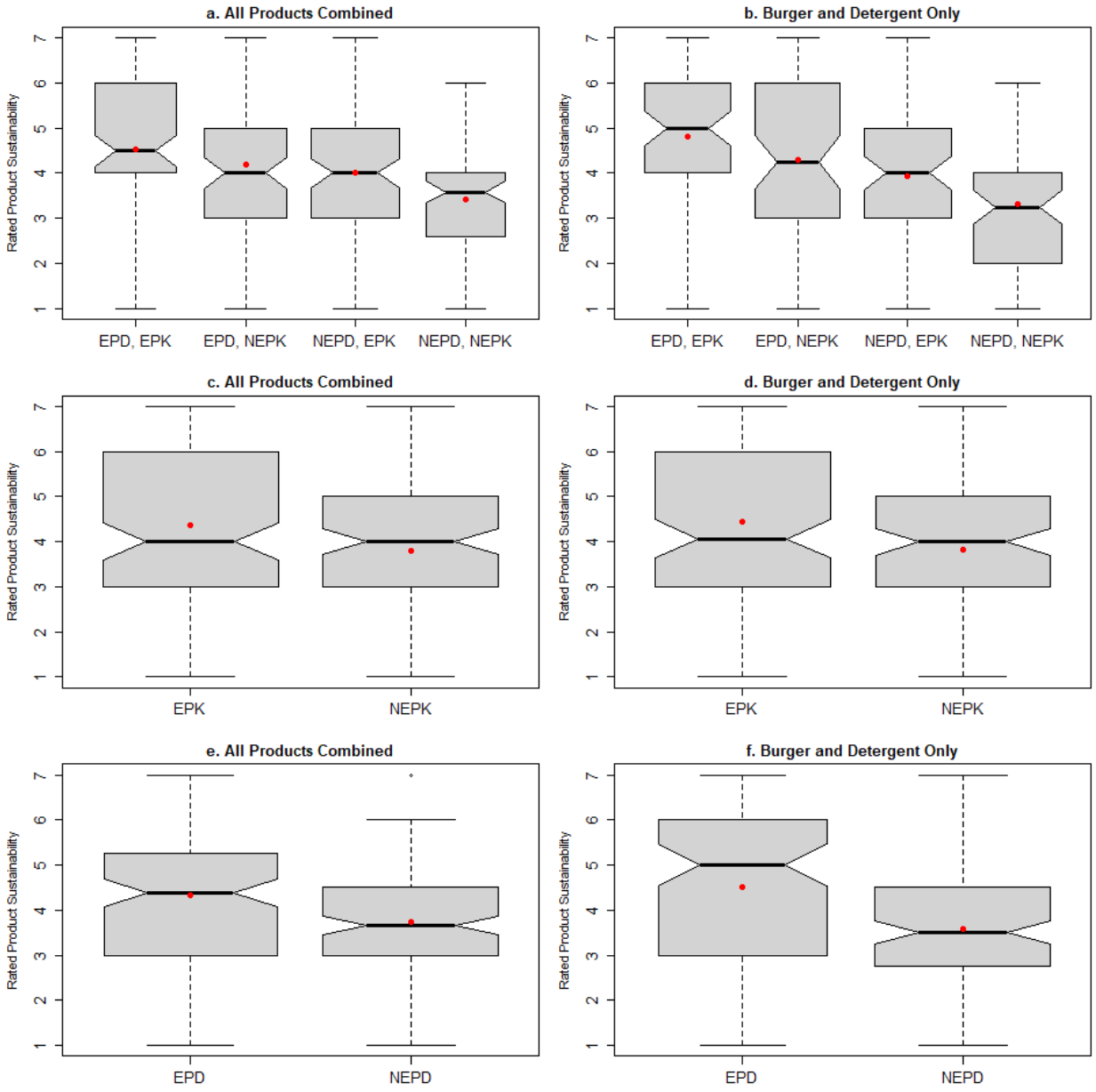
Comparison	Estimate	lwr	upr	*p* adj
Tukey's multiple comparisons of means, without accounting for interaction effect				
EPD-EPK – EPD-NEPK	1.77	-1.58	5.11	.52
EPD-EPK – NEPD-EPK	-0.37	-3.62	2.89	.99
EPD-EPK – NEPD-NEPK	1.66	-1.72	5.05	.58
EPD-NEPK – NEPD-EPK	-2.14	-5.31	1.04	.31
EPD-NEPK – NEPD-NEPK	-0.10	-3.41	3.20	.99
NEPD-EPK – NEPD-NEPK	2.03	-1.18	5.25	.36
EPD – NEPD	-1.44	-3.62	0.75	.20
EPK – NEPK	1.67	-0.12	3.46	.07**
Estimated marginal means, with interaction effect, environmental concern at mean of 5.33				
EPD-EPK – EPD-NEPK	1.40	0.68	2.12	< .001*
EPD-EPK – NEPD-EPK	-0.40	-1.11	0.31	.46
EPD-EPK – NEPD-NEPK	1.87	1.17	2.58	< .001*
EPD-NEPK – NEPD-EPK	-1.80	-2.51	-1.09	< .001*
EPD-NEPK – NEPD-NEPK	0.48	-0.23	1.18	.31
NEPD-EPK – NEPD-NEPK	2.27	1.58	2.97	< .001*
EPD – NEPD	1.44	-0.75	3.62	.20
EPK – NEPK	1.88	1.50	2.27	< .001*

Note: * denotes results with significant *p*-values. ** denotes a result with a marginally significant *p*-value.

VIII.1.e. Product Evaluations

Figure 21

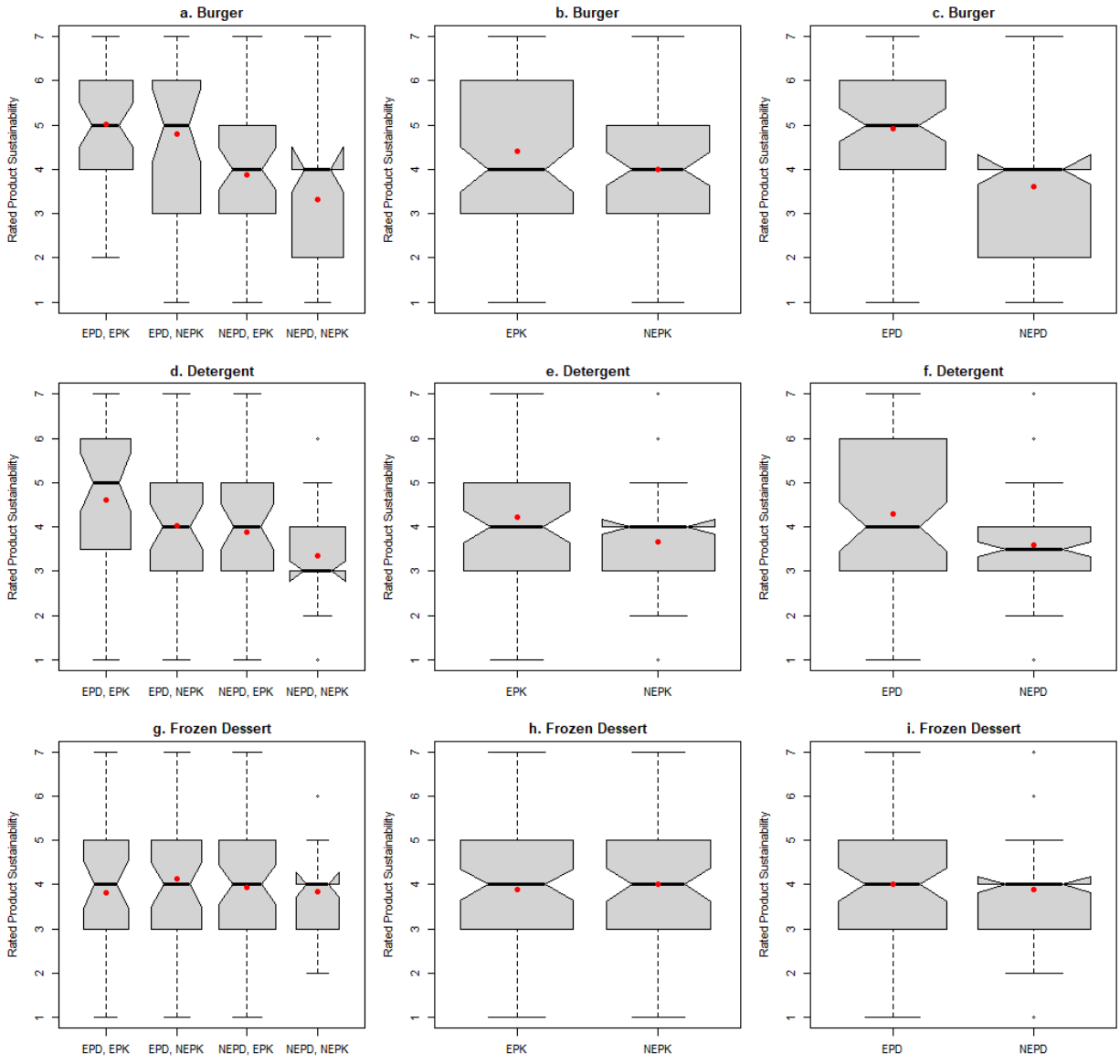
Boxplots of Rated Product Sustainability Across All Products (Burger, Detergent, and Frozen Dessert), and for Burger and Detergent Only



Note: From top to bottom, plots show all versions, compare the sustainable packaged versions (EPK and NEPK), and compare the sustainable product versions (EPD and NEPD). Whiskers indicate the minimum and maximum outliers, box region indicates the bounds of the 1st and 3rd quartile range, lines represent the median, notches represent the 95% confidence interval of the median, and red dots indicate the mean value.

