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When Is Transparent Packaging Beneficial?

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Structured Abstract

Purpose: The purpose of this paper is to demonstrate that the positive effect of packaging transparency on purchase intention is moderated by product quality risk (PQR) associated with the product category.

Design: Two separate experiments were conducted. Study 1 was designed to test the mediating role of perceived quality to account for the positive effect of transparency on purchase intention. Two types of packaging (opaque *vs*. transparent) for a product associated with a high level of PQR were examined. Study 2 extended the findings by introducing the moderating role of PQR. A 2 (type of packaging: opaque *vs*. transparent)*2 (PQR: low *vs*. high) between subjects design was used.

Findings: The moderating role of the product PQR level is established: transparent packaging improves the product perceived quality and brand purchase intention when the product is associated with a high PQR, whereas there is no such preference for transparent packaging when the product is associated with a low PQR.

Practical implications: The results offer insights to better understand the potential gains from adopting transparent packaging. If a brand manager's main goals are to develop sales, costly investments in research and development of transparent packaging appear to be fruitful only for products associated with high PQR.

Originality/Value: This paper contributes to packaging, cue utilization and perceived risk literatures by evidencing the moderating role of PQR to explain the positive effect of transparency on purchase intention.

Article classification: Research paper

Keywords: transparent packaging, product quality risk, product evaluations, perishable goods.

Introduction

Considering that more than 70% of purchase decisions are made at retail store (Rettie and Brewer, 2000), packaging plays a strategic role as it is the first product attribute to which consumers are exposed (Argo and White, 2012; Jones *et al.*, 2018). Packaging has utility value for brands, consumers and retailers; it can be a means of communicating brand identity (Lee *et al.*, 2019; Underwood, 2003), an attention-grabbing tool (Krishna *et al*., 2017; Underwood, Klein and Burke, 2001), and a driver of purchase intention both on the shelves of retail outlets and online (Rettie and Brewer, 2000). The impact of various packaging attributes on consumer behaviour has thus far been studied in terms of design (Ampuero and Vila, 2006; Favier *et al.*, 2019; Jones *et al.*, 2018; Krishna *et al*., 2017; Wells *et al.*, 2007; Wang, 2013), imagery (Hota and Charry, 2004; Khan, 2017; Underwood *et al.,* 2001, Van Rompay et al., 2014), size (Wansink, 1996), colour (Mai *et al*., 2016) and shape (Van Esch *et al*., 2019. Wansink and Van Ittersum, 2003).

More recently, contemporary developments in nano-coated aluminium oxide materials have made it possible to launch consumer products with transparent packaging (Young and Hoedebeck, 2015) that protects food from contaminants such as light and moisture (Mesquita *et al.*, 2013). Transparent packaging has become prevalent for non-durable consumer goods in retail shelf setting (Deng and Srinivasan, 2013; Simmonds *et al*., 2018). It was considered to be one of 2015's hottest trends in packaging design (Carper, 2015) as well as an inspirational packaging design trend in 2017 (Lupus, 2017). Consumer goods producers are finding innovative ways to make their packaging transparent (Carper, 2015). For example, Smith Dairy has introduced a new fruit-on-bottom line of Artisa Fine Curd Cottage Cheese with packaging that is unique to the industry—a transparent, 5.3-ounce, single-serve cup. The development of transparent packaging has been reinforced by the results concerning its influence on the behavior of buyers and consumers. An increasing body of research has explored how transparent packaging affects consumer decisions. Transparent packaging leads to increased purchase intention (Bileter *et al*., 2012; Chandran *et al*., 2009), and willingness-to-pay (Chandran *et al*., 2009).

However, transparent packaging requires costly investment in research and development (Young and Hoedebeck, 2015). Although it is well known that transparent packaging might be an effective practice (Bileter et al., 2012; Chandran et al., 2009), our research suggests that rather than adopting a broad-stroke strategy, further insights are needed

to understand the conditions under which transparent packaging is beneficial as one of the most commonly cited challenge for manufacturers is how to best design the product packaging while saving costs and maintaining their profitability (Green, 2018). To fill this gap, we posit that the beneficial effect of transparent packaging is conditional on the role of perceived risk associated with the product promoted. More specifically, from a consumer point of view, when the product is associated with a high perceived risk, the transparent packaging is highly valuable as it gives customers the opportunity to inspect the product before buying it (Carper, 2015). It then limits the perceived risk's inhibiting effect on buying (Dowling and Staelin, 1994; Taylor, 1974), as perceived risk is mainly caused by consumers' incapacity to personally inspect products and to evaluate their quality (Derbaix, 1983; Roselius, 1971). However, when the product is associated with a low perceived risk, the packaging transparency is useless as it does not help to develop more positive product quality inferences or purchase intention.

