Available online at www.sciencedirect.com

ScienceDirect

Journal of Consumer Psychology 24, 1 (2014) 4 – 17

Research Article

Package size and perceived quality: The intervening role of unit price perceptions

Dengfeng Yan [a,*], Jaideep Sengupta [b], Robert S. Wyer Jr. [c]

[a] University of Texas at San Antonio, USA
[b] Hong Kong University of Science and Technology, Hong Kong
[c] Chinese University of Hong Kong, Hong Kong

Received 2 October 2011; revised 6 August 2013; accepted 12 August 2013
Available online 17 August 2013

Abstract

This research examines how package size can influence quality judgments for packaged goods, and also identifies a price-based mechanism for the observed size–quality relationship. Results from several studies show that a product in a smaller package is rated more favorably than the equivalent product in a larger package. Further, this effect is due to the smaller package being associated with a higher unit price (despite having a lower overall price), which suggests that unit price information is more diagnostic than overall price information when forming judgments of product quality. We also find a theoretically-derived reversal of this effect under conditions in which the greater diagnosticity of unit price is overwhelmed by its lower ease of use. Namely, when overall price is the only explicitly-provided price cue and consumers are too distracted to estimate unit price, a larger package is now rated as being better. Finally, two concluding studies examine the downstream consequences of changes in package size, building off our basic conceptualization to document effects on product choice as well as consumption experience.
Published by Elsevier Inc. on behalf of Society for Consumer Psychology.

Keywords: Package size; Unit price; Quality perceptions; Dual role of price

A product is often sold in different package sizes. For example, the volume of a Coke could be 200 ml, 330 ml, 500 ml, 1250 ml, or 2500 ml. This is also true of many other packaged goods (cosmetics, shampoo, chocolate, etc.). Anecdotal evidence suggests that consumers associate package size with quality. In one web log,[1] for instance, a consumer reports that he and his friend have reached an agreement on Reese's peanut butter cups: "It seems that the smaller miniature cups… taste the best…the small cups seem to be far superior to the normal sized cups…and the 'Reese's big cup' tasted…inferior to the normal sized cups." Similarly, on websites such as Yahoo Answers, it's not uncommon to find questions such as "why does a soda taste better in a small bottle than in a large bottle or can?"[2]

These examples suggest that package size, which is one of the most accessible and easy-to-process product cues to which consumers are exposed, can have a significant impact on quality judgments. However, this influence has rarely been investigated empirically (for an exception, see Mathur & Qiu, 2012). Moreover, the mechanism underlying the effect has not been articulated. This paper reports five studies that provide empirical evidence regarding the impact of packaging products in different sizes on consumers' quality judgments. We begin by providing evidence for the basic effect, showing that smaller sizes typically yield inferences of higher quality. We then elucidate the psychological process that underlies the phenomenon. Our findings show that the size–quality relationship is mediated by differences in perceptions of unit price (price per unit volume) associated with different package sizes. Further, our theorizing enables us to identify particular conditions (e.g., when resources are constrained) under which quality perceptions are more likely to be guided by total price rather than unit price. In such cases, quality inferences are positively

* Corresponding author at: Department of Marketing, University of Texas at San Antonio, One UTSA Circle, San Antonio, TX 78249, USA.
E-mail address: dengfeng.yan@utsa.edu (D. Yan).

[1] http://danielbroadway.blogspot.com.
[2] http://in.answers.yahoo.com/question/index?qid=20090112083116AAvL1H9.

1057-7408/$ -see front matter. Published by Elsevier Inc. on behalf of Society for Consumer Psychology.
http://dx.doi.org/10.1016/j.jcps.2013.08.001

associated with larger package sizes, thus providing an interesting boundary condition for the size–quality effect. Finally, we leverage our conceptualization to look at two important downstream consequences of varying package size: namely, perceptions of the actual consumption experience, as well as pre-trial product choice.

This investigation of the relationship between package size and perceived quality, and the mediating influence of unit price on these perceptions, contributes to research in two major areas. First, our substantive focus on the size–quality issue adds to the recent and growing body of work concerning the effects of packaging characteristics on various types of consumer judgments and behavior, such as volume estimation (Raghubir & Krishna, 1999), self-control (Argo & White, 2011), and actual amount consumed (Wansink, 1996). Our results show that package characteristics (specifically, size) can also have an impact on more abstract judgments such as quality perceptions; further, this effect has important implications both for product choice and also the consumption experience.

Second, from a theoretical perspective, examining the critical mediating role of unit price perceptions enables us to inform the price–quality literature. Research in this area has focused on the use of total price in driving quality perceptions (Krishna & Johar, 1996; Shiv, Carmon, & Ariely, 2005). In contrast, examining quality perceptions through the lens of package size allows us to disentangle the effect of unit price from that of overall price. In doing so, we find support for the proposition that it is unit price that is the more diagnostic of the two cues. At the same time, we delineate theoretically-derived conditions that determine when each of these two opposing influences (total vs. unit price) may drive quality perceptions, thus identifying when lower package size leads to higher estimates of quality (reliance on unit price) versus lower estimates of quality (reliance on overall price).

It should be kept in mind that the current inquiry focuses on packaged goods alone; it is conceivable that the relationship between size, price and quality for other types of product categories (e.g., cars, houses, etc.) will be quite different, an issue to which we return in the General Discussion.

Conceptual background

Package size and the (unit) price–quality link

Much research in the consumer literature has demonstrated that other things being equal, consumers use higher prices as being indicative of greater product quality (Rao, 2005; Rao & Monroe, 1989). In one early study, for instance, participants were presented the same brand of beer in bottles labeled with different prices. They rated the beer to be of higher quality when it was associated with a higher price (McConnell, 1968; see also Shiv et al., 2005).

These and other convergent studies (Jacoby, Olson, & Haddock, 1971; Rao & Monroe, 1989) have not distinguished between the effects of overall (i.e., total) price and unit price (i.e., price per unit volume) on quality perceptions. One reason for this is that price–quality research has typically not varied package size. When package size is held constant, a higher overall price obviously implies a higher unit price as well. In contrast, the substantive question addressed in the current investigation has to do with the effect of varying package size, which brings the distinction between unit price and overall price sharply into focus. To illustrate, a very large bottle of relatively low-quality shampoo may carry a higher overall price than a much smaller bottle of a higher-quality shampoo; however, unit price is likely to be lower for the large bottle.

In cases such as these, when unit price and overall price offer competing predictions of product quality, we argue that unit price is the more diagnostic of the two cues. An overall price figure, while clearly important, simply informs consumers about the cost of a product. Unit price, on the other hand, informs consumers about the cost in relation to the unit of product volume that they will receive for that cost. The unit price cue thus incorporates information about both cost and value (cf. Monroe, 2003 for a discussion of the dual role of price). Drawing on the premise that cue diagnosticity is heavily influenced by its informativeness (Broniarczyk & Alba, 1994), a higher unit price should be more indicative of good quality than just a higher overall price.