Figure 22

Boxplots of Rated Product Sustainability for Burger, Detergent, and Frozen Dessert Products



Note: Boxplots of rated package sustainability for each product separately. From left to right, plots show all versions, compare the sustainable packaged versions (EPK and NEPK), and compare the sustainable product versions (EPD and NEPD). Whiskers indicate the minimum and maximum outliers, box region indicates the bounds of the 1st and 3rd quartile range, lines represent the median, notches represent the 95% confidence interval of the median, and red dots indicate the mean value.

Table 16

Summary Information of Perceived Product Sustainability

Version	*n*	*M*	*SD*	Min	Pctl. 25	Pctl. 75	Max
Burger, Detergent, and Frozen Dessert							
EPD-EPK	82	4.5	1.4	1	4	5.9	7
EPD-NEPK	86	4.2	1.5	1	3	5	7
NEPD-EPK	97	4	1.5	1	3	5	7
NEPD-NEPK	80	3.4	1.3	1	2.6	4	6
EPD	130	4.3	1.4	1	3	5.2	7
NEPD	135	3.7	1.3	1	3	4.5	7
EPK	138	4.2	1.3	1	3.1	5	7
NEPK	133	3.9	1.4	1	3	5	7
Burger and Detergent							
EPD-EPK	64	4.8	1.4	1	4	6	7
EPD-NEPK	62	4.3	1.7	1	3	5.9	7
NEPD-EPK	67	3.9	1.6	1	3	5	7
NEPD-NEPK	68	3.3	1.4	1	2	4	6
EPD	106	4.5	1.5	1	3.1	6	7
NEPD	115	3.6	1.4	1	2.8	4.5	7
EPK	118	4.5	1.5	1	3	5.9	7
NEPK	116	3.8	1.5	1	3	5	7
Burger							
EPD-EPK	40	5	1.3	2	4	6	7
EPD-NEPK	33	4.8	1.7	1	3	6	7
NEPD-EPK	45	3.9	1.8	1	3	5	7
NEPD-NEPK	38	3.3	1.7	1	2	4	7
EPD	73	4.9	1.5	1	4	6	7
NEPD	83	3.6	1.7	1	2	4	7
EPK	85	4.4	1.7	1	3	6	7
NEPK	71	4	1.9	1	3	5	7
Detergent							
EPD-EPK	35	4.6	1.6	1	3.5	6	7
EPD-NEPK	39	4	1.5	1	3	5	7
NEPD-EPK	38	3.9	1.4	1	3	5	7
NEPD-NEPK	44	3.3	1.3	1	3	4	6
EPD	74	4.3	1.6	1	3	6	7
NEPD	82	3.6	1.4	1	3	4	7
EPK	73	4.2	1.6	1	3	5	7
NEPK	83	3.7	1.4	1	3	4	7
Frozen Dessert							
EPD-EPK	33	3.8	1.4	1	3	5	7
EPD-NEPK	42	4.1	1.4	1	3	5	7
NEPD-EPK	51	3.9	1.3	1	3	5	7

NEPD-NEPK	30	3.8	1.1	2	3	4	6
EPD	75	4	1.4	1	3	5	7
NEPD	81	3.9	1.2	1	3	4	7
EPK	84	3.9	1.4	1	3	5	7
NEPK	72	4	1.3	1	3	5	7

Note: Mean values are based on a 7-point scale, where 4 = 'neutral'.

Table 17

Results of Linear Regression Models of Plastic Concern, Condition, and Rated Product Sustainability; Using Data with All Three Products: Burger, Detergent, and Frozen Dessert

Comparison	Estimate	lwr	upr	*p* adj
Tukey's multiple comparisons of means, without accounting for interaction effect				
EPD-EPK – EPD-NEPK	1.32	-1.76	4.40	.68
EPD-EPK – NEPD-EPK	0.44	-2.54	3.41	.98
EPD-EPK – NEPD-NEPK	0.32	-2.87	3.51	.99
EPD-NEPK – NEPD-EPK	-0.88	-3.40	1.63	.80
EPD-NEPK – NEPD-NEPK	-1.00	-3.77	1.77	.79
NEPD-EPK – NEPD-NEPK	-0.12	-2.77	2.54	.99
EPD – NEPD	-0.46	-2.13	1.21	.59
EPK – NEPK	0.21	-1.40	1.83	.79
Estimated marginal means, with interaction effect, environmental concern at mean of 5.85				
EPD-EPK – EPD-NEPK	0.23	-0.33	0.79	.71
EPD-EPK – NEPD-EPK	0.43	-0.12	0.96	.18
EPD-EPK – NEPD-NEPK	1.06	0.49	1.63	< .001*
EPD-NEPK – NEPD-EPK	0.20	-0.34	0.73	.78
EPD-NEPK – NEPD-NEPK	0.82	0.27	1.38	.001*
NEPD-EPK – NEPD-NEPK	0.628	0.08	1.17	.02*
EPD – NEPD	0.57	0.24	0.89	< .001*
EPK – NEPK	0.32	-0.003	0.63	.052**

Note: * denotes results with significant *p*-values. ** denotes a result with a marginally significant p-value.

Table 18

Results of Cohen's d Effect Size for Rated Product Sustainability

	Cohen's d estimate		95% CI (lower – upper)	
Burger, Detergent, and Frozen Dessert				
EPD-EPK vs. EPD-NEPK	0.23	small	-0.08	0.54
EPD-EPK vs. NEPD-EPK	0.37	small	0.07	0.67
EPD-EPK vs. NEPD-NEPK	0.84	large	0.52	1.16
EPD-NEPK vs. NEPD-EPK	0.13	negligible	-0.16	0.42
EPD-NEPK vs. NEPD-NEPK	0.56	medium	0.25	0.88
NEPD-EPK vs. NEPD-NEPK	0.43	small	0.13	0.73
EPD vs. NEPD	0.44	small	0.20	0.69
EPK vs. NEPK	0.24	small	-0.01	0.48
Burger and Detergent				
EPD-EPK vs. EPD-NEPK	0.32	small	-0.03	0.68
EPD-EPK vs. NEPD-EPK	0.56	medium	0.21	0.92
EPD-EPK vs. NEPD-NEPK	1.06	large	0.69	1.42
EPD-NEPK vs. NEPD-EPK	0.22	small	-0.13	0.57
EPD-NEPK vs. NEPD-NEPK	0.64	medium	0.28	0.99
NEPD-EPK vs. NEPD-NEPK	0.41	small	0.07	0.76
EPD vs. NEPD	0.61	medium	0.34	0.88
EPK vs. NEPK	0.41	small	0.15	0.67
Burger				
EPD-EPK vs. EPD-NEPK	0.15	negligible	-0.31	0.62
EPD-EPK vs. NEPD-EPK	0.74	medium	0.29	1.19
EPD-EPK vs. NEPD-NEPK	1.13	large	0.65	1.62
EPD-NEPK vs. NEPD-EPK	0.53	medium	0.06	0.99
EPD-NEPK vs. NEPD-NEPK	0.86	large	0.36	1.36
NEPD-EPK vs. NEPD-NEPK	0.32	small	-0.12	0.76
EPD vs. NEPD	0.80	medium	0.47	1.12
EPK vs. NEPK	0.24	small	-0.08	0.55
Detergent				
EPD-EPK vs. EPD-NEPK	0.37	small	-0.10	0.84
EPD-EPK vs. NEPD-EPK	0.46	small	-0.01	0.94
EPD-EPK vs. NEPD-NEPK	0.87	large	0.40	1.34
EPD-NEPK vs. NEPD-EPK	0.09	negligible	-0.36	0.54
EPD-NEPK vs. NEPD-NEPK	0.49	small	0.05	0.94
NEPD-EPK vs. NEPD-NEPK	0.41	small	-0.04	0.85
EPD vs. NEPD	0.48	small	0.16	0.80
EPK vs. NEPK	0.39	small	0.07	0.71
Frozen Dessert				
EPD-EPK vs. EPD-NEPK	-0.23	small	-0.69	0.24
EPD-EPK vs. NEPD-EPK	-0.09	negligible	-0.53	0.35
EPD-EPK vs. NEPD-NEPK	-0.01	negligible	-0.52	0.49
EPD-NEPK vs. NEPD-EPK	0.15	negligible	-0.27	0.56

EPD-NEPK vs. NEPD-NEPK	0.24	small	-0.24	0.72
NEPD-EPK vs. NEPD-NEPK	0.09	negligible	-0.37	0.55
EPD vs. NEPD	0.07	negligible	-0.24	0.39
EPK vs. NEPK	-0.09	negligible	-0.41	0.23

Table 19

Results of Linear Regression Models of Plastic Concern, Condition, and Rated Product Sustainability; Using Only Two Products: Burger and Detergent