The aim of the study is then to demonstrate that the positive effect of packaging transparency on purchase intention is moderated by product quality risk (PQR) associated with the product category. Little attention has been directed towards the role of perceived risk associated with the product promoted, except for Batra *et al*. (2010) who have demonstrated how brand familiarity limits the risk of distrust due to packaging.

This study contributes to the growing literature on packaging, cue utilization in marketing, and perceived risk.

Among the literature on packaging, this study contributes to the literature in two specific ways. On the one hand, unlike previous studies, it is proposed that perceived risk is an important situational variable that moderates the positive influence of transparent packaging on product choice and perception. Products vary in terms of the perceived risks associated with them. Tsiros and Heilman (2005) have identified two main dimensions of risk perception, respectively referred to as "product quality risk" (PQR) and "personal risk" (PR). PQR captures "the functional, performance and physical risks associated with product quality as a perishable product approaches its expiration date and the associated health risks" (Tsiros and Heilman, 2005, p. 119), while "PR captures the psychological, social and financial risks associated with the negative emotions a consumer experiences when a product fails, such as the impressions others form about the consumer, the way consumer feels about him or herself, and the frustration of a financial loss" (p. 119). As PQR dominates the other PR in the case of perishable products (Tsiros and Heilman, 2005), we will only focus on the role of PQR perceptions. It is proposed that the beneficial effect of transparent packaging will be more apparent when the

perishable good is associated with a high PQR. On the other hand, and in contrast to most studies focusing on packaging transparency effect, a more complete framework was created that isolates the moderating role of PQR. Factors that have been previously recognised as moderating variables affecting transparent packaging evaluation and outcomes were cautiously controlled (Berneth and Aguinis, 2016), including brand familiarity (Chandran *et al.*, 2009), physical product appeal (Bileter *et al.*, 2012), with the measurement of product perceived aesthetic, and product type effect (Batra *et al*., 2010) as the studies presented were restricted to perishable food products.

Second, we have extended the literature on cue utilization, which focuses on the effects of packaging design cues (shape, size or colour) (Simmonds et al., 2019; Matthews, Simmonds and Spence, 2019; Van Esch, Heller and Northey, 2019) and explicit cues (price, nutrition labels, country of origin) (Van Ooijen, Fransen, Verlegh and Smit 2017) on product evaluations and purchase intentions. Our research identifies product quality risk as a new boundary condition of the efficiency of packaging related cues.

Finally, this study also enriches the literature on risk perception. This research provides new insight on the role of packaging transparency as an additional risk-reduction strategy (Derbaix, 1983; Roselius, 1971; Taylor, 1974) for consumers when exposed to a product associated with a high PQR level.

Transparent packaging and product evaluations

The fact that packaging can alter consumers' perceptions has been well documented (Wansink, 1996). Packaging is often the medium through which consumers develop an impression of a product's quality (Khan, 2017). Cue utilisation theory considers packaging to be an extrinsic cue, along with price, logo and brand name (Birch *et al*., 2018; Olson, 1972), that is a product-related attribute that is not part of the physical product and its intrinsic cues (*i.e*., ingredients, texture, aroma). Extrinsic cues are indicators from which consumers can infer product quality (Bruce and Daly, 2007; McDaniel and Baker, 1977), especially when a brand is unfamiliar and there are limited opportunities to inspect intrinsic product properties (Zeithaml, 1988). Packaging provides visual cues to reinforce the values of the company to the customer (Bruce and Daly, 2007; Hota and Charry, 2004; Khan, 2017; Underwood *et al.,* 2001, Van Ooijen et al., 2017; Van Esch et al., 2019). In addition, visual stimuli from packaging through design elements such as illustration, colour, typography and shape, communicate the

attributes of the product and influence in-store buying decision process (Clement, 2007). However, as packaging cues interact to affect product inferences (Van Ooijen et al., 2017), Matthews et al. (2019) have demonstrated that increasing the number of congruent cues on product packaging boosts the strength of people's expectations concerning the relevant basic taste.