Unit price takes on particular importance with regard to our size–quality inquiry because of an empirical regularity that has been observed between size and unit price in the context of packaged goods. Products in large packages, while being higher in overall price, typically cost less per unit volume (Granger & Billson, 1972). Given the ubiquity of this pattern, it seems reasonable to assume that consumers develop a learned association between size and unit price, such that they infer higher unit prices for smaller sizes. Indeed, this assumption has been validated by Wansink (1996), who found that for a majority of products across 21 different categories, perceptions of unit price (i.e., the ratio of estimated price to package size) increased as package size decreased.

This learned relationship between package size and unit price perceptions should directly influence quality assessments. Specifically, even when no price information is explicitly provided, simply being exposed to a product in a smaller (vs. larger) package will lead to inferences of higher unit price; in turn, this should be reflected in a perception of higher product quality. Formally, we predict that for packaged goods, when no price information is provided:

H1a. Products in smaller packages will be rated as possessing higher quality than equivalent products in larger packages. This effect will be driven by differences in perceptions of unit price, with smaller-size packages being perceived as being more expensive.

Given the critical role we attribute to unit price differences in driving the size–quality relationship, a straightforward corollary to the prediction above is:

H1b. If the unit price is held constant across differing package sizes, a package size difference will no longer impact quality perceptions.

Of note, a recent working paper, which uses an economic model based on the firm's profit-maximization motive, also predicts that smaller package sizes are associated with higher quality estimates (Mathur & Qiu, 2012). While this is reassuringly convergent with the prediction outlined in H1a above, one of the several major differences between the two sets of research is that the Mathur and Qiu paper, unlike the current focus, does not attempt to find evidence for the underlying mechanism (i.e., the intervening role of unit price perceptions). Other differences, which we elaborate upon later, include our theoretically-derived identification of boundary conditions for the basic size–quality effect, as well as an investigation of the downstream consequences of this effect on product choice and consumption experience.

The size–quality effect given price information

The prediction articulated in H1a and H1b applies to cases where consumers do not know the price of a product but are simply given package size information. When price information is available however, additional considerations arise. These are useful to examine both from an applied perspective (since prices are frequently provided on packages), and also to provide a deeper look at the competing roles of overall price versus unit price in driving the size–quality effect. We consider two different cases, both of which follow actual practice for packaged goods: one where both unit price and overall price information is provided along with package size (Russo, 1977), and another where only overall price information is provided with the package. In both cases, the competing influences of overall versus unit price are best illustrated by comparing quality perceptions of a larger package with higher overall price but lower unit price than the same product in a smaller package (cf. Granger & Billson, 1972).

The first case is relatively straightforward. When both the unit price and the overall price are explicitly provided, consumers should rely on the more diagnostic cue. If unit price is indeed the more diagnostic of the two cues, this suggests that the smaller package should again be judged as possessing higher quality. Note that this prediction is the stimulus-based analog of H1a and H1b. There, in the absence of any price information, we argue that consumers are more likely to rely on their (memory-based) inferences of unit price rather than overall price in judging product quality. Here, when both cues are externally provided, a similar pattern should hold. In both cases, the prediction is consistent with the well-established principle of cue diagnosticity: other things being equal, individuals are more likely to base their judgments on the more diagnostic of competing cues (Chaiken, 1980; Feldman & Lynch, 1988). Formally therefore, we predict that when both unit price and overall price information is provided for packaged goods:

H2. Consumers will rely on unit price rather than overall price in their quality judgments. Therefore, assuming the typical scenario in which smaller packages carry a higher unit price (albeit a lower overall price) than larger packages, the former should be rated higher in quality.

Unit price vs. overall price: diagnosticity vs. ease of use

The second case — when only overall price information is provided with the package size (the likely situation in many store contexts) — is the more interesting one. Since the overall price (but not unit price) information is explicitly provided, consumers could simply use this cue to form quality judgments; if so, the larger package, because it has a higher overall price, will be judged more favorably. On the other hand, even though unit price is not explicitly provided, consumers could compute an estimate of unit price given package size and overall price. If so, the smaller package will again be judged more favorably than the larger one. Note that we are not arguing here that consumers necessarily compute the exact, accurate unit price. Rather, we suggest that in this situation, instead of simply relying on the provided overall price, consumers may make the effort to take both overall price and package size into account, forming a rough idea of "price per unit volume".

A diagnosticity-based account argues for the latter possibility, since unit price is the more diagnostic of the two cues. Apart from diagnosticity, however, the two price cues in this scenario now differ along another important dimension: ease of use. In the cases discussed earlier, either both cues were readily available (H2), or neither was (H1a and H1b). Now however, one cue (the overall price) is readily available and therefore easy to process, while computing the other (unit price) requires more effortful processing, involving as it does the simultaneous consideration of two pieces of information: package size as well as overall price (Russo, 1977; Russo, Krieser, & Miyashita, 1975). The ease-of-use distinction is an important one since much research on judgment and decision-making has shown that, along with diagnosticity, ease of processing influences which of two competing cues is used to form judgments. Thus, an objectively less diagnostic cue may be relied upon simply because it is easier to use. This is especially likely to be the case when conditions hamper effortful processing — as, for instance, when cognitive resources are constrained (Chaiken, Liberman, & Eagly, 1989; Petty & Cacioppo, 1984).

Applying these principles to the current context, we argue that given sufficient cognitive resources, consumers will exert the effort required to form a rough estimate of unit price (the more diagnostic cue) and therefore judge the smaller package to be of better quality. However, the reverse will obtain when capacity is constrained: consumers will now rely on the readily available (and thus easy to process) overall price cue, consequently judging the larger package to be better. Formally therefore, we predict that for packaged goods, when overall price information (but not unit price) is provided:

H3a. When consumers' cognitive resources are not constrained, the influence of package size on quality perceptions will be driven by differences in estimated unit price. Therefore, assuming the typical scenario in which smaller packages carry a higher unit price than larger packages, the former should be rated higher in quality.

H3b. When consumers' cognitive resources are constrained, the influence of package size on quality perceptions will be

driven by differences in overall price. Therefore, the larger package should be rated higher in quality than the smaller package, since the former will typically have a higher overall price.

Downstream consequences of size-induced quality perceptions

Apart from identifying the influence of package size on quality estimates, and examining the critical intervening role of price perceptions, a final goal of this research is to build on our ideas to document the downstream consequences of varying package size. We look at two such consequences in particular: a) post-trial consumption satisfaction (e.g., how good a juice tastes when consumed from a small vs. big carton); and b) pre-trial product choice (e.g., whether consumers purchase the bigger or smaller package when given a choice between the two).