Comparison	Estimate	lwr	upr	*p* adj
Tukey's multiple comparisons of means, without accounting for interaction effect				
EPD-EPK – EPD-NEPK	2.16	-1.98	6.30	.53
EPD-EPK – NEPD-EPK	1.04	-2.66	4.73	.89
EPD-EPK – NEPD-NEPK	0.45	-3.42	4.33	.99
EPD-NEPK – NEPD-EPK	-1.13	-4.64	2.39	.84
EPD-NEPK – NEPD-NEPK	-1.71	-5.42	2.00	.63
NEPD-EPK – NEPD-NEPK	-0.58	-3.78	2.62	.97
EPD – NEPD	-0.64	-2.76	1.48	.55
EPK – NEPK	0.07	-1.91	2.05	.94
Estimated marginal means, with interaction effect, environmental concern at mean of 5.85				
EPD-EPK – EPD-NEPK	0.44	-0.26	1.13	.37
EPD-EPK – NEPD-EPK	0.72	0.3	1.40	.04*
EPD-EPK – NEPD-NEPK	1.43	0.75	2.11	< .001*
EPD-NEPK – NEPD-EPK	0.28	-0.41	0.97	.72
EPD-NEPK – NEPD-NEPK	0.99	0.31	1.67	.001*
NEPD-EPK – NEPD-NEPK	0.71	0.04	1.39	.03
EPD – NEPD	0.87	0.48	1.27	< .001*
EPK – NEPK	0.63	0.25	1.01	.001*

Note: * denotes results with significant *p*-values.

Table 20

Results of Linear Regression Models of Environmental Concern, Condition, and Rated Product Sustainability; Using Data with All Three Products: Burger, Detergent, and Frozen Dessert

Comparison	Estimate	lwr	upr	*p* adj
Tukey's multiple comparisons of means, without accounting for interaction effect				
EPD-EPK – EPD-NEPK	0.33	-2.52	3.19	.99
EPD-EPK – NEPD-EPK	-0.27	-3.07	2.54	.99
EPD-EPK – NEPD-NEPK	0.02	-2.95	2.99	.99
EPD-NEPK – NEPD-EPK	-0.60	-3.08	1.89	.93
EPD-NEPK – NEPD-NEPK	-0.31	-2.98	2.36	.99
NEPD-EPK – NEPD-NEPK	0.29	-2.33	2.91	.99
EPD – NEPD	-0.91	-2.49	0.66	.25
EPK – NEPK	0.12	-1.48	1.72	.88
Estimated marginal means, with interaction effect, environmental concern at mean of 5.37				
EPD-EPK – EPD-NEPK	0.29	-0.28	0.85	.55
EPD-EPK – NEPD-EPK	0.47	-0.08	1.02	.12
EPD-EPK – NEPD-NEPK	1.08	0.50	1.65	< .001*
EPD-NEPK – NEPD-EPK	0.18	-0.36	0.72	.82
EPD-NEPK – NEPD-NEPK	0.79	0.22	1.35	.002*
NEPD-EPK – NEPD-NEPK	0.60	0.05	1.16	.026*
EPD – NEPD	0.57	0.25	0.89	< .001*
EPK – NEPK	-0.31	-0.63	0.01	0.058**

Note: * denotes results with significant *p*-values. ** denotes a result with a marginally significant *p*-value.

Table 21

Results of Linear Regression Models of Environmental Concern, Condition, and Rated Product Sustainability; Using Only Two Products: Burger and Detergent

Comparison	Estimate	lwr	upr	*p* adj
Tukey's multiple comparisons of means, without accounting for interaction effect				
EPD-EPK – EPD-NEPK	0.75	-2.54	4.03	.94
EPD-EPK – NEPD-EPK	-0.19	-3.39	3.01	.99
EPD-EPK – NEPD-NEPK	1.02	-2.30	4.34	.86
EPD-NEPK – NEPD-EPK	-0.94	-4.06	2.18	.87
EPD-NEPK – NEPD-NEPK	0.27	-2.98	3.52	.99
NEPD-EPK – NEPD-NEPK	1.21	-1.95	4.37	.76
EPD – NEPD	-0.73	-2.66	1.19	.45
EPK – NEPK	0.93	-0.88	2.74	.31
Estimated marginal means, with interaction effect, environmental concern at mean of 5.33				
EPD-EPK – EPD-NEPK	0.49	-0.22	1.19	.28
EPD-EPK – NEPD-EPK	0.81	0.11	1.50	.02*
EPD-EPK – NEPD-NEPK	1.46	0.77	2.15	< .001*
EPD-NEPK – NEPD-EPK	0.32	-0.38	1.02	.64
EPD-NEPK – NEPD-NEPK	0.97	0.28	1.67	.002*
NEPD-EPK – NEPD-NEPK	0.65	-0.03	1.34	.069**
EPD – NEPD	0.89	0.49	1.28	< .001*
EPK – NEPK	0.64	0.25	1.03	.002*

Note: * denotes results with significant *p*-values. ** denotes results with marginally significant *p*-values.

VIII.1.f. Thematic Analysis of Product Advertisements

Table 22

Environmental (EV) Comments From Open-Ended Questions with Each Product Advertisement, Based on the Number of Comments Given

Condition	All EV Comments	Vague EV Comments	Plastic-Based EV Comments	Non-Plastic EV Comments	Total Sample (*n*)
Burger, Detergent, and Frozen Dessert					
EPD, EPK	54%	22%	20%	13%	82
EPD, NEPK	23%	14%	0%	9%	86
NEPD, EPK	37%	8%	29%	1%	97
NEPD, NEPK	9%	4%	4%	1%	80
EPD	37%	16%	10%	11%	130
NEPD	24%	5%	18%	1%	135
EPK	46%	16%	24%	7%	138
NEPK	17%	10%	2%	5%	133
Burger and Detergent					
EPD, EPK	68%	29%	25%	14%	65
EPD, NEPK	35%	21%	0%	14%	62
NEPD, EPK	54%	11%	40%	2%	67
NEPD, NEPK	11%	5%	4%	1%	68
EPD	52%	25%	13%	14%	106
NEPD	31%	7%	23%	2%	115
EPK	62%	21%	33%	9%	119
NEPK	22%	13%	2%	7%	116

Table 23

Results of 2x2 ANOVA with Post-hoc Tukey HSD Test on the Amounts of Environmental Comments (EV) During Exposure to All Product Advertisements (Burger, Detergent, and Frozen Dessert)

Comparison	diff	lwr	upr	*p* adj
		All EV Comments		
EPD-EPK – EPD-NEPK	0.31	0.13	0.49	.002*
EPD-EPK – NEPD-EPK	0.17	-0.01	0.34	.06
EPD-EPK – NEPD-NEPK	0.45	0.27	0.64	< .001*
EPD-NEPK – NEPD-EPK	-0.14	-0.31	0.03	.14
EPD-NEPK – NEPD-NEPK	0.14	-0.04	0.32	.17
NEPD-EPK – NEPD-NEPK	0.29	0.11	0.46	< .001*
EPD – NEPD	0.13	0.02	0.24	0.02*
EPK – NEPK	0.24	0.03	0.24	< .001*
		Vague EV Comments		
EPD-EPK – EPD-NEPK	0.08	-0.04	0.19	.33
EPD-EPK – NEPD-EPK	0.14	0.03	0.25	.009*
EPD-EPK – NEPD-NEPK	0.18	0.06	0.30	< .001*
EPD-NEPK – NEPD-EPK	0.06	-0.05	0.17	.47
EPD-NEPK – NEPD-NEPK	0.10	-0.01	0.22	.11
NEPD-EPK – NEPD-NEPK	0.04	-0.07	0.15	.80
EPD – NEPD	0.11	0.05	0.17	< .001*
EPK – NEPK	0.06	-0.01	0.12	.12
		Plastic EV Comments		
EPD-EPK – EPD-NEPK	0.20	0.08	0.32	<.001*
EPD-EPK – NEPD-EPK	-0.09	-0.20	0.03	.24
EPD-EPK – NEPD-NEPK	0.16	0.04	0.29	.005*
EPD-NEPK – NEPD-EPK	-0.29	-0.40	-0.17	< .001*
EPD-NEPK – NEPD-NEPK	-0.04	-0.16	0.09	.86
NEPD-EPK – NEPD-NEPK	0.25	0.13	0.37	< .001*
EPD – NEPD	-0.08	-0.15	-0.01	.03*
EPK – NEPK	0.23	0.15	0.28	< .001*
		Non-Plastic EV Comments		
EPD-EPK – EPD-NEPK	0.03	-0.05	0.12	.71
EPD-EPK – NEPD-EPK	0.12	0.03	0.20	.002*
EPD-EPK – NEPD-NEPK	0.11	0.03	0.20	.004*
EPD-NEPK – NEPD-EPK	0.08	-0.001	0.16	.052**
EPD-NEPK – NEPD-NEPK	0.08	-0.01	0.16	.08
NEPD-EPK – NEPD-NEPK	0.002	-0.09	0.08	.99
EPD – NEPD	0.10	0.05	0.15	< .001*
EPK – NEPK	0.01	-0.04	0.06	.61

Note: * denotes results with significant *p*-values. ** denotes results with marginally significant *p*-values.