Transparent packaging, as a prevalent practice in retail context for non-durable consumer goods (Deng and Srinivasan, 2013; Simmonds *et al*., 2018), is an extrinsic cue that can influence consumers' perceptions about the intrinsic attributes of the product (Bileter *et al*., 2012; Chandran *et al*., 2009). Transparent packaging is a window that provides access to a product's intrinsic proprieties and that can enable consumers to visualise and monitor the product itself. Indeed, the predominant rationale held by marketing professionals for adopting transparent packaging is that it gives consumers the opportunity to see and inspect what they are buying (Carper, 2015). In particular, food manufacturers and retailers offer glimpses of their products through transparent packaging to convey the freshness and naturalness of their products (Baltazar, 2016). The literature has extensively documented the positive influence of transparent packaging on purchase intention and perceived quality (Bileter *et al*., 2012; Chandran *et al*., 2009). Replicating their results for four different product categories, Simmonds et al. (2018) found that transparent packaging (compared to opaque packaging that features product imagery) for unfamiliar brands leads to better evaluations of product quality and levels of purchase intention. They demonstrated that transparent packaging will lead to increased purchase intentions by enhancing its perceived quality, and this effect is even more positive when the transparent window shape is rounded (vs. angular) and upward-pointing (as compared to downward pointing) triangle (Simmonds et al., 2019).

Replicating the previous results, we posit the following:

H1. The positive effect of the packaging (opaque *vs*. transparent) on purchase intention will be mediated through product quality perception.

Perceived product risks and transparent packaging evaluations

Perceived risks are defined in terms of consumers' perceptions of the uncertainty and adverse consequences of buying a product (Dowling and Staelin, 1994; Taylor, 1974). Several sources of risk have been identified including financial-, social-, performance-, psychological-, physical-, and functional sources (Jacoby and Kaplan, 1972; Roselius, 1971) (for a definition

of risk sources, see Table 1 adapted from Tsiros and Heilman, 2005, p. 117).

< Insert Table 1 near here>

Conducting a factor analysis on the six main types of risk (functional, performance, physical, psychological, social and financial), Tsiros and Heilman (2005) identified two main factors, product quality risk (PQR) and personal risk (PR), as defined in the introduction section, and demonstrated that PQR may be prevalent in the case of perishable goods. We use the PQR associated with perishable goods as the focus of this research.

Perceived risk is mainly caused by consumers' incapacity to personally inspect products and to evaluate their quality (Derbaix, 1983; Roselius, 1971). Evolutionary psychologists have well documented how humans develop strategies to avoid threats that may cause harm or illness (Neuberg *et al.*2011; Schaller and Park, 2011). Along with the avoidance of superficial packaging damage that conveys information about a health and safety threat from the product (White, Lin, Dahl, and Ritchie, 2016) or products that come into physical contact with adverse material (Morales and Fitzsimons, 2007), consumers may use transparent packaging to control for product safety and risk of harm to their health (Erdem, 1998; Roselius, 1971; Taylor, 1974). As previously recognised by management scholars, consumers' risk perceptions about products is found to be greater for products in which they have little control over the risk exposure (Zepeda *et al.*, 2003). Transparent packaging may increase consumers' confidence where the consumption of products will not result in adverse health effects for the people who consume them, especially when the perishable goods are associated with a high level of PQR. When a perishable product is associated with a high level of PQR, consumers will rely more strongly on the transparent packaging to check for the quality of the product (Bruce and Daly, 2007; McDaniel and Baker, 1977) and to limit the potential risk of harm to their health, which may reinforce the desire to buy the product. We then assume that transparent packaging will trigger more positive consumer product evaluations than opaque packaging when the PQR of a product is high. Consequently, we posit the following:

H2: The effect of the packaging (opaque *vs*. transparent) on purchase intention will be more strongly mediated through product quality perception when the participants are exposed to perishable products with a high level of PQR rather than a low level of PQR.

To summarise, the tested model is presented in Figure 1.

< Insert Figure 1 near here>

Research overview

Two separate lab experiments were conducted to investigate that transparent packaging will trigger more positive consumer product evaluations than opaque packaging when the product is associated with a high PQR. As we wanted to test the effects of two manipulated variables (PQR and packaging transparency) on perceived quality and purchase intention, while controlling the roles of other packaging cues and respondents' profile, lab experiment was the most appropriate methodology regarding the aim of the studies and hypotheses (Campbell and Stanley, 1966; Hjalmarsson, 2005, Steffe and Thompson, 2000). The data for all two studies were collected in France in January 2019.