With regard to the first issue, we draw on expectancy confirmation research (Herr, 1986; Lambert & Wyer, 1990) to explain how the quality expectations induced by package size can materially influence the actual consumption experience. In particular, we argue that depending on the objective quality of the product, changes in package size may produce either an assimilation effect of expectations (more pleasurable experience when the product is consumed from a smaller package) or a contrast effect (more pleasurable experience when the product is consumed from a larger package). With regard to the second issue of pre-trial choice, the underlying idea that package size influences quality via price estimates (smaller size = higher unit price = higher quality) suggests two opposing effects on choice. If consumers are more concerned with quality rather than expense, they should choose the smaller package. However, the reverse should be true when consumers are concerned about the expense rather than the quality — i.e., when they are focusing on saving money and getting a good value. We draw on construal level theory (Trope & Liberman, 2010) to argue and show that either of these effects may occur depending upon how psychologically distant the choice decision is perceived to be.

For ease of exposition, further details of the specific hypotheses and accompanying rationale for each of these consequences are presented along with the corresponding studies.

Experiment 1: smaller is better (and costlier)

Experiment 1 provided an initial demonstration of the basic size–quality relationship posited in H1a (smaller size = superior quality), and of the mediating role of unit price in driving this relationship. Participants in experiment 1A judged the quality of Pringles potato chips, a brand with which they were familiar. They were given a picture of this product in either a large or a small package. If the smaller package is associated with higher unit price, the product should be rated higher in quality when presented in the smaller (vs. larger) package. Experiment 1B replicated these results in a non-food domain. In both studies, participants were only provided with package sizes; no price information was included.

Experiment 1A

Method

Participants in all the studies reported in this paper were Hong Kong undergraduate students, who were rewarded with course credit. Participants were run in groups of up to seven, with each individual seated in a separate cubicle. Questionnaires and stimuli were all provided on paper. Participants in experiment 1A (n = 44) were informed that the purpose of the study was to understand consumers' opinions of Pringles potato chips. They were then shown a picture of the product (see Appendix). The picture featured either a small (43 g) package or a large one (170 g). After seeing the picture, all participants (a) rated the expected taste of Pringles potato chips along a scale from 0 (not at all) to 10 (very tasty), and (b) judged the quality of the product along a scale from 0 (poor) to 10 (excellent).[3] Finally, they estimated the total price of the product in HK dollars (1 USD = 7.8 HKD), which is the unit of currency used in this paper.

Results

Consistent with our predictions, participants judged the potato chips to be tastier if they were contained in a small package than if they were contained in a large one (M_{Small} = 8.05 vs. M_{Large} = 5.09; F (1, 42) = 28.65, $p < .001$), and also judged their quality to be higher in the former condition (M_{Small} = 7.73 vs. M_{Large} = 6.09; F (1, 42) = 10.13, $p < .01$). Unsurprisingly, participants estimated total price to be higher for the larger package ($11.59) than the smaller package ($7.23; F (1, 42) = 50.06, $p < .001$). Critically however, these total price estimates translated to the reverse pattern with regard to perceptions of unit price (computed by dividing the total price by package size). That is, as predicted, unit price was perceived to be higher when the package was small ($0.17) than when it was large ($0.07, F (1, 42) = 50.06, $p < .001$).

Finally, bootstrapping tests (Preacher & Hayes, 2008; Zhao, Lynch, & Chen, 2010) revealed that the effect of package size on quality perceptions was fully mediated by unit price (a × b = −1.44, 95% CI = −2.70 to −.72; z = −2.45, p = .01). Exactly the same pattern was obtained when using tastiness judgments as the quality measure (not reported for reasons of space).

Experiment 1B

Experiment 1B replicated the findings of experiment 1A using a different product category. In doing so, it ruled out an alternative interpretation for the results obtained in experiment 1A. Prior research in the context of edibles has shown that the contents of large packages are usually consumed more rapidly (Wansink, 1996). As a result, consumers are more likely to over-eat or over-drink when a product is contained in a large

[3] Note that quality judgments can either take the form of abstract, summary inferences of a product's "goodness" (Holbrook & Corfman, 1985), or more specific inferences regarding a key dimension — such as "taste" for edibles (Elder & Krishna, 2010; Krishna & Morrin, 2008).

package, and so their enjoyment of the experience may be reduced. The less favorable ratings for the larger package in experiment 1A could be driven by a recall of such adverse past experience, or even by the expectation that the larger amount of food contained in the bigger package will grow stale before it is fully consumed. However, non-food products are not susceptible to such alternative interpretations.

Method

Participants (n = 41) were informed that the purpose of the study was to obtain judgments of Head & Shoulders shampoo. Following the procedures used in Experiment 1A, they were then shown a picture of either a small bottle (400 ml) or large bottle (1000 ml) of the shampoo. After seeing the picture, participants rated the quality of the product along a scale from 0 (very poor) to 10 (excellent). In addition, they indicated how much they liked the brand on an 11-point scale ranging from 0 (not at all) to 10 (like very much). Finally, they were asked to estimate the overall price of the product.

Results

As predicted, participants found the shampoo to be higher in quality when its container was small rather than large (6.77 vs. 5.63, respectively; F (1, 39) = 6.79, $p < .01$). Liking for the brand followed a similar pattern (5.96 vs. 4.42, respectively; F (1, 39) = 5.29, $p < .05$). Importantly, although participants estimated the overall price of the small bottle to be lower than that of the large one ($28.64 vs. $43.05; F (1, 39) = 12.04, $p < .01$), these total price estimates again translated to the reverse pattern with regard to perceptions of underlying unit price (M_{Small} = $0.07, M_{Large} = $0.04; $F(1, 39) = 15.62, p < .01$). As in Experiment 1A, bootstrapping tests confirmed that the effect of size on perceived quality was fully mediated by differences in unit price perceptions (a × b = -.74, 95% CI = −1.64 to −.20; $z = -2.34$, $p = .02$).

Discussion

Experiments 1A and 1B demonstrated that a product in a smaller package was perceived to be of higher quality than the same product in a larger package, and also that this effect was mediated by perceived differences in unit price. Of note, the findings also show that quality perceptions were not driven by differences in overall (i.e., total) price — had this been the case, the larger package, which was believed to have a higher total price in each study, would have received better quality ratings. Exactly the same pattern of results was obtained regardless of whether the product was a food or a non-food. Collectively, these results support our contention regarding the effect of package size on perceived quality, and also provide initial evidence as to the key intervening influence of unit price perceptions.

Experiment 2: manipulating unit price

Experiment 2 had two key goals. Foremost, it sought to provide more compelling support for the causal role of unit price in driving the size–quality relationship by manipulating unit price along with package size. Doing so (instead of simply measuring unit price) allowed us to address an important alternate explanation for the results observed in the previous studies: namely, package size might have a direct impact on quality perceptions. Several factors could produce such a direct relationship. First, smaller packages might signal scarcity. Because scarcity often leads to perceptions of greater desirability (Worchel, Lee, & Adewole, 1975), this could produce the observed effect on perceived quality. Second, smaller products might be perceived as more difficult to manufacture; if so, consumers may infer greater effort on the manufacturer's part, again leading to higher quality perceptions (Hui et al., 2004). Third, consumers might simply hold a lay belief about good things being contained in smaller packages. Finally, smaller packages may be aesthetically more attractive.