Table 24

Results of 2x2 ANOVA with Post-hoc Tukey HSD Test on the Amounts of Environmental Comments (EV) During Exposure to the Burger and Detergent Products

Comparison	Estimate	lwr	upr	*p* adj
All EV Comments				
EPD-EPK – EPD-NEPK	0.34	0.11	0.56	< .001*
EPD-EPK – NEPD-EPK	0.15	-0.07	0.36	.31
EPD-EPK – NEPD-NEPK	0.57	0.36	0.79	< .001*
EPD-NEPK – NEPD-EPK	-0.19	-0.41	0.03	.12
EPD-NEPK – NEPD-NEPK	0.24	0.02	0.50	.03*
NEPD-EPK – NEPD-NEPK	0.43	0.21	0.64	< .001*
EPD – NEPD	0.21	0.08	0.34	.002*
EPK – NEPK	0.40	0.30	0.52	< .001*
Vague EV Comments				
EPD-EPK – EPD-NEPK	0.08	-0.07	0.24	.51
EPD-EPK – NEPD-EPK	0.18	0.03	0.33	.01*
EPD-EPK – NEPD-NEPK	0.24	0.09	0.39	< .001*
EPD-NEPK – NEPD-EPK	0.19	-0.06	0.25	.36
EPD-NEPK – NEPD-NEPK	0.16	0.004	0.31	.04*
NEPD-EPK – NEPD-NEPK	0.06	-0.09	0.21	.72
EPD – NEPD	0.19	0.10	0.27	< .001*
EPK – NEPK	0.07	-0.02	0.16	.11
Plastic EV Comments				
EPD-EPK – EPD-NEPK	0.25	0.10	0.41	< .001*
EPD-EPK – NEPD-EPK	-0.15	-0.30	0.001	.051**
EPD-EPK – NEPD-NEPK	0.21	0.06	0.36	.002*
EPD-NEPK – NEPD-EPK	-0.40	-0.55	-0.25	< .001*
EPD-NEPK – NEPD-NEPK	-0.04	-0.20	0.11	..87
NEPD-EPK – NEPD-NEPK	0.36	0.21	0.51	< .001*
EPD – NEPD	-0.10	-0.19	-0.01	.03*
EPK – NEPK	0.31	0.22	0.39	< .001*
Non-Plastic EV Comments				
EPD-EPK – EPD-NEPK	0.001	-0.11	0.12	.99
EPD-EPK – NEPD-EPK	0.12	0.004	0.23	.04*
EPD-EPK – NEPD-NEPK	0.12	0.01	0.24	.02*
EPD-NEPK – NEPD-EPK	0.11	0.001	0.23	.047*
EPD-NEPK – NEPD-NEPK	0.12	0.01	0.24	.03
NEPD-EPK – NEPD-NEPK	0.01	-0.10	0.12	.99
EPD – NEPD	0.12	0.06	0.19	< .001*
EPK – NEPK	0.02	-0.05	0.08	.55

Note: * denotes results with significant *p*-values. ** denotes results with marginally significant *p*-values.

Table 25

Results of Cohen's d Effect Size Comparing the Amounts of Environmental Comments (EV) During Exposure to All Product Advertisements (Burger, Detergent, and Frozen Dessert)

	Cohen's d estimate		95% CI (lower – upper)	
All EV Comments				
EPD-EPK vs. EPD-NEPK	0.60	medium	0.29	0.92
EPD-EPK vs. NEPD-EPK	0.31	small	0.01	0.61
EPD-EPK vs. NEPD-NEPK	0.96	large	0.63	1.28
EPD-NEPK vs. NEPD-EPK	-0.33	small	-0.63	-0.04
EPD-NEPK vs. NEPD-NEPK	0.44	small	0.13	0.75
NEPD-EPK vs. NEPD-NEPK	0.75	medium	0.44	1.06
EPD vs. NEPD	0.30	small	0.05	0.54
EPK vs. NEPK	0.69	medium	0.44	0.93
Vague EV Comments				
EPD-EPK vs. EPD-NEPK	0.22	small	-0.09	0.52
EPD-EPK vs. NEPD-EPK	0.43	small	0.13	0.73
EPD-EPK vs. NEPD-NEPK	0.59	medium	0.27	0.91
EPD-NEPK vs. NEPD-EPK	0.22	small	-0.07	0.51
EPD-NEPK vs. NEPD-NEPK	0.40	small	0.09	0.71
NEPD-EPK vs. NEPD-NEPK	0.18	negligible	-0.12	0.48
EPD vs. NEPD	0.45	small	0.20	0.69
EPK vs. NEPK	0.19	negligible	-0.05	0.43
Plastic EV Comments				
EPD-EPK vs. EPD-NEPK	0.72	medium	0.40	1.03
EPD-EPK vs. NEPD-EPK	-0.21	small	-0.51	0.09
EPD-EPK vs. NEPD-NEPK	0.52	medium	0.21	0.84
EPD-NEPK vs. NEPD-EPK	-0.94	large	-1.24	-0.63
EPD-NEPK vs. NEPD-NEPK	-0.31	small	-0.62	-0.002
NEPD-EPK vs. NEPD-NEPK	0.75	medium	0.44	1.06
EPD vs. NEPD	-0.27	small	-0.51	-0.02
EPK vs. NEPK	0.81	large	0.56	1.06
Non-Plastic Comments				
EPD-EPK vs. EPD-NEPK	0.12	negligible	-0.19	0.42
EPD-EPK vs. NEPD-EPK	0.52	medium	0.22	0.92
EPD-EPK vs. NEPD-NEPK	0.48	small	0.17	0.80
EPD-NEPK vs. NEPD-EPK	0.42	small	0.13	0.72
EPD-NEPK vs. NEPD-NEPK	0.39	small	0.08	0.70
NEPD-EPK vs. NEPD-NEPK	-0.03	negligible	-0.33	0.27
EPD vs. NEPD	0.48	small	0.24	0.73
EPK vs. NEPK	0.06	negligible	-0.18	0.30

Table 26

Results of Cohen's d Effect Size Comparing the Amounts of Environmental Comments (EV) During Exposure to the Burger and Detergent Products

	Cohen's d estimate		95% CI (lower – upper)	
		All EV Comments		
EPD-EPK vs. EPD-NEPK	0.61	medium	0.25	0.97
EPD-EPK vs. NEPD-EPK	0.26	small	-0.09	0.60
EPD-EPK vs. NEPD-NEPK	1.18	large	0.81	1.55
EPD-NEPK vs. NEPD-EPK	-0.39	small	-0.74	-0.04
EPD-NEPK vs. NEPD-NEPK	0.63	medium	0.27	0.98
NEPD-EPK vs. NEPD-NEPK	1.04	large	0.67	1.40
EPD vs. NEPD	0.42	small	0.16	0.69
EPK vs. NEPK	0.81	large	0.54	1.08
		Vague EV Comments		
EPD-EPK vs. EPD-NEPK	0.20	small	-0.15	0.56
EPD-EPK vs. NEPD-EPK	0.49	small	0.14	0.84
EPD-EPK vs. NEPD-NEPK	0.71	medium	0.36	1.07
EPD-NEPK vs. NEPD-EPK	0.29	small	-0.06	0.64
EPD-NEPK vs. NEPD-NEPK	0.52	medium	0.17	0.87
NEPD-EPK vs. NEPD-NEPK	0.23	small	-0.11	0.57
EPD vs. NEPD	0.60	medium	0.33	0.88
EPK vs. NEPK	0.21	small	-0.05	0.47
		Plastic EV Comments		
EPD-EPK vs. EPD-NEPK	0.82	large	0.45	1.18
EPD-EPK vs. NEPD-EPK	-0.33	small	-0.68	0.01
EPD-EPK vs. NEPD-NEPK	0.63	medium	0.28	0.98
EPD-NEPK vs. NEPD-EPK	-1.21	large	-1.59	-0.83
EPD-NEPK vs. NEPD-NEPK	-0.32	small	-0.67	0.03
NEPD-EPK vs. NEPD-NEPK	1.02	large	0.66	1.38
EPD vs. NEPD	-0.29	small	-0.55	-0.02
EPK vs. NEPK	0.95	large	0.67	1.22
		Non-Plastic Comments		
EPD-EPK vs. EPD-NEPK	0.004	negligible	-0.35	0.36
EPD-EPK vs. NEPD-EPK	0.45	small	0.11	0.80
EPD-EPK vs. NEPD-NEPK	0.51	medium	0.16	0.86
EPD-NEPK vs. NEPD-EPK	0.45	small	0.10	0.80
EPD-NEPK vs. NEPD-NEPK	0.50	medium	0.15	0.86
NEPD-EPK vs. NEPD-NEPK	0.07	negligible	-0.27	0.41
EPD vs. NEPD	0.52	medium	0.25	0.79
EPK vs. NEPK	0.08	negligible	-0.18	0.33

Table 27

Positive and Negative Sentiments From Open-Ended Questions with Each Product Advertisement, Based on the Proportion of the Number of Comments Given