A certificate of ethics for research inquiries involving human respondents was granted by the research council of the first author university for all dataset collections. Both studies were conducted using a French online panel. The survey institute (*i.e.*, Createst), which is a member of Esomar, follows the Esomar ethical recommendations and codes (see http://www.esomar.org/uploads/public/knowledge-and-standards/codes-and-guidelines/ICCESOMAR_Code_English_.pdf). The panellists received a financial reward in the form of a gift voucher based on the time allotted to the study. Instructions were given to the panellists to recruit participants who live in different locations in France with different occupations and ages to obtain a representative sample of the French population (See Table 2). As we manipulated packs for fast-moving consumer goods (milk, soup, pasta), that can be consumed by younger and older people, women and men, in lower and higher socio-professional categories, it was important to use representative samples of the French population.

< Insert Table 2 near here>

Study 1: Effect of packaging transparency on purchase intention when exposed to a product associated with a high level of PQR

Design

Study 1 was designed to test the hypothesis that the positive effect of packaging (transparent *vs*. opaque) on purchase intention is mediated by product perceived quality (H1). The main goal of Study 1 was to replicate previous research on the mediating role of product perceived quality in the specific context of a high PQR exposure (Chandran *et al*., 2009; Simmonds e*t al.*, 2018). To do this, two packaging (opaque *vs*. transparent) were examined for a product associated with a high level of PQR.

To select a perishable product based on its level of PQR, different product categories were used, as the prevalence of one specific product risk may depend on the product considered (Derbaix, 1983; Dowling and Staelin, 1994; Jacoby and Kaplan, 1972). A pre-test was then developed to select a product category associated with high PQR. In the pre-test, 30 respondents (mean age: 33.73; 54% female) evaluated the perceived PQR associated with 9 different perishable products. Thirty respondents were selected using extended personal contacts. An assortment of food products was selected. Products for which the aging process is difficult to stop were favoured as the selected products cannot be frozen (Tsiros and Heilman, 2005).

For each perishable product, we measured perceived PQR. In the original scale developed by Tsiros and Heilman (2005), PQR is assessed with three statements on a seven-point bipolar scale from "very unlikely" to "very likely": "How likely is that the following product does not meet your expectations as it approaches its expiry date?", "How likely is it that the quality of the following product will become worse as the product approaches its expiry date?", "How likely is it that consuming a spoiled product of the following grocery item will lead to a health risk?". From the original scale developed by Tsiros and Heilman (2005), we avoided negation in the first design question as well as probabilities of attitude to limit perceived complexity of the statements and confusion. In addition, we changed the formulation of the third statement to retain the format of the first two questions. Finally, we measured PQR using three seven-point Likert scales: "The following product will meet your expectations as it approaches its expiry date", "The quality of the following product becomes worse as the product approaches its expiry date", "The following grocery item may lead to a health risk as it exceeds its expiry date". During the pre-test, we introduced an open-ended question to check if the respondents understood the questions. All 30 respondents stated that the questions were clear enough; however, 14 respondents consider the first two questions to be very similar. As we did

not identify any incomprehension of the PQR questions, we retained the adapted scale of PQR (Tsiros and Heilman, 2005) while conducting our two main studies, which are presented below.

< Insert Table 3 near here>

Drawing on the pre-test results, the proposed design allowed identifying one product category (fresh milk) that represented the experimental condition in which two different stimuli were created. Fresh milk was selected for its high level of PQR. To manipulate packaging, the original packaging in which fresh milk appeared was taken and digitally altered to create one transparent version and one opaque version. In doing so, the size, colour, and layout of the created stimuli were controlled for, as well as the packaging material perception as it can influence risk perception (Venter *et al.*, 2011). To do so, the material of the product packaging assigned was clearly specified to the respondents. It was stated that the fresh milk packaging is a plastic bottle. In the questionnaire, it was checked that the respondents were aware of such packaging and able to correctly state the material of the packaging to which they were exposed. The two created packs are shown in Figure 2.

< Insert Figure 2 near here>

Procedure and participants

To measure reactions to the two experimental stimuli in their final form, a study using a French online panel of 71 French respondents (mean age: 41.73; 55% female) was conducted. They were randomly assigned to two subgroups, each of which was exposed to one of the two packaging versions shown in Figure 2. The participants received an e-mail invitation to visit a website, which randomly assigned them to the conditions and provided the experimental instructions.