By manipulating unit price in addition to package size, experiment 2 was able to test whether the effects obtained in the first two studies were attributable to such price-unrelated factors. If this was the case, a significant effect of size should still be obtained if unit price was to be held constant. However, if unit price is indeed the key mediator of quality perceptions, package size should have no effect on quality ratings when unit price is held at the same level (as we predict in H1b). Rather, manipulating the unit price (while keeping package size constant) should itself influence perceptions of product quality.

The other goal of Experiment 2 was to examine the size–quality link when both unit price and overall price information are explicitly provided (unlike in Experiment 1, where participants were only provided the size cue). Including full price information allowed us to provide further evidence for the posited greater diagnosticity of unit price as compared to overall price. As articulated in H2, when both types of price information are provided, we predict that consumers will rely on unit price information — therefore, the package associated with the higher unit price (rather than the higher overall price) should again be rated as being higher in quality.

Method

Participants (n = 123) were randomly assigned to conditions using a 2 (package size) × 2 (unit price) between-subjects factorial design. They were told that a new laundry detergent brand was planning to enter the Hong Kong market and the company wanted to get some feedback from consumers. Participants were then asked to evaluate the product based on a picture of the product, coupled with written information about its size, overall price, and unit price. The package was described either as 100 oz. (large) or 25 oz. (small); the accompanying picture accordingly depicted a big or a small package. Unit price was described as being either $1/oz. or $0.5/oz. Overall price information was also provided; the different combinations of unit price and package size resulted in four different overall price points: $100, $50, $25, or $12.5.

After exposure to the product information, participants responded to two dependent measures which were combined into a quality index: (1) predicted quality of the detergent and (2) predicted effectiveness (1 = very poor/not effective at all; 7 = very excellent/very effective; $r = .93$). As manipulation checks,

participants were then asked to rate the size of the product (1 = very small; 7 = very large), the unit price level (1 = very cheap; 7 = very expensive), and the attractiveness of the package (1 = very unattractive; 7 = very attractive). Package attractiveness was used as a covariate in initial analyses and had no effect on any of the results; it is accordingly not discussed further.

Results

Manipulation checks

Perceptions of package size and unit price were analyzed in the context of a 2 (package size) × 2 (unit price) ANOVA. Those exposed to the bigger package judged the package as larger than those exposed to the smaller package (M_{Big} = 6.25 vs. M_{Small} = 4.24, F (1, 119) = 53.12, $p < .001$); none of the other effects was significant ($p's > .10$). Similarly, unit price was judged to be higher when actual unit price was high vs. low (M_{High} = 5.75 vs. M_{Low} = 4.29, F (1, 119) = 20.50, $p < .001$); again, no other effect was significant ($p's > .10$).

Quality judgments

Our simultaneous manipulation of package size and unit price allowed us to examine whether size has an impact on quality judgments once unit price is controlled for (if so, a main effect of size on quality ratings should be observed) or whether the size effect on quality is primarily due to variations in unit price perceptions (if so, unit price alone should have an impact, with no main effect of size). An analysis of the quality index revealed only a main effect of unit price (F (1, 119) = 9.42, $p < .01$). Participants judged the product's quality to be higher given a higher (M = 5.93) vs. lower unit price (M = 5.11); this was true regardless of whether the package size was small ($M_{High\text{-}unitprice}$ = 5.95, $M_{Low\text{-}unitprice}$ = 5.08; t (119) = 2.02, $p < .05$) or large ($M_{High\text{-}unitprice}$ = 5.91, $M_{Low\text{-}unitprice}$ = 5.14; t (119) = 2.32, $p < .05$). While unit price thus had a clear impact on the quality index, package size in itself did not when unit price was held constant (M_{Large} = 5.56, M_{Small} = 5.52, F < 1). This was true whether the unit price was high (M_{Large} = 5.91, M_{Small} = 5.95) or low (M_{Large} = 5.14, M_{Small} = 5.08), supporting H1b (Table 1).

Note that while this pattern of results rule out a direct impact of package size on quality perceptions, it does not necessarily confirm H2, which argues for a reliance on unit price rather than overall price when both pieces of information are provided. Within each level of package size in the study, overall price is a direct function of unit price, making it impossible to identify which of these two price cues is driving quality perceptions by simply considering the main effect of unit price above. The two cues can be disentangled, however, by contrasting quality ratings in two specific conditions: the small package (25 oz.) associated with a higher unit price ($1/oz.) but lower overall price ($25) vs. the large package (100 oz.) associated with a lower unit price ($.5/oz.) but higher overall price ($50). A reliance on overall price would manifest in the latter package being rated higher; instead, as predicted by H2, the smaller package was rated higher in quality, testifying to the influence of unit price ($M_{\$25–\$1/oz.}$ = 5.95 vs. $M_{\$50–\$.5/oz.}$ = 5.14; t (119) = 2.10, $p < .05$). Finally, a trend analysis revealed no differences in quality perceptions ($F_{Linear\text{-}trend}$ = 2.52, $p > .10$) across the four overall-price points examined in this study ($12.5, $25, $50, $100), further arguing against the overall price account.

Table 1
Experiment 2: effects of package size and unit price on perceived quality (standard deviation in parentheses).

Unit price	Package size	Overall price	Quality judgment
Low	Small	$12.5	5.08 (1.39)
	Large	$50	5.14 (1.54)
High	Small	$25	5.95 (1.54)
	Large	$100	5.91 (1.43)

Discussion

By manipulating unit price along with package size, experiment 2 provided further evidence for the crucial role of unit price in driving quality perceptions. As our conceptualization would predict, an increase in unit price led to more favorable inferences about product quality. On the other hand, variations in size did not influence quality judgments as long as unit price was held constant. This constitutes strong evidence in support of our posited unit price mechanism for the size–quality effect, and simultaneously argues against the possibility that the size–quality relationship observed in our earlier studies was driven by other, price-unrelated, correlates of size (perceptions of scarcity, manufacturer effort, etc.).

Of course, the null effect of size when unit price is held constant should not be taken to mean that package size in general does not affect quality estimates. It is important to note that in the real world, unit price would not stay constant across differing package sizes. Instead, because smaller sizes are typically associated with higher unit price, we would indeed expect a size–quality effect across differing package sizes (as we find in Experiments 1A and 1B). However, the artificial conditions of the lab allow us to test our theoretical mechanism by holding unit price constant across differing package sizes — and it is in those particular conditions that we are able to take away the usual effect of size on quality, supporting our reasoning.

It is also noteworthy that both overall price and unit price were explicitly provided in this study, along with package size. Consistent with our arguments regarding the relative diagnosticity of the two cues, quality judgments were influenced by variations in unit price rather than overall price. Thus, a smaller package which had a higher unit price but lower overall price was judged more favorably than a larger package with a lower unit price but higher overall price.