Condition	Very Positive	Positive	Neutral	Negative	Very Negative	Total Sample (*n*)
Burger, Detergent, and Frozen Dessert						
EPD, EPK	37%	24%	26%	13%	16%	82
EPD, NEPK	34%	27%	20%	21%	15%	86
NEPD, EPK	34%	30%	29%	19%	6%	97
NEPD, NEPK	44%	26%	18%	26%	9%	80
EPD	36%	25%	24%	19%	14%	130
NEPD	39%	27%	26%	21%	9%	135
EPK	34%	27%	28%	20%	12%	138
NEPK	39%	27%	18%	24%	13%	133
Burger and Detergent						
EPD, EPK	40%	18%	20%	15%	15%	65
EPD, NEPK	24%	24%	23%	21%	18%	62
NEPD, EPK	31%	36%	24%	13%	7%	67
NEPD, NEPK	38%	28%	15%	24%	10%	68
EPD	34%	21%	22%	19%	16%	106
NEPD	36%	29%	22%	19%	10%	115
EPK	36%	27%	21%	15%	12%	119
NEPK	33%	27%	19%	22%	14%	116

Table 28

Results of 2x2 ANOVA with Post-hoc Tukey HSD Test on the Positive and Negative Sentiments From Open-Ended Questions with Each Product Advertisement (Burger, Detergent, and Frozen Dessert)

Comparison	diff	lwr	upr	*p* adj
		Positive Comments		
EPD-EPK – EPD-NEPK	0.002	-0.20	0.20	.99
EPD-EPK – NEPD-EPK	-0.04	-0.23	0.15	.95
EPD-EPK – NEPD-NEPK	-0.05	-0.25	0.15	.91
EPD-NEPK – NEPD-EPK	-0.04	-0.23	0.15	.94
EPD-NEPK – NEPD-NEPK	-0.05	-0.25	0.15	.90
NEPD-EPK – NEPD-NEPK	-0.01	-0.21	0.18	.99
EPD – NEPD	-0.02	-0.14	0.10	.80
EPK – NEPK	0.01	-0.11	0.13	.88
		Neutral Comments		
EPD-EPK – EPD-NEPK	0.08	-0.07	0.23	.52
EPD-EPK – NEPD-EPK	0.04	-0.11	0.18	.92
EPD-EPK – NEPD-NEPK	0.11	-0.05	0.26	.29
EPD-NEPK – NEPD-EPK	0.04	-0.19	0.10	.86
EPD-NEPK – NEPD-NEPK	0.03	-0.13	0.18	.97
NEPD-EPK – NEPD-NEPK	0.07	-0.08	0.22	.61
EPD – NEPD	0.01	-0.08	0.11	.76
EPK – NEPK	0.03	-0.06	0.12	.53
		Negative Comments		
EPD-EPK – EPD-NEPK	-0.08	-0.26	0.09	.61
EPD-EPK – NEPD-EPK	0.003	-0.17	0.17	.99
EPD-EPK – NEPD-NEPK	-0.06	-0.23	0.12	.85
EPD-NEPK – NEPD-EPK	0.09	-0.08	0.25	.54
EPD-NEPK – NEPD-NEPK	0.03	-0.15	0.20	..98
NEPD-EPK – NEPD-NEPK	-0.06	-0.23	0.11	.81
EPD – NEPD	0.001	-0.10	0.10	.98
EPK – NEPK	-0.04	-0.14	0.07	.46

Table 29

Results of 2x2 ANOVA with Post-hoc Tukey HSD Test on the Positive and Negative Sentiments From Open-Ended Questions with Each Product Advertisement (Burger, Detergent)

Comparison	diff	lwr	upr	*p* adj
		Positive Comments		
EPD-EPK – EPD-NEPK	0.10	-0.12	0.33	.65
EPD-EPK – NEPD-EPK	-0.09	-0.31	0.13	.74
EPD-EPK – NEPD-NEPK	-0.06	-0.29	0.16	.88
EPD-NEPK – NEPD-EPK	-0.19	-0.42	0.03	.13
EPD-NEPK – NEPD-NEPK	-0.17	-0.39	0.06	.22
NEPD-EPK – NEPD-NEPK	0.02	-0.20	0.24	.99
EPD – NEPD	-0.1	-0.23	0.03	.14
EPK – NEPK	0.05	-0.07	0.18	.41
		Neutral Comments		
EPD-EPK – EPD-NEPK	0.006	-0.17	0.18	.99
EPD-EPK – NEPD-EPK	0.04	-0.13	0.20	.95
EPD-EPK – NEPD-NEPK	0.08	0.09	0.25	.59
EPD-NEPK – NEPD-EPK	0.03	-0.14	0.20	.97
EPD-NEPK – NEPD-NEPK	0.08	-0.09	0.25	.66
NEPD-EPK – NEPD-NEPK	0.05	-0.12	0.21	.89
EPD – NEPD	0.04	-0.06	0.15	.42
EPK – NEPK	0.01	-0.09	0.11	.80
		Negative Comments		
EPD-EPK – EPD-NEPK	-0.11	-0.31	0.09	.51
EPD-EPK – NEPD-EPK	0.05	-0.15	0.25	.90
EPD-EPK – NEPD-NEPK	-0.02	-0.22	0.18	.99
EPD-NEPK – NEPD-EPK	0.16	-0.04	0.36	.16
EPD-NEPK – NEPD-NEPK	0.09	-0.11	0.29	.65
NEPD-EPK – NEPD-NEPK	-0.07	-0.27	0.13	.79
EPD – NEPD	0.06	-0.06	0.17	.33
EPK – NEPK	-0.07	-0.18	0.05	.25

Table 30

Positive and Negative Environmental (EV) Sentiments From Open-Ended Questions with Each Product Advertisement, Based on the Proportion of the Number of Comments Given

Condition	EV Comments (+)	EV Comments (-)	Plastic Comments (+)	Plastic Comments (-)	Total Sample (*n*)
Burger, Detergent, and Frozen Dessert					
EPD, EPK	27%	12%	21%	2%	82
EPD, NEPK	20%	12%	0%	0%	86
NEPD, EPK	11%	1%	35%	5%	97
NEPD, NEPK	4%	3%	1%	6%	80
EPD	24%	11%	10%	1%	130
NEPD	8%	2%	20%	6%	135
EPK	19%	7%	29%	5%	138
NEPK	14%	8%	1%	3%	133
Burger and Detergent					
EPD, EPK	34%	14%	26%	3%	65
EPD, NEPK	24%	15%	0%	0%	62
NEPD, EPK	15%	1%	49%	4%	67
NEPD, NEPK	4%	3%	1%	7%	68
EPD	31%	14%	13%	2%	106
NEPD	10%	3%	24%	7%	115
EPK	25%	8%	38%	4%	119
NEPK	14%	9%	1%	4%	116

Table 31

Results of 2x2 ANOVA with Post-hoc Tukey HSD Test on the Positive and Negative Environmental-Specific Sentiments From Open-Ended Questions with Each Product Advertisement (Burger, Detergent, and Frozen Dessert)

Comparison	diff	lwr	upr	*p* adj
Positive Overall EV Comments				
EPD-EPK – EPD-NEPK	0.28	0.07	0.48	.003*
EPD-EPK – NEPD-EPK	0.01	-0.19	0.21	.99
EPD-EPK – NEPD-NEPK	0.43	0.21	0.64	< .001*
EPD-NEPK – NEPD-EPK	-0.27	-0.46	-0.07	.003*
EPD-NEPK – NEPD-NEPK	0.15	-0.06	0.36	.26
NEPD-EPK – NEPD-NEPK	0.41	0.21	0.62	< .001*
EPD – NEPD	0.06	-0.07	0.19	.34
EPK – NEPK	0.34	0.22	0.45	< .001*
Negative Overall EV Comments				
EPD-EPK – EPD-NEPK	0.03	-0.09	0.15	.92
EPD-EPK – NEPD-EPK	0.08	-0.04	0.21	.27
EPD-EPK – NEPD-NEPK	0.06	-0.07	0.19	.63
EPD-NEPK – NEPD-EPK	0.05	-0.06	0.17	.64
EPD-NEPK – NEPD-NEPK	0.03	-0.10	0.15	.93
NEPD-EPK – NEPD-NEPK	-0.03	-0.15	0.10	.95
EPD – NEPD	0.04	-0.03	0.11	.30
EPK – NEPK	0.01	-0.06	0.09	.71
Positive Non-Plastic EV Comments				
EPD-EPK – EPD-NEPK	0.07	-0.07	0.21	.56
EPD-EPK – NEPD-EPK	0.15	0.02	0.29	.02*
EPD-EPK – NEPD-NEPK	0.23	0.09	0.37	< .001*
EPD-NEPK – NEPD-EPK	0.08	-0.05	0.22	.37
EPD-NEPK – NEPD-NEPK	0.16	0.02	0.30	.02*
NEPD-EPK – NEPD-NEPK	0.08	-0.06	0.21	.48
EPD – NEPD	0.16	0.07	0.24	< .001*
EPK – NEPK	0.06	-0.03	0.14	.19
Negative Non-Plastic EV Comments				
EPD-EPK – EPD-NEPK	0.01	-0.09	0.10	.99
EPD-EPK – NEPD-EPK	0.11	0.02	0.21	.01*
EPD-EPK – NEPD-NEPK	0.10	-0.003	0.20	.06**
EPD-NEPK – NEPD-EPK	0.11	0.01	0.20	.02*
EPD-NEPK – NEPD-NEPK	0.09	-0.01	0.19	.08**
NEPD-EPK – NEPD-NEPK	0.01	-0.11	0.08	.97
EPD – NEPD	0.09	0.03	0.15	.002*
EPK – NEPK	0.01	-0.07	0.05	.83
Positive Plastic EV Comments				
EPD-EPK – EPD-NEPK	0.21	0.08	0.34	< .001*
EPD-EPK – NEPD-EPK	-0.14	-0.27	-0.02	.02*
EPD-EPK – NEPD-NEPK	0.19	0.06	0.33	.001*