Measurements

Following the exposure to the targeted product, respondents were invited to fill out the questionnaire. Firstly, purchase intention was measured, using a ten-point probability scale from “no chance that I will buy the product” to “I will certainly buy the product” adapted from Juster (1966): “How likely is it that you will buy the product in the next three months?”. Secondly, to measure perceived product quality, the responses to a statement using a bipolar

scale were assessed: “The product should be of very poor quality to very good quality” (Aqueveque, 2015).

Then, all the covariates were measured: brand familiarity (Chandran *et al*., 2009), perceived product aesthetic (Bigoin-Gagnan and Lacoste-Badie, 2018; Sevilla and Townsend, 2016), product purchase frequency (Tsiros and Heilman, 2005), general risk aversion (Mandrik and Bao, 2005), packaging familiarity, and age (see Figure 1). In particular, perceived product aesthetic (Sevilla and Townsend, 2016) and packaging familiarity (Ettlie *et al*., 1984) might affect food product adoption. Age was also introduced as a potential covariate as it might influence risk factor evaluation (Simcock *et al*., 2006) and packaging evaluation (Ford *et al*., 2016). In addition, brand familiarity was considered as a control variable as brand familiarity might influence perceived risk (Roselius, 1971; Taylor, 1974) and packaging evaluations (Chandran *et al*., 2009). However, even if a fictitious brand was used and the visual layout of the packaging was changed, brand familiarity (Chandran *et al*., 2009) was also controlled as confusion can appear between fictitious and original brands when products resemble the overall appearance of well-known brands (Balabanis and Craven, 1997). This look-alike effect can lead to falsely recognising the fictitious brand as the original one (Falkowski *et al*., 2015) and artificially create a sense of brand familiarity. Perceived product aesthetic was assessed using two seven-point Likert scales adapted from Sevilla and Townsend (2016): “The product is good-looking”, “The product is aesthetically pleasing” (Pearson correlation = 0.787). A single item was used to measure brand familiarity (“unfamiliar–familiar”) on a seven-point scale. Packaging familiarity was also measured using a seven-point differential scale: “More generally, when you buy and/or consume milk, the packaging of the purchased and/or consumed product is most often opaque or transparent”. Then, product purchase frequency was assessed by rating one item on a five-point scale (“never” to “more than four times per month”) adapted from Tsiros and Heilman (2005): “How often do you purchase the product [X] in an average month?”. Next, consumer general risk aversion was measured with three seven-point Likert scales adapted from Payan *et al*. (2012) (α= 0.850). General risk aversion has been defined as the degree of an individual’s negative attitude toward risk arising from outcome uncertainty (Mandrik and Bao, 2005). The following items were included: “I avoid taking risks in life,” “I’d rather be safe than sorry,” and “I avoid taking chances if possible”.

Finally, three additional controlled variables were introduced. The perceived PQR was first measured for fresh milk (α = 0.873) using the adapted scale developed by Tsiros and Heilman (2005), which is described in the pre-test section. Secondly, the respondents were

asked if they had been exposed to transparent packaging or to opaque packaging. Thirdly, the respondents were asked to identify the type of packaging material to which they were exposed: either glass, plastic or cardboard.

Results

Control variables. To strengthen confidence in the findings discussed in the next section, we checked whether the participants rated the fresh milk product as a risk associated with a high PQR (M = 4.72). In addition, from the 71 questionnaires collected, 11 questionnaires were eliminated because the respondents were unable to correctly state if they were (or not) exposed to transparent packaging and/or to identify the material of the packaging. Finally, all the analyses were conducted among the 60 remaining questionnaires. Furthermore, chi-square tests and analyses of variance (ANOVAs) including post-hoc tests were conducted to check whether groups differ with regards to their structural composition. The two groups do not differ significantly in terms of gender, occupation and location. Finally, we checked that there were no significant differences in terms of perceived product aesthetic ($M_{OpaquePack}$= 4.00, $M_{TransparentPack}$= 4.43, t=-1.285, p=.204, p>.05) and packaging familiarity ($M_{OpaquePack}$= 2.70, $M_{TransparentPack}$= 2.63, t=.116, p=.908, p>.05) between groups exposed to the opaque vs. transparent packaging.

The effect of packaging type on purchase intention: the mediating role of perceived product quality. The consumers exposed to the opaque fresh milk product showed lower mean scores for brand purchase intention ($M_{transparent}$= 6.10; M_{opaque}= 4.76, t (1, 58) = 2.293, p<0.05) and perceived product quality ($M_{transparent}$= 5.30; M_{opaque}= 4.37, t (1,58) =2.500, p<0.05) compared to those exposed to the transparent packaging. To check the assumption about the mediating role of product perceived quality and account for the positive effect of packaging type on brand purchase intention, a mediation test was conducted (Hayes, 2015) using Hayes's PROCESS tool. Packaging manipulation was considered as the independent variable, brand purchase intention as the dependent variable, and perceived product quality as the mediating variable along with the potential covariates.