Experiment 3: unit price versus overall price

Experiment 3 delved more deeply into the competing influences of overall price vs. unit price in determining the size–quality relationship by examining a context where overall

price information is explicitly provided on the package, while unit price is not. We have argued that the overall price cue should influence quality judgments when cognitive resources are restricted. When resources are unrestricted, on the other hand, cue diagnosticity will prevail, such that the advantage of unit price will again be observed, yielding the usual size–quality relationship: i.e., the smaller package with the higher unit price should now be rated more favorably.

Method

Participants (n = 203) were randomly assigned across a 2 (cognitive load: high vs. low) × 2 (size: small vs. large) × 2 (unit price: high vs. low) between-subjects design. They were asked to evaluate a carton of orange juice based on written information about its size and overall price. The package was described as either small (400 ml) or large (1000 ml). Note that although the unit price of the product was implicitly manipulated within each product size, participants were given explicit information only about overall price, not unit price. Specifically, those evaluating the 400 ml package were told that it was priced at either $4 or $10 (which represents underlying unit prices of $1/100 ml or $2.5/100 ml, respectively). Similarly, participants who evaluated a 1000 ml package were told that it was priced at either $10 or $25, representing the same two unit prices. Thus, as shown in the top half of Table 2, the overall price of the product was a direct function of unit price within each level of package size. As in Experiment 2, however, we were able to discriminate between the effects of unit price and overall price by carrying out specific comparisons, described later.

On arrival at the laboratory, each participant was seated at a computer and told that the experiment was concerned with memory assessment. They were asked to remember either a two-digit number (*low cognitive load* condition) or an eight-digit number (*high cognitive load* condition) and were told that they would be asked to recall this number later (Shiv & Fedorikhin, 1999). All participants were then told that in the meantime, they would participate in an unrelated study of how consumers make quality judgments. They were then asked to imagine one of the four descriptions of orange juice resulting from the four possible price–size combinations (e.g., "a 400 ml orange juice that is sold for $10"), and to judge its quality along a scale from 1 (extremely bad) to 9 (extremely good). They also indicated how tasty the juice would be along a scale from 1 (not at all) to 9 (extremely tasty). Next, they evaluated the size of the product along a scale from 1 (extremely small) to 9 (extremely large). Finally, they recalled the number they had been given earlier, and indicated how difficult it had been to remember it, along a scale from 1 (not at all) to 9 (extremely difficult).

Table 2
Experiment 3: perceived quality as a function of unit price, package size, and cognitive load (standard deviation in parentheses).

Cognitive load	Unit price	Package size	Perceived quality
Low	Low	Small	4.25 (1.40)
		Large	4.11 (1.78)
	High	Small	5.96 (0.98)
		Large	5.59 (1.50)
High	Low	Small	4.32 (1.33)
		Large	5.15 (1.75)
	High	Small	5.24 (1.61)
		Large	6.00 (0.93)

Results

Manipulation checks

Participants judged the 1000 ml package to be larger than the 400 ml package (M = 6.38 vs. 5.28; F (1, 195) = 31.02, $p < .001$). In addition, participants who were asked to remember an 8-digit number judged the task as more difficult than those who were asked to remember a 2-digit number ($M_{High\text{-}load}$ = 4.07 vs. $M_{Low\text{-}load}$ = 1.79; F (1, 195) = 82.73, $p < .001$). No other effect was significant in any of the preceding analyses.

Quality ratings

Responses to the two items pertaining to quality and taste were averaged to provide a single estimate of perceived product quality (r = .94). Results of a 2 (cognitive load: high vs. low) × 2 (size: small vs. large) × 2 (unit price: high vs. low) ANOVA on this index revealed a main effect of unit price (F (1, 195) = 36.86, $p < .001$), a significant interaction between cognitive load and size (F (1, 195) = 6.63, $p < .05$), and a marginally significant load by unit price interaction (F (1, 195) = 3.03, p = .08). No other effects reached significance (p's > .19). To explore these significant effects, a series of contrast analyses were conducted for high versus low load conditions.

Low cognitive load

We predicted that in the absence of cognitive load, quality perceptions would be a function of underlying unit price (H3a). In line with this hypothesis, the analysis of quality judgments under low load conditions revealed a main effect of unit price (F (1, 195) = 29.99, $p < .001$) such that participants made more favorable quality judgments when the underlying unit price was high than when it was low (5.79 vs. 4.17, respectively).

To disentangle the roles of unit price and overall price, which were confounded within each level of package size, we compared judgments of the package which was described as being small in size and high in unit price (400 ml; $2.5/100 ml) with the package that was large and low in unit price (1000 ml; $1/100 ml). Note that the overall price is the same ($10) in these two conditions. Nevertheless, replicating the size–quality relationship observed earlier, quality ratings were appreciably higher for the smaller package (M = 5.96) than the bigger one (M = 4.11, F (1, 195) = 22.52, $p < .001$). This finding supports the premise that unit price, rather than overall price, was the primary determinant of quality judgments under low load, as argued in H3a.

Finally, recall that our argument is that even though a smaller package (with a higher unit price) induces higher perceptions of quality under unconstrained conditions than a larger package (with a lower unit price), this effect is driven by the underlying difference in unit price, rather than being a direct effect of size itself. In support, when unit price was held

constant, package size per se had no impact on quality ratings under low load conditions (M_{Small} = 5.19, M_{Large} = 4.77, $F < 1$, $p > .30$). This was true regardless of whether the unit price was high (M_{Small} = 5.96, M_{Large} = 5.59, $F < 1$, $p > .30$) or low (M_{Small} = 4.25, M_{Large} = 4.11, $F < 1$, $p > .60$). Thus, as in Experiment 2, when unit price was controlled, difference in package size had no influence on perceived quality, further testifying to the crucial role of unit price in driving the size–quality relationship under unrestricted conditions.

High cognitive load

Under high cognitive load, we predicted that consumers would be less likely to try and estimate underlying unit price; consequently, they would use the explicitly-provided overall price as a simple heuristic for judging quality (H3b). Further, since package size is positively associated with overall price within each level of unit price, the influence of overall price should manifest as a more favorable quality rating for the larger than the smaller package (H3b). An analysis of quality judgments under high load conditions supported this reasoning. Unlike the low-load case, the effect of package size was now significant (F (1, 195) = 7.67, $p < .01$); quality judgments were higher when the package was large than when it was small (5.54 vs. 4.75, respectively), Thus, consistent with H3b, the usual size–quality relationship was now reversed.