EPD-NEPK – NEPD-EPK	-0.35	-0.48	-0.23	< .001*
EPD-NEPK – NEPD-NEPK	-0.01	-0.14	0.12	.99
NEPD-EPK – NEPD-NEPK	0.34	0.21	0.47	< .001*
EPD – NEPD	-0.10	-0.18	-0.02	.02*
EPK – NEPK	0.28	0.21	0.35	< .001*
Negative Plastic EV Comments				
EPD-EPK – EPD-NEPK	0.02	-0.05	0.10	.82
EPD-EPK – NEPD-EPK	-0.3	-0.10	0.04	.75
EPD-EPK – NEPD-NEPK	-0.04	-0.11	0.04	.55
EPD-NEPK – NEPD-EPK	-0.05	-0.12	0.02	.23
EPD-NEPK – NEPD-NEPK	-0.06	-0.14	0.01	.12
NEPD-EPK – NEPD-NEPK	-0.01	-0.08	0.06	.98
EPD – NEPD	-0.05	-0.09	-0.01	.02*
EPK – NEPK	0.02	-0.03	0.07	.38

Note: * denotes results with significant *p*-values. ** denotes results with marginally significant *p*-values.

Table 32

Results of 2x2 ANOVA with Post-hoc Tukey HSD Test on the Positive and Negative Environmental-Specific Sentiments From Open-Ended Questions with Each Product Advertisement (Burger and Detergent)

Comparison	diff	lwr	upr	*p* adj
Positive Overall EV Comments				
EPD-EPK – EPD-NEPK	0.36	0.11	0.61	.001*
EPD-EPK – NEPD-EPK	-0.04	-0.29	0.20	.97
EPD-EPK – NEPD-NEPK	0.54	0.30	0.78	< .001*
EPD-NEPK – NEPD-EPK	-0.40	-0.65	-0.15	< .001*
EPD-NEPK – NEPD-NEPK	0.18	-0.06	0.43	.22
NEPD-EPK – NEPD-NEPK	0.58	0.34	0.82	< .001*
EPD – NEPD	0.11	-0.04	0.26	.16
EPK – NEPK	0.48	0.34	0.62	< .001*
Negative Overall EV Comments				
EPD-EPK – EPD-NEPK	0.02	-0.13	0.18	.98
EPD-EPK – NEPD-EPK	0.11	-0.04	0.26	.24
EPD-EPK – NEPD-NEPK	0.07	-0.08	0.22	.66
EPD-NEPK – NEPD-EPK	0.09	-0.07	0.24	.47
EPD-NEPK – NEPD-NEPK	0.04	-0.11	0.19	.89
NEPD-EPK – NEPD-NEPK	-0.04	-0.19	0.11	.88
EPD – NEPD	0.06	-0.03	0.15	.19
EPK – NEPK	-0.01	-0.10	0.08	.87
Positive Non-Plastic EV Comments				
EPD-EPK – EPD-NEPK	0.10	-0.08	0.27	.48
EPD-EPK – NEPD-EPK	0.19	0.02	0.36	.02*
EPD-EPK – NEPD-NEPK	0.29	0.12	0.46	< .001*
EPD-NEPK – NEPD-EPK	0.09	-0.08	-0.27	.51
EPD-NEPK – NEPD-NEPK	0.20	0.03	0.37	.02*
NEPD-EPK – NEPD-NEPK	0.11	-0.06	0.27	.38
EPD – NEPD	0.22	0.12	0.31	< .001*
EPK – NEPK	0.11	0.01	0.21	.03*
Negative Non-Plastic EV Comments				
EPD-EPK – EPD-NEPK	-0.01	-0.13	0.12	.99
EPD-EPK – NEPD-EPK	0.12	0.001	0.24	.04*
EPD-EPK – NEPD-NEPK	0.11	-0.01	0.23	.09**
EPD-NEPK – NEPD-EPK	0.13	0.01	0.25	.03*
EPD-NEPK – NEPD-NEPK	0.12	-0.01	0.24	.07**
NEPD-EPK – NEPD-NEPK	-0.01	-0.13	0.10	.99
EPD – NEPD	0.11	0.04	0.18	.002*
EPK – NEPK	-0.01	-0.08	0.06	.76
Positive Plastic EV Comments				
EPD-EPK – EPD-NEPK	0.26	0.10	0.42	< .001*
EPD-EPK – NEPD-EPK	-0.23	-0.39	-0.08	< .001*
EPD-EPK – NEPD-NEPK	0.25	0.09	0.40	< .001*

EPD-NEPK – NEPD-EPK	-0.49	-0.65	-0.34	< .001*
EPD-NEPK – NEPD-NEPK	-0.01	-0.17	0.14	.99
NEPD-EPK – NEPD-NEPK	0.48	0.33	0.63	< .001*
EPD – NEPD	-0.10	-0.20	-0.01	.03*
EPK – NEPK	0.37	0.28	0.46	< .001*
Negative Plastic EV Comments				
EPD-EPK – EPD-NEPK	0.03	-0.06	0.12	.80
EPD-EPK – NEPD-EPK	-0.01	-0.10	0.07	.97
EPD-EPK – NEPD-NEPK	-0.04	-0.13	0.04	.57
EPD-NEPK – NEPD-EPK	-0.04	-0.13	0.04	.54
EPD-NEPK – NEPD-NEPK	-0.07	-0.16	0.01	.13
NEPD-EPK – NEPD-NEPK	-0.03	-0.11	0.06	.82
EPD – NEPD	-0.05	-0.11	0.004	.07**
EPK – NEPK	0.003	-0.04	0.05	.90

Note: * denotes results with significant *p*-values. ** denotes results with marginally significant *p*-values.

Table 33

Results of Cohen's d Effect Size Comparing the Positive and Negative Environmental-Specific Sentiments From Open-Ended Questions with Each Product Advertisement (Burger, Detergent, and Frozen Dessert)

	Cohen's d estimate		95% CI (lower – upper)	
Positive Overall EV Comments				
EPD-EPK vs. EPD-NEPK	0.52	medium	0.21	0.83
EPD-EPK vs. NEPD-EPK	0.02	negligible	-0.28	0.31
EPD-EPK vs. NEPD-NEPK	0.87	large	0.55	1.20
EPD-NEPK vs. NEPD-EPK	-0.49	small	-0.79	-0.19
EPD-NEPK vs. NEPD-NEPK	0.45	small	0.14	0.76
NEPD-EPK vs. NEPD-NEPK	0.83	large	0.52	1.14
EPD vs. NEPD	0.12	negligible	-0.13	0.36
EPK vs. NEPK	0.69	medium	0.44	0.94
Negative Overall EV Comments				
EPD-EPK vs. EPD-NEPK	-0.13	negligible	-0.44	0.18
EPD-EPK vs. NEPD-EPK	0.27	small	-0.03	0.56
EPD-EPK vs. NEPD-NEPK	0.17	negligible	-0.14	0.48
EPD-NEPK vs. NEPD-EPK	0.19	negligible	-0.10	0.49
EPD-NEPK vs. NEPD-NEPK	0.09	negligible	-0.21	0.40
NEPD-EPK vs. NEPD-NEPK	-0.10	negligible	-0.40	0.20
EPD vs. NEPD	0.13	negligible	-0.11	0.37
EPK vs. NEPK	0.05	negligible	-0.19	0.28
Positive Non-Plastic EV Comments				
EPD-EPK vs. EPD-NEPK	0.17	negligible	-0.14	0.47
EPD-EPK vs. NEPD-EPK	0.41	small	0.11	0.70
EPD-EPK vs. NEPD-NEPK	0.67	medium	0.35	0.99
EPD-NEPK vs. NEPD-EPK	0.23	small	-0.06	0.53
EPD-NEPK vs. NEPD-NEPK	0.50	medium	0.19	0.82
NEPD-EPK vs. NEPD-NEPK	0.28	small	-0.02	0.58
EPD vs. NEPD	0.46	small	0.22	0.71
EPK vs. NEPK	0.16	negligible	-0.08	0.40
Negative Non-Plastic EV Comments				
EPD-EPK vs. EPD-NEPK	0.02	negligible	-0.29	0.32
EPD-EPK vs. NEPD-EPK	0.48	small	0.18	0.78
EPD-EPK vs. NEPD-NEPK	0.37	small	0.06	0.69
EPD-NEPK vs. NEPD-EPK	0.45	small	0.16	0.75
EPD-NEPK vs. NEPD-NEPK	0.36	small	0.05	0.66
NEPD-EPK vs. NEPD-NEPK	-0.11	negligible	-0.41	0.18
EPD vs. NEPD	0.38	small	0.14	0.62
EPK vs. NEPK	-0.03	negligible	-0.26	0.21
Positive Plastic EV Comments				
EPD-EPK vs. EPD-NEPK	0.73	medium	0.41	1.04
EPD-EPK vs. NEPD-EPK	-0.32	small	-0.62	-0.02
EPD-EPK vs. NEPD-NEPK	0.65	medium	0.33	0.97