The results show the impact of packaging transparency on product perceived quality (coefficient=0.6298, p<.05) but not on brand purchase intention (coefficient=0.5582, p>0.05).

In addition, the PROCESS code of the Hayes's PROCESS tool generated a bootstrap confidence interval for the index of mediation. The results indicated a significant indirect effect of the packaging transparency on brand purchase intention through perceived product quality (Effect=0.4461; bootstrap confidence interval: [0.109; 1.0659]). No significant direct effect of the type of packaging on brand purchase intention was established ($p>0.05$). Product perceived quality fully mediated the effect of the type of packaging on brand purchase intention. H1 is thus supported.

As for control variables, perceived product aesthetic is the only control variable that impacted positively and significantly on product perceived quality (coefficient=0.6837, $p=0.000$).

Discussion

Using a manipulation of packaging transparency, it was found that packaging transparency improves brand purchase intention and this relationship is fully mediated by product perceived quality. Thus, our work replicated previous research on the mediating role of product perceived quality in the specific context of a high level of product PQR (Chandran *et al.*, 2009; Simmonds *et al*., 2018) within a French cultural setting. It provides a direct answer to the call for further replication studies to increase external validity of published results (Royne, 2018).

Study 2: the moderating role of types of perishable product based on its PQR level

Design

Study 2 followed the same procedure as Study 1. Relying on the pre-test conducted during Study 1 (Table 3), pasta (mean 2.18) and fresh soup (mean 5.11) were selected as they have divergent PQR scores and can be consumed at the same time of day (during lunch or dinner meal).

As before, two versions of the packaging for each product category were created (Figure 3). An online study of 149 French respondents (mean age: 41.68; 52.5% female) was conducted. They were randomly assigned to four subgroups, each of which was exposed to one of the four packaging versions shown in Figure 3. The respondents completed the same questionnaire as described in Study 1.

< Insert Figure 3 near here>

Results

Manipulation checks and control variables. Exclusion criteria were determined before data collection began. As previously done in Study 1, it was checked that all respondents were able to state to which types of packaging and material they were exposed to. A total of 29 the respondents were excluded from the database because they were unable to state the type of packaging and/or identify the packaging material to which they were exposed. As expected, the participants rated the fresh soup product as more risky (M = 4.61) than the pasta product (M = 1.99) (t (1,119) = -14.217, p = 0.000). The manipulation of perishable product type associated with divergent PQR level was then validated. Finally, we checked that there were no significant differences in terms of perceived product aesthetic ($M_{OpaquePack}$= 3.78, $M_{TransparentPack}$= 4.00, t=-.623, p=.536, p>.05) and packaging familiarity ($M_{OpaquePack}$= 5.80, $M_{TransparentPack}$= 5.13, t=1.457, p=.151, p>.05) between groups exposed to the opaque vs. transparent packaging in the fresh soup product condition. We replicate the same pattern of results for the milk product condition (all ps>.05).

The moderating role of perishable product type based on its PQR level. Transparent packaging improved product evaluations in terms of perceived product quality and brand purchase intention when the PQR of the product is high. Consumers exposed to the opaque packaging of the fresh soup product (product high in PQR) showed lower mean scores for brand purchase intention ($M_{transparent}$= 4.87; M_{opaque}= 4.20) and perceived product quality ($M_{transparent}$= 4.70; M_{opaque}= 4.00) compared to those exposed to the transparent packaging. However, respondents exposed to the opaque packaging of the pasta product (product low in PQR), did not show lower mean scores for brand purchase intention ($M_{transparent}$= 5.63; M_{opaque}= 5.60) and perceived product quality ($M_{transparent}$= 5.07; M_{opaque}= 5.13) compared to those exposed to the transparent packaging.

To check the assumption about the interaction effect of the level of PQR and packaging type on perceived product quality and brand purchase intention, as well as the mediating role of product perceived quality, a moderated mediation (Hayes, 2015) was conducted using Hayes's PROCESS tool. The packaging type manipulation was considered as the independent variable, brand purchase intention as the dependent variable, perceived product quality as the mediating variable and product type based on its PQR level as the moderating variable, along

with the eight potential covariates (brand familiarity, pasta and soup product purchase frequencies, perceived product aesthetic, consumer general risk aversion, soup and pasta packaging familiarity and age).