In seeming contradiction to our expectations for high load conditions, the effect of unit price was also significant (F (1, 195) = 9.54, $p < .01$). This could be however, because (as noted above), overall price and unit price are confounded within each level of package size. Therefore, this unit price effect could simply be a reflection of the impact of overall price. In order to disentangle the effects of unit price and overall price, we again compared the two conditions in which the overall price was the same ($10) but the unit price differed. If unit price does exert an influence, these two conditions should differ in their quality ratings; if, on the other hand (as we argue), overall price is the key driver under high load, no difference should be observed. Consistent with our argument, and in contrast to the preceding low-load conditions, quality judgments in these two cells were now virtually the same regardless of whether unit price was high or low (5.24 vs. 5.15; $F < 1$). This is consistent with the premise that it is overall price, rather than unit price, which influences quality judgments under constrained conditions. As a final piece of convergent evidence, a specific comparison of quality ratings across the three overall price points in the study ($4, $10, $25) showed a significant upward linear trend (F (195) = 25.84, $p < .001$): quality ratings were higher in the $25 condition ($M$ = 6.00) than in the $10 condition ($M$ = 5.20; t (195) = 2.23, $p < .05$), and were higher in the $10 condition than in the $4 condition ($M$ = 4.32; t (195) = 2.57; $p < .05$).

Discussion

By examining a context in which package size and overall price (but not unit price) information are explicitly provided to consumers, Experiment 3 provided deeper insights into the competing roles of unit price and overall price in determining quality judgments of a given package. Overall price, since it is readily available, is likely to prevail under cognitively taxing conditions that restrict processing. On the other hand, the unit price cue, which requires relatively effortful estimation but is more diagnostic, will influence judgments under the type of unrestricted conditions that prevailed in the previous studies, as well as in the low-load conditions of this study.

The existence of these two different price-based mechanisms suggests, in turn, that the size–quality relationship can follow different patterns depending upon prevailing conditions. Specifically, under constrained conditions, larger packages are preferred to smaller ones, as predicted by the overall price mechanism. Under unconstrained conditions, on the other hand, when overall price is kept constant, a smaller package is preferred to a larger one, as predicted by the unit price mechanism (which also underlies the results obtained in our previous studies).

While identifying a size–quality relationship, and explicating the underlying role of price perceptions, is undoubtedly of interest in itself, it would be even more meaningful if such size-induced quality expectations had noteworthy downstream consequences. We now turn our attention to two such consequences in particular: consumers' perceptions of their actual consumption experience (Experiment 4) and pre-trial choice (Experiment 5). In both cases, we examine default (i.e., unconstrained) conditions in which a smaller size yields estimates of higher quality. Further, in order to understand how package size influences downstream consequences even absent any explicit price information, we revert to the paradigm used in Experiments 1A and 1B: namely, participants are simply exposed to different package sizes, without any price information being provided.

Experiment 4: influencing the consumption experience

To understand how package size can influence the actual consumption experience, we draw on research relating to expectancy confirmation processes (Klayman & Ha, 1987). This literature suggests that if individuals expect a stimulus person or object to have certain attributes, they are likely to interpret the actual attribute of the stimulus in a way that confirms this expectation — i.e., an assimilation effect obtains. On the other hand, if the implications of the stimulus information clearly fall outside the range of values that individuals expect, they may use concepts activated by their expectations as a comparative standard, leading to a contrast effect whereby the dissimilarity between the stimulus and the concept is exaggerated (Herr, 1986; Lambert & Wyer, 1990; Lockwood & Kunda, 1997; Pelham & Wachsmuth, 1995).

These phenomena have interesting implications for our context, where we argue that a smaller package typically creates an expectation of superior quality. These expectations should influence post-consumption product judgments, with the direction of the effect (assimilation vs. contrast) being driven by the favorability of the consumption experience. Given the relatively high levels of quality control that prevail for packaged goods in most of the developed world, a reasonably positive consumption experience will not be too widely discrepant from initial expectations of quality, allowing these expectations to

exert an assimilation effect. Therefore, we predict that, given a positive consumption experience, a product in a smaller package will be judged more favorably post-consumption than the same product in a bigger package. If, however, the quality of the product is clearly inferior, initial expectations will be used as a standard of comparison, leading to a contrast effect. That is, a small package will lead to lower post-consumption evaluations than a large one — precisely because of the more favorable expectations created by the smaller package (cf. Raghubir & Krishna, 1999; Sarris and Heineken1976).[4]

Method

Participants (n = 91) were randomly assigned to the four conditions of a 2 (package size: small vs. large) × 2 (quality: high vs. low) between-subjects design. We used Minute Maid orange juice as the experimental stimulus. Minute Maid is a brand unfamiliar to the Hong Kong students who participated in the study, minimizing the effect of pre-experiment expectations.

All participants were informed that Minute Maid was planning to introduce a new type of orange juice in Hong Kong and that the company wanted to get some feedback from consumers before doing so. They were then provided a sample (approximately 50 ml) in a disposable cup. They were told that the sample was drawn from a bottle that was ostensibly either large or small, as shown in an accompanying picture (see Appendix). Finally, the juice itself was either pure (*high quality*) or was substantially diluted, consisting of 70% distilled water (*low quality*).

After tasting the juice, participants rated its sweetness, concentration, freshness, purity, and overall quality along scales from 0 to 10, with higher numbers indicating greater favorability in each case. The five items were highly correlated ($\alpha = .86$) and were averaged to form a single index of quality. As a manipulation check of package size, we also asked them to estimate the volume of the bottle in which the product was contained.

Results

Manipulation checks

Size perceptions were analyzed as a function of package size and objective quality. Participants judged the volume of the package to be lower when the picture of the package was smaller (M_{Small} = 440 ml vs. M_{Large} = 1011 ml; F (1, 87) = 39.31, $p < .001$). No other effect reached significance.

Effect of package size on quality judgments

We hypothesized that when the product's objective quality was high, participants would judge it to be even higher when it apparently came from a smaller package, whereas when the product's objective quality was low, the reverse would be true. Post-consumption quality ratings, shown in the left half of Table 3, support this hypothesis. A main effect of objective quality showed that participants rated post-consumption quality more favorably when the juice was objectively superior ($M_{High\text{-}quality}$ = 5.11 vs. $M_{Low\text{-}quality}$ = 3.13; F (1, 87) = 39.91, $p < .001$). Of more interest however, the interaction of package size and quality was also significant (F (1, 87) = 13.19, $p < .001$) and of the form we expected. When the product's actual quality was relatively high, participants judged its quality to be higher when it had purportedly come from a small bottle (M = 5.61) than when it had come from a large one (M = 4.47; F (1, 87) = 6.17, $p < .01$). When the product's objective quality was low, however, they judged the product's quality to be lower when it had ostensibly come from a small bottle than when it had come from a large one (2.65 vs. 3.66, respectively; F (1, 87) = 6.25, $p < .05$).

Liking for the product was affected similarly. As shown in the right half of Table 3, participants generally liked the high quality product better than the low quality product (5.66 vs. 2.73, respectively; F (1, 87) = 41.34, $p < .001$). However, the interaction of objective quality and package size was significant (F (1, 87) = 10.10, $p < .005$). When the objective quality of the product was high, participants liked it more when it came from a small package vs. large one (6.25 vs. 4.79, respectively; F (1, 87) = 4.67, $p < .05$). When the objective quality was low, however, the reverse was true (2.12 vs. 3.39, respectively; F (1, 87) = 5.43, $p < .05$).