EPD-NEPK vs. NEPD-EPK	-1.00	large	-1.31	-0.69
EPD-NEPK vs. NEPD-NEPK	-0.16	negligible	-0.47	0.15
NEPD-EPK vs. NEPD-NEPK	0.93	large	0.62	1.24
EPD vs. NEPD	-0.29	small	-0.54	-0.05
EPK vs. NEPK	0.92	large	0.66	1.17
Negative Plastic EV Comments				
EPD-EPK vs. EPD-NEPK	0.22	small	-0.08	0.53
EPD-EPK vs. NEPD-EPK	-0.14	negligible	-0.44	0.16
EPD-EPK vs. NEPD-NEPK	-0.19	negligible	-0.50	0.12
EPD-NEPK vs. NEPD-EPK	-0.32	small	-0.61	-0.02
EPD-NEPK vs. NEPD-NEPK	-0.37	small	-0.68	-0.06
NEPD-EPK vs. NEPD-NEPK	-0.05	negligible	-0.35	0.25
EPD vs. NEPD	-0.29	small	-0.53	-0.04
EPK vs. NEPK	0.11	negligible	-0.13	0.35

Table 34

Results of Cohen's d Effect Size Comparing the Positive and Negative Environmental-Specific Sentiments From Open-Ended Questions with Each Product Advertisement (Burger and Detergent)

	Cohen's d estimate		95% CI (lower – upper)	
Positive Overall EV Comments				
EPD-EPK vs. EPD-NEPK	0.63	medium	0.27	0.99
EPD-EPK vs. NEPD-EPK	-0.06	negligible	-0.41	0.28
EPD-EPK vs. NEPD-NEPK	1.07	large	0.71	1.44
EPD-NEPK vs. NEPD-EPK	-0.69	medium	-1.05	-0.33
EPD-NEPK vs. NEPD-NEPK	0.53	medium	0.18	0.89
NEPD-EPK vs. NEPD-NEPK	1.13	large	0.77	1.50
EPD vs. NEPD	0.19	negligible	-0.08	0.46
EPK vs. NEPK	0.89	large	0.62	1.16
Negative Overall EV Comments				
EPD-EPK vs. EPD-NEPK	-0.17	negligible	-0.52	0.18
EPD-EPK vs. NEPD-EPK	0.32	small	-0.02	0.67
EPD-EPK vs. NEPD-NEPK	0.18	negligible	-0.16	0.53
EPD-NEPK vs. NEPD-EPK	0.28	small	-0.07	0.64
EPD-NEPK vs. NEPD-NEPK	0.13	negligible	-0.22	0.48
NEPD-EPK vs. NEPD-NEPK	-0.16	negligible	-0.50	0.18
EPD vs. NEPD	0.18	negligible	-0.09	0.44
EPK vs. NEPK	-0.02	negligible	-0.28	0.24
Positive Non-Plastic EV Comments				
EPD-EPK vs. EPD-NEPK	0.21	small	-0.14	0.56
EPD-EPK vs. NEPD-EPK	0.45	small	0.10	0.80
EPD-EPK vs. NEPD-NEPK	0.81	large	0.45	1.16
EPD-NEPK vs. NEPD-EPK	0.23	small	-0.12	0.58
EPD-NEPK vs. NEPD-NEPK	0.59	medium	0.24	0.95
NEPD-EPK vs. NEPD-NEPK	0.36	small	0.02	0.70
EPD vs. NEPD	0.58	medium	0.31	0.85
EPK vs. NEPK	0.28	small	0.03	0.54
Negative Non-Plastic EV Comments				
EPD-EPK vs. EPD-NEPK	-0.02	negligible	-0.37	0.33
EPD-EPK vs. NEPD-EPK	0.48	small	0.13	0.83
EPD-EPK vs. NEPD-NEPK	0.40	small	0.05	0.75
EPD-NEPK vs. NEPD-EPK	0.498	small	0.14	0.85
EPD-NEPK vs. NEPD-NEPK	0.41	small	0.07	0.77
NEPD-EPK vs. NEPD-NEPK	-0.10	negligible	-0.44	0.24
EPD vs. NEPD	0.42	small	0.15	0.69
EPK vs. NEPK	-0.04	negligible	-0.30	0.22
Positive Plastic EV Comments				
EPD-EPK vs. EPD-NEPK	0.83	large	0.46	1.19
EPD-EPK vs. NEPD-EPK	-0.49	small	-0.84	-0.14
EPD-EPK vs. NEPD-NEPK	0.77	medium	0.41	1.12
EPD-NEPK vs. NEPD-EPK	-1.36	large	-1.74	=0.97

EPD-NEPK vs. NEPD-NEPK	-0.17	negligible	-0.52	0.18
NEPD-EPK vs. NEPD-NEPK	1.31	large	0.93	1.68
EPD vs. NEPD	-0.29	small	-0.56	-0.03
EPK vs. NEPK	1.08	large	0.81	1.36
Negative Plastic EV Comments				
EPD-EPK vs. EPD-NEPK	0.25	small	-0.11	0.60
EPD-EPK vs. NEPD-EPK	-0.07	negligible	-0.42	0.27
EPD-EPK vs. NEPD-NEPK	-0.19	negligible	-0.53	0.15
EPD-NEPK vs. NEPD-EPK	-0.30	small	-0.65	0.05
EPD-NEPK vs. NEPD-NEPK	-0.39	small	-0.74	-0.04
NEPD-EPK vs. NEPD-NEPK	-0.12	negligible	-0.46	0.22
EPD vs. NEPD	-0.24	small	-0.51	0.02
EPK vs. NEPK	0.02	negligible	-0.24	0.27

Table 35

Participant Skepticism about the Sustainability Claims of Products and Packaging

Condition	Skeptical of Product		Skeptical of Packaging		Skeptical of Product and Packaging		Total
EPD-EPK	5	26%	0	0%	2	11%	37%
EPD-NEPK	5	26%	1	5%	0	0%	32%
NEPD-EPK	1	5%	3	16%	0	0%	21%
NEPD-NEPK	2*	10%	0	0%	0	0%	10%
Total	13	67%	4	21%	2	11%	
EPD	10	53%	1	5%	2	11%	68%
NEPD	3	16%	3	16%	0	0%	32%
Total	13	68%	4	21%	2	11%	
EPK	6	32%	3	16%	2	11%	58%
NEPK	7	37%	1	5%	0	0%	42%
Total	13	68%	4	21%	2	11%	

Note: Some totals do not sum to 100% due to rounding. *One of the NEPD-NEPK comments was for the burger; otherwise, all claims of greenwashing were for the detergent product.

VIII.1.g. Pro-Environmental Behaviours

Table 36

Environmental Comments from Open-Ended Shopping Question, Based on the Number of Participants, Not on the Proportion of the Number of Comments Given

Type of Comment	*n*	Percentage
Only Made Plastic or Packaging Comments	60	39%
Listed Both a Plastic and Non-Plastic Comment	40	26%
Listed Only Non-Plastic Comments	17	11%
Provided No Pro-Environmental Comments or Behaviours	38	24%
Plastic Mentioned as First Issue in the First Sentence	63	41%

Note: Total number of responses to the open-ended question was *n* = 155.

Table 37

Environmental Comments from Open-Ended Shopping Question, Based on the Proportion of the Number of Comments Given, Not the Number of Participants

Topic		*n*	Percentage
Reduce Plastic Packaging		133	65%
	Use Less Plastic	83	40%
	Bring Your Own Shopping Bag	23	11%
	Reusable Packaging	9	9%
	Recycle More	8	4%
	Paper Packaging	3	4%
	Sustainable Packaging	2	2%
	Recyclable Packaging	4	1%
Food Production Method		15	7%
	Organic	8	4%
	Fewer Processed Foods	3	1%
	Sustainable Farming	2	1%
	Fairtrade	1	0.5%
	Non-GMO	1	0.5%
Shop Local		19	9%
Fewer Animal Products		15	7%
Reduce Food Waste		10	5%
Drive Less		9	4%
Consume Less		3	1%
Civic Action		1	0.5%

Note: Total amount of pro-environmental comments given was *n* = 205, from a sample of *n* = 155 participants. The average number of comments per participant is *M* = 1.3, *SD* = 1.1. Collectively, all of the comments that do not mention 'plastic' or 'packaging' amount to *n* = 72 (35%).

Table 38

Choices of Sustainable vs. Conventional Behaviours When Hypothetically Purchasing a Cup of Coffee

Distribution Table

	Sustainable	Non-Sustainable	% Choosing Sustainable
Container	89	38	70%
Bean	28	99	22%
Creamer	48	79	38%

Pearson's Chi-Squared with Yates' Continuity Correction

Comparison Type	Number of cases in table	Number of factors	χ^2	*df*	*p*
Container Type – Bean Type	127	1	57.05	1	< .001
Container Type – Creamer Type	127	1	25.35	1	< .001

VIII.2. Survey

1. Welcome!

Hello there, and thanks for participating in our study.