The index of moderated mediation shows that product perceived quality mediates the impact of packaging type on brand purchase intention (Index= -0.6395; bootstrap confidence interval: [-1.31; -1.15]). H1 is thus supported. To further validate the findings on the moderated mediation relationship (H2), the varying magnitude of the conditional indirect effect of the type of packaging on brand purchase intention through product perceived quality was examined across the two types of perishable products based on the PQR level (low *vs*. high). The results of this moderated mediation test are shown in Table 4, highlighting that the indirect effect is positive and significant when the product is associated with a high PQR (95% bootstrap CI, 0.12 to 0.90) but weaker and non-significant when a product is associated with a low level of PQR (95% bootstrap CI, -0.58 to 0.07). This pattern is consistent with the hypothesis and indicates that the indirect effect of the type of packaging on brand purchase intention through product perceived quality is conditional on the type of product and its level of PQR. H2 is thus corroborated.

< Insert Table 4 near here>

Discussion

Study 2 provided additional empirical support to explain the mediating role of product perceived quality to account for the positive effect of packaging transparency on brand purchase intention. In addition, Study 2 introduced the moderating role of product PQR level as an important boundary condition: the positive mediated effect of packaging transparency on brand purchase intention becomes insignificant when dealing with a product with low PQR level. This research not only extended previous valuable research (Batra *et al*., 2010; Bileter *et al*., 2012; Chandran *et al*., 2009), and also provided new insights into the role of product PQR level as an important moderating variable.

General conclusions and contributions

The starting point of this research was to further explore the boundary conditions to account for

the positive effects of transparent-over-opaque packaging. No research to date has focused on product type based on its PQR level in the context of non-durable consumer goods.

Theoretical contributions

These findings demonstrated that PQR moderates the effect of packaging on product evaluations in a retail context, and contributed to literature on packaging, cue utilization and perceived risk.

First, the results extended the research on the efficacy of transparent packaging (Chandran *et al.*, 2009; Bileter *et al*., 2012; Simmonds *et al*., 2018; Simmonds et al., 2019; Van Esch, Heller and Northey, 2019), and established product PQR level as an important moderating variable to account for the strength of positive effects of transparent-over-opaque packaging. Focusing only on product type (Batra *et al*., 2010) to obtain a trade-off between transparent and opaque packaging may not be sufficient to develop positive product evaluations. The role of PQR must be taken into account as a key factor that influences product packaging evaluations. In addition, extending the work of Simmonds et al. (2019) who have established the moderating role of transparent window shape on consumer's product evaluations, we have introduced an additional boundary condition (PQR) of packaging transparency efficiency.

Second, this result supports and extends the literature and theory of cue utilization (Birch *et al*., 2018; Olson, 1972). It has been well documented that packaging is an extrinsic cue on which consumers rely to evaluate a product (Wansink, 1996) and is an indicator by which consumers infer product quality (Bruce and Daly, 2007; McDaniel and Baker, 1977). Extending the conclusions of Bruce and Daly (2007), the transparency of the packaging is an additional element of the packaging design (Favier *et al.*, 2019; Jones *et al.*, 2018; Krishna *et al*., 2017; Krishna *et al*., 2017; Wells *et al.* , 2007; Wang, 2013) on which brands can communicate quality and value to the customer (Khan, 2017). In line with Clement (2007) who demonstrated that visual stimuli from packaging influence the in-store buying-decision process, this work established that packaging transparency positively affects brand purchase intention and perceived product quality. By doing so, this research introduces a new dimension of packaging (transparency *vs*. opacity) as an extrinsic cue (Birch *et al*., 2018) and demonstrates that transparent packaging may increase perceived product quality and purchase intention when the perishable product is associated with a high PQR. Furthermore, when exposed to a product

class associated with a high PQR, it was demonstrated that the effect of packaging type on purchase intention is mediated by perceived product quality. As a result, packaging type (transparent *vs*. opaque) is a context-dependent extrinsic cue and tributary to perishable product PQR level. Consequently, we extend the results on the boundary conditions of the efficiency of packaging cues (Simmonds et al., 2019; Matthews *et al*., 2019; Van Esch *et al.,* 2019; Van Ooijen et al., 2017).