Discussion

Experiment 4 shows that size-induced expectations of quality can exert significant downstream consequences; in particular, they can influence even post-consumption judgments. Furthermore, this effect differs depending upon the objective quality of the product. When the product's quality was relatively high, participants' size-based expectations exerted an assimilation effect on evaluations, leading them to judge the product more favorably after consuming it when it was contained in a small package. When the product was clearly of poor quality, however, participants' expectations had the opposite effect. In this case, consumers apparently used their expectations as a standard of comparison in evaluating their actual experience with the product, leading to a contrast effect of package size on their judgments.

Experiment 5: influencing choice

While Experiment 4 examined one important consequence of varying package size (i.e., actual consumption experience), the

Table 3
Experiment 4: post-consumption judgments as a function of package size and objective quality (standard deviation in parentheses).

	Dependent variables			
	Post-consumption quality		Post-consumption liking	
Package size	High quality	Low quality	High quality	Low quality
Small	5.61 (1.10)	2.65 (1.19)	6.25 (2.09)	2.12 (1.51)
Large	4.47 (1.19)	3.66 (1.95)	4.79 (1.90)	3.39 (2.54)

[4] Note that such a contrast-based reversal can also occur if the product quality is significantly better than expected (rather than worse). However, we did not study this direction of contrast since it would have been difficult to create a product to fit the criterion of being significantly superior to what consumers are used to.

final study in this paper examines another such downstream effect: pre-trial choice. Specifically, Experiment 5 draws on our conceptualization to investigate whether consumers prefer the smaller or larger package when given a choice between two different-sized versions of the same product, and also the reasons for such a preference.

An obvious answer to this question is that the smaller package is more likely to be chosen — because the smaller package is typically deemed higher in quality. However, unlike the case of consumption experience, the relationship between package size and actual choice is a more complex one, going beyond considerations of quality alone. The reason for this complexity lies in a fundamental premise underlying our conceptualization: namely, package size does not exert a direct influence on quality judgments; rather, this influence is driven by price expectations. And importantly, the existing pricing literature suggests that product price can influence purchase decisions in two diametrically opposing ways (Monroe, 2003; Raghubir, Inman, & Grande, 2004). One of these, as we have already noted, has to do with quality: higher price induces estimates of higher quality, and this should enhance choice of the higher-priced option (i.e., the smaller package, which typically has a higher unit price). However, apart from its quality connotation, a higher price also suggests a higher expense — i.e., a greater level of monetary sacrifice involved in the purchase, which should detract from purchase likelihood (Monroe, 2003; Raghubir et al., 2004).

These opposing implications of price illustrate the dilemma involved in the choice between a smaller and a larger package. If consumers care about quality, they should choose the more expensive option — i.e., the smaller package with the higher unit price. If, however, they care more about the monetary sacrifice aspect, they should prefer the larger package with the lower unit price — in other words, they should go with the "value" option. Research relating to construal level theory (CLT; Trope & Liberman, 2010) suggests a way to resolve this dilemma. Briefly, CLT posits that a decision is more likely to be driven by desirability concerns ("how good/desirable is this outcome?") rather than feasibility concerns ("how easy is it to achieve this outcome"?) when the decision is psychologically distant — e.g., when it is the distant rather than in the near future. Conversely, feasibility concerns are more likely to dominate for psychologically proximal decisions, such as those in the near future (Liberman & Trope, 1998). Based on these considerations, recent work in consumer research has shown that the monetary-sacrifice aspect of price, which can be viewed as a feasibility concern, is more salient for proximal decisions. In contrast, the quality aspect of price, which is akin to a desirability concern, is more salient for distant decisions (Yan & Sengupta, 2011).

These ideas are directly applicable to the current context, which examines choice between a smaller vs. a larger package (with the former associated with a higher unit price, and therefore deemed both more expensive and also of better quality). If the choice decision is for the distant future, consumers are more likely to focus on the quality connotations of price. Such a focus will benefit the smaller package. In contrast, if the choice decision is for the near future, the monetary sacrifice aspect of price will be more salient, thus benefiting the larger package. Pulling these ideas together, we predict that the larger packge is more likely to be chosen in the proximal (vs. distant) future, with the reverse being true of the smaller package.

Method

One hundred and twelve participants read a scenario asking them to imagine purchasing vitamin pills either tomorrow or a year from now. In both cases, the scenario informed them that their decision came down to two options: a larger bottle with 300 tablets and a smaller bottle with 60 tablets. Participants were provided with a picture of each option and asked to make a choice. Next, on two successive items, we asked participants to indicate the extent to which they agreed that the smaller package, as compared to the larger one, was: (a) of better quality; and (b) appeared more expensive (in both cases, 1/7 = strongly disagree/agree).

Responses to the first item thus provided a measure of relative quality perceptions for the two packages, whereas responses to the second provided perceptions of relative expense. According to our conceptualization, choice is more likely to be driven by quality perceptions in the distant (vs. near) condition; in contrast, it should be driven more by perceptions of expensiveness in the near (vs. distant) condition.

Results

Our key prediction was that the product in a smaller package (60 tablets) would be less likely to be chosen than the one in the larger package (300 tablets) when the choice decision was for the near vs. the distant future. In support, participants in the "decision for tomorrow" condition were found to be significantly less likely to choose the smaller package (25/57 or 44%) than participants in the "decision for next year" condition (36/55 or 65%; χ^2 (1) = 5.26, $p < .05$).

We argue that the reason for this choice pattern is that participants rely more on quality differences in the distant (vs. near) case, whereas their perceptions of relative expense exert more influence in the near (vs. distant) case. Two sets of binary logistic analyses were conducted to examine how the impact of quality and expensiveness perceptions on choice differed as a function of temporal distance. To investigate the influence of quality perceptions, we ran a model which predicted choice using a) temporal distance, b) participants' responses to the quality rating measure, and c) the interaction term. Results revealed three significant effects: main effect of quality rating ($B = -1.16$, $SE = .55$, Wald (1) = 4.51, $p < .05$), main effect of temporal distance ($B = -5.06$, $SE = 1.98$, Wald (1) = 6.53, $p < .05$), and a significant interaction ($B = 1.29$, $SE = .44$, Wald (1) = 8.78, $p < .01$). The interaction was further explored via two separate logistic regressions, one for each temporal condition. Consistent with our hypothesis, quality perception was a significant predictor of choice in the distant condition ($B = 1.42$, $SE = .39$, Wald (1) = 13.16, $p < .001$) but not in the near condition ($B = .13$, $SE = .19$, Wald (1) = .48, $p > .40$).

An exactly parallel set of analyses was conducted using the expensiveness rating, temporal distance, and the interaction

term to predict choice. Again, all three effects were significant (all p's < .01). Exploring the significant interaction revealed, as anticipated, that perceived expensiveness predicted choice only in the temporally close ($B = -.89$, $SE = .28$, Wald (1) = 9.83, $p < .01$) but not in the distant condition ($B = .23$, $SE = .18$, Wald (1) = 1.64, $p > .20$).