Overview: In the following, we're going to show you three product advertisements which we'd like your thoughts and opinions on. Then you'll go through two hypothetical shopping scenarios with a few follow-up questions each. Finally, we'd like to ask for some quick demographic information, and you're done.
There are 21 questions in total, and the whole process should take about 15-30 minutes. You'll find the code to receive your credit at the end of the survey. You will be rewarded $1.00 for completing the survey, and responses that are completed honestly and thoughtfully will receive a bonus payment of an extra $1.50.

Note, once you proceed to a 'new page', you can't go back and edit your responses on the previous page.

Voluntary Participation: No known risks are associated with your participation. And, please remember, your participation is completely voluntary. You may stop at any time if you wish to.

Confidentiality: The confidentiality of your responses will be protected. If you close the browser or do not submit your responses, then you are able to withdraw from the study and your data will be destroyed. However, after you have submitted your data, it is logistically impossible to remove your data because it is anonymously submitted. If you continue, please be advised that this research study includes data storage in U.S.A. As such, there is a possibility that information about you that is gathered for this research study may be accessed without your knowledge or consent by the U.S. government, in compliance with the U.S. Freedom Act.

The results of this study will be shared on UVic's Research and Learning Repository - UVicSpace - and will potentially be shared in academic journals public outreach. Your data will be archived to support and back-up the study's results.

Consent: If you agree to proceed with the questionnaire, your free and informed consent is implied.

We appreciate as much detail in your answers as possible to make the survey as worthwhile as can be. Thank you so much for taking part!

2. Product Advertisements

We're going to show you three different product advertisements. Please take a moment to look at each one carefully. Then you'll proceed to a new page, where you'll be asked a couple of questions on what you think about them.

3.

Please take a moment to look at the details of this product.

A 25.0%

B 25.0%


NEW RICHER FLAVOUR
DOD'S BURGER CO.
PLANT-BASED BURGER
19g OF PLANT PROTEIN PER BURGER
NET WEIGHT: 226g

C 25.0%


NEW ZERO PLASTIC FIBER PACKAGING
DOD'S BURGER CO.
BEEF BURGER
19g OF PROTEIN PER BURGER
NET WEIGHT: 226g

D
25.0%

* 1. Please explain what this product makes you think about. And be as comprehensive as you can – the more detail you share the better.

And this is product #2 below:

A 25.0%


66
CONCENTRATED
RUSTIC STRENGTH
PLANT-POWER FORMULA
FIGHTS STAINS | MADE for SENSITIVE SKIN
This bottle made with 70% recycled paper fiber*

B 25.0%


66
CONCENTRATED
RUSTIC STRENGTH
PLANT-POWER FORMULA
FIGHTS STAINS | MADE for SENSITIVE SKIN

C 25.0%


66
CONCENTRATED
RUSTIC STRENGTH
ORIGINAL FORMULA
FIGHTS STAINS
MADE for SENSITIVE SKIN

D 25.0%


66
CONCENTRATED
RUSTIC STRENGTH
ORIGINAL FORMULA
FIGHTS STAINS
MADE for SENSITIVE SKIN

* 2. Again, what does this product make you think about? And be as comprehensive as you can – the more detail you share the better.

And finally, product #3:

A 25.0%

B 25.0%

C 25.0%

D 25.0%

* 3. Like before, please explain what this product makes you think about. And be as comprehensive as you can – the more detail you share the better.

4.

* 4. How much would you like to purchase these items?

	I'm actively against purchasing this			I'm indifferent to this product			I'm very interested in purchasing this
The burger	◯	◯	◯	◯	◯	◯	◯
The laundry detergent	◯	◯	◯	◯	◯	◯	◯
The ice cream	◯	◯	◯	◯	◯	◯	◯

5.

* 5. What do you think is the environmental footprint of the PACKAGING for these three products?

	Very environmentally harmful			Neither harmful nor beneficial			Very environmentally beneficial
Packaging of the burger	◯	◯	◯	◯	◯	◯	◯
Packaging of the laundry detergent	◯	◯	◯	◯	◯	◯	◯
Packaging of the ice cream	◯	◯	◯	◯	◯	◯	◯

6.

* 6. What do you think is the environmental footprint of these PRODUCTS, as separate from their packaging?

	Very environmentally harmful			Neither harmful nor beneficial			Very environmentally beneficial
The burger	◯	◯	◯	◯	◯	◯	◯
The laundry detergent	◯	◯	◯	◯	◯	◯	◯
The ice cream	◯	◯	◯	◯	◯	◯	◯

7.

* 7. From strongly disagree to strongly agree, please answer how you feel about the following statements.

	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
I like to shop in mega-supermarket chains	○	○	○	○	○	○	○
My favourite cuisine is Italian	○	○	○	○	○	○	○
All sunflowers are carnivores	○	○	○	○	○	○	○
Farmer's markets are my favourite place to shop	○	○	○	○	○	○	○
I never eat in fast-food outlets	○	○	○	○	○	○	○
I always check labels for calouries	○	○	○	○	○	○	○
Carrots are made of gold	○	○	○	○	○	○	○
I never buy imported food products	○	○	○	○	○	○	○
For me, food is more important than friends	○	○	○	○	○	○	○

8.

* 8. Do you drink coffee?

◯ Yes ◯ No

9.

Over the next three questions, imagine yourself in a coffee shop, preparing to have your ideal cup of coffee. For each question, select the option you'd prefer, and then share how you feel about your choice.

* 9. From the following, what type of cup would you like?

◯ Ceramic Mug or Thermos ◯ Corn Starch Compostable Cup

◯ Regular Take-away Cup ◯ Doesn't matter

How do you feel about your choice? Would you prefer something else, and why?

* 10. What type of beans would you like?

◯ Dark roast ◯ Light or blonde roast ◯ Fair-trade certified sourced beans

◯ Doesn't matter

Likewise, is there a different choice that you'd prefer?

* 11. And would you like anything added to your coffee?

◯ Milk or Cream ◯ Non-dairy alternative ◯ Nothing (black coffee, please)

◯ Doesn't matter

Any additional thoughts or feelings you have about your choice?

10.

* 12. People around the world are generally concerned about environmental problems because of the consequences that result from harming nature. However, people differ in the consequences that concern them.

Please rate each of the following items from 1 (not important) to 7 (supreme importance) in response to the question:

"I am concerned about environmental problems because of the consequences for _____."

Plants	
Marine Life	
Birds	
Animals	
Me	
My Health	
My Future	
All People	
Children	

11.

* 13. Imagine yourself at the grocery store: How do you feel about, and work through, the environmental impacts of your grocery shopping? What concerns and solutions come to mind?

12.

* 14. One final question, how much do you care about plastic pollution?

	I don't care at all			I'm indifferent to it			I really care about it
Plastic Pollution...	◯	◯	◯	◯	◯	◯	◯

Please, do you have any comments about this?

13. Demographic Information

We like to ask the following demographic questions just to get a better understanding of who's answering this questionnaire.

* 15. In what year were you born? (enter a 4-digit birth year; for example, 1976)

* 16. Where are you from? (as specific or broad as you'd like)

* 17. What is the highest level of school you have completed or the highest degree you have received?

- ◯ Less than high school degree
- ◯ High school degree or equivalent (e.g., GED)
- ◯ Some college/university but no degree
- ◯ Bachelor degree
- ◯ Graduate degree
- ◯ Other (please specify)

* 18. How would you describe your political orientation?

- ◯ Extremely Liberal
- ◯ Liberal
- ◯ Moderate
- ◯ Conservative
- ◯ Extremely Conservative
- ◯ Other (please specify)

* 19. What is your gender identity? (Select all that apply)

- [ ] Woman
- [ ] Man
- [ ] Prefer not to say
- [ ] Other (please specify)

* 20. Please indicate your total annual household income. (Only use a simple number, such as 20000)

* 21. Which of the following best describes your current diet?

- ◯ Traditional omnivore (meat, fish, etc.)
- ◯ No red meat (but yes to fish, poultry)
- ◯ Vegetarian (but yes to dairy products)
- ◯ Vegan

14. End-Page

Congratulations and thank you for participating! That's the end of the survey.

To validate your survey on MTurk, **use your unique WorkerID.** Please ensure that you accurately submit your WorkerID as the survey code on the original starting page, in order to have your response approved.

22. For a little debrief...

This research is interested in exploring pro-environmental concerns and actions, with the hope that we can find ways to better achieve ecologically-sustainable consumer practices. Specifically, this research has been interested in the way that packaging affects product evaluations.

If you're interested in looking into the CO2 reductions of various pro-environmental actions for yourself, here's a great paper that has some wonderful infographics to give you ideas on how each action differs in its CO2 reduction potential (some huge, some less significant). Search online for "Quantifying the potential for climate change mitigation of consumption options," written in 2020 by D. Ivanova et al.

We really appreciate you sharing your time to take part in this research. If you have any thoughts or comments, please enter them here. We're interested in anything you'd like to share.

Thanks, and we wish you all the very best!