Finally, the results extended the literature on risk perception. Previous research has highlighted that consumers develop various risk-reduction strategies to limit the inhibiting effect of risk perceptions, such as information acquisition, relying on familiar brands, money-back guarantees (Derbaix, 1983; Roselius, 1971; Taylor, 1974), and/or labels (Berry *et al.,* 2018; Lowe *et al*., 2013; Rauschnabel *et al*., 2015). This research provides new insight on the role of packaging transparency as an additional risk-reduction strategy for consumers when exposed to a product associated with a high PQR level. Packaging is then an important attribute on which consumers rely on to check for the quality of the product (Khan, 2017), before buying it, especially when the product is associated with a high PQR level. When a perishable product is associated with a high PQR, it may represent an important threat for consumers as it can cause harm or illness if the product is not of good quality. In this context, along with calorie labelling on packaging, (Berry *et al*., 2018) packaging transparency becomes a medium used by consumers to limit health risks associated with perishable products. Evolutionary psychologists have well documented strategies implemented by individuals to avoid health threats (Neuberg *et al*., 2011; Schaller and Park, 2011). According to Schaller and Park (2011), human beings engage in behavioural defences against infectious pathogens through the detection of cues connoting the presence of infectious pathogens in their immediate environment. Extending those results, packaging transparency utilisation is an additional valuable strategy that can be implemented in threat avoidance processes.

Managerial implications

This study also contributes to management practice. It was established that transparent packaging improves products' perception associated with high PQR. The implication of this result for food producers and retailers is to reinforce the use of transparent packaging when PQR is high; there is no similar preference for transparent packaging when a product has low PQR. If a brand manager's main goals are to develop sales, costly investments in research and

development of transparent packaging appear to be fruitful only for products associated with high PQR.

Consequently, we advise brand managers and retailers to measure PQR before launching a new product or new packaging for an existing perishable product. The adapted short scales developed by Tsiros and Heilman (2005), which are composed of three items, can be easily implemented by managers. The levels of PQR obtained through preliminary studies can be strong indicators when devising product packaging. In conclusion, we suggest that managers should opt for transparent packaging when the PQR of a product is high.

Finally, from packaging suppliers' point of view, they are urged to develop their offers in terms of transparent packaging, especially when designing packaging for products with high PQR. Two important challenges are faced by packaging suppliers. On the one hand, an important challenge is to develop transparent packaging that combines visibility of product with high impact graphics, as it was found that perceived aesthetics are an important variable impacting product evaluation (Bigoin-Gagnan and Lacoste-Badie, 2018). On the other hand, packaging suppliers working in international markets may also develop transparent packaging that complies with the country specific updated packaging laws, such as The New German Packaging Law (VerpackG) that came into effect on 1 January 2019. There is an increasing demand for eco-design packaging made from 100% renewable raw materials.

Limitations and directions for future research

The previous studies on transparent packaging did not investigate the role of perceived product risk. Although this gap was filled by the present study, limitations are acknowledged, opening new avenues for continued research.

Firstly, the replication of these studies is highly recommended in order to avoid overgeneralisation and to bolster a more confident application of these findings across different marketing contexts. Additional studies might consider other product category classes, and other types of risk such as the personal risk associated with consumer goods (Tsiros and Heilman, 2005). In addition, it appears that the present results are validated in France, and further research could replicate our experimental approach in other contexts and geographical areas. Empirical findings from different cultural contexts (Trinidad, the West Indies; South Africa) have already demonstrated that packaging material could adversely affect the quality or performance of

convenience products (Peters-Texeira and Badrie 2005; Venter *et al*., 2011). However, previous research has not focused properly on the moderating role of the type of product based on its PQR level to explain benefits of transparent packaging. It will thus be valuable to replicate the preliminary results established in a French cultural context in other countries.

Secondly, the participants were exposed to only one type of packaging (opaque or transparent) for one product category; these experimental conditions do not accurately reflect real life, in which consumers are exposed to more than one product at a time, especially given the increasingly competitive advertising of products in retail spaces and store flyers, which might affect message processing (Mimouni *et al.*, 2010). Future research could test the role of PQR along with multiple packaging cues to predict their combined effects on product evaluation.

Finally, the two experimental designs consisted first in presenting the product, brand name and packaging material. By doing so, it is possible that the attention of the respondents has been directed towards the packaging, in spite of all filter questions being introduced at the end of the questionnaire. To overcome this important limit, future research could develop field experiment studies to test the effect of packaging transparency in a more natural retail setting (Theotokis *et al.*, 2012).

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