Thus, in line with our theorizing, participants' choice between the small and large bottle of tablets was influenced more by quality (expensiveness) perceptions when the decision was temporally distant (near).

Discussion

Adding to our exploration of the effects of package size, Experiment 5 provided evidence for how differences in size — and concomitant variations in unit price perceptions — can influence pre-trial choice. Since the quality (expense) connotation of price is more salient under distant (near) conditions (Yan & Sengupta, 2011), we predicted that the smaller package was more likely to be chosen than the larger package when the decision was temporally distant rather than proximal. Results supported these conclusions: given a choice between a smaller vs. larger bottle of tablets, participants' preference for the smaller package increased when the decision was temporally distant rather than close.

General discussion

This research examines how variations in package size can affect quality judgments by influencing price perceptions. We argue that unit price is a particularly diagnostic input into quality inferences, and that other things being equal, a product in a smaller package will be associated with a higher unit price (and thus higher quality) than the equivalent product in a larger package — even when the latter has a higher overall price. A set of five studies provided good support for the basic effect, identified a theoretically-derived boundary condition for it, and also examined downstream consequences of the effect on choice and consumption perceptions.

Contributions

Our research advances knowledge on two separate fronts. First, in examining the substantive issue of how package size influences quality perceptions, we add to the literature that has examined how various package-related features influence consumer judgment and decision-making. Second, in addressing the size–quality relationship through the prism of unit price, we do not only draw on the price–quality literature, we also add to it. We elaborate on each of these dimensions below.

Contributions to the packaging literature

Our findings add to the growing body of work on the effects of packaging characteristics on consumer perceptions and behavior. Past research has shown that different package shapes and sizes can influence a variety of outcomes such as volume perceptions, consumption amount, and self-regulation behavior (Coelho do Vale, Pieters, & Zeelenberg, 2008; Raghubir & Krishna, 1999; Wansink, 1996). To this diverse set, we add another, more abstract outcome: quality perceptions. Moreover, this influence is reflected not only in consumers' predictions of a product's quality before consuming the product but also in their assessment of the product's actual quality after consuming it. The quality expectations created by package size, along with considerations of expense, are also shown to influence pre-trial choice.

Relatedly, our findings also contribute to the quality judgment literature by documenting another antecedent of quality perceptions, apart from numerous factors identified in the extant literature, such as brand name (Erdem, 1998), advertising content (Kirmani & Wright, 1989), ad expenditure (Tellis & Fornell, 1988), and brand alliances (Rao, Lu, & Ruekert, 1999). Indeed, it can be argued that package characteristics are particularly important quality cues in that they readily available to consumers (unlike, say, information about ad expenditure).

We note that research on how package size influences quality judgments is still in its infancy. Apart from the current investigation, we are aware of only one project that examines this issue (Mathur & Qiu, 2012). As with our work, that paper proposes that smaller sizes are associated with higher quality. Despite this overlap, however, the major thrust of the two investigations is quite different. First, our paper focuses on the psychological process underlying the size–quality relationship, documenting a key intervening role of unit price perceptions. In contrast, the Mathur and Qiu work is based on an economic model with an emphasis on how companies seek profit maximization by using package sizes as a quality cue; those scholars do not test the possible intervening role of price. Second, our focus on the underlying process enables us to show when the small size advantage is reversed: namely, when consumers utilize the overall price cue rather than the unit price cue (Experiment 3), and when the choice is temporally proximal (Experiment 5). These are important boundary conditions unexamined by Mathur and Qiu (2012). Finally, our research, unlike theirs, also examines downstream consequences of the size–quality relationship, both in terms of the consumption experience (Experiment 4) and product choice (Experiment 5).

Contributions to the price–quality literature

While much price–quality research has examined how price influences quality perceptions (Curry & Riesz, 1988; McConnell, 1968; Shiv et al., 2005), that work has focused on total price and neglected the possible role of unit price. Indeed, it has not been possible to distinguish between the two because past work has kept package size constant; thus, overall price and unit price have been in alignment. In contrast, by investigating how variations in package size can affect quality judgments, the current research allows us to disentangle the influence of unit price vs. overall price. As we show, it is important to do so because these two price cues can exert diametrically opposing effects on quality judgments. Specifically, given the fairly typical scenario whereby a smaller package is associated with a higher unit price but a lower overall price, a reliance on unit price (overall price) produces more favorable quality ratings for the smaller (larger) package. Our conceptualization, which incorporates perspectives on cue diagnosticity as well as ease-of-use, allows us to predict

which of these two opposing effects will prevail. We argue that unit price is the more diagnostic cue than overall price; therefore, when the two cues are equated on ease of use — such as when neither cue is explicitly provided (experiments 1A and 1B) nor both are (experiment 2) — the effect of unit price will dominate and a smaller package will be judged to be better. Indeed, its diagnosticity advantage means that unit price is likely to be relied upon even when it is relatively harder to use — e.g., when overall price information is provided, but unit price is not — as long as consumers possess sufficient cognitive resources (Experiment 3). However, when processing is constrained, the ease-of-use dimension dominates — in such conditions, if only overall price information is provided, as is the case in many non-US retail settings, consumers are likely to rely on it; thus, the larger package will now be rated more favorably. Collectively, these findings inform the price–quality literature, which has not previously examined the opposing effects that can be exerted by total price versus unit price.

Marketplace implications

Our results suggest that package size is an important element in the toolkit that marketers can use to influence consumers' quality perceptions. Moreover, these findings provide guidelines as to the conditions under which a smaller or a larger package may be more advisable. In a cognitively busy environment, for example, a larger package might actually produce inferences of higher quality. When consumers have the opportunity to process price and size information carefully, however, a smaller package is likely to be preferred. These findings contain clear implications for product positioning. For instance, if marketers want to position their products as a high quality one, it might be desirable to decrease package size. In contrast, using a smaller package may backfire as the positioning emphasizes "value for money" rather than quality.

The results of this research also inform the debate on whether retailers should provide unit price information, and whether consumers actually use this information (Russo, 1977). Our findings suggest that even when the unit price information is not explicitly provided, consumers can rely on unit prices estimates when making quality judgments. However, this is unlikely to be the case when consumers are under cognitive load. In these cases, consumers may simply rely on the provided overall price to make quality judgments; retailers who would prefer consumers to utilize unit price information in cognitively busy store contexts should consider explicitly providing such information.

Limitations and future research

A word of caution is in order regarding the likely generalizability of our findings. Despite the consistent support that was obtained across the current set of studies, it should be borne in mind that this investigation focused exclusively on packaged goods, for which smaller sizes are typically associated with higher unit prices. The relationship we observed between size and quality (namely, smaller size = better quality) might not hold for non-packaged goods, where larger sizes do not reflect lower unit prices (e.g., diamonds, houses, etc.). Indeed, for such products, larger sizes may actually be judged as being of higher quality.

Although it is important to bear this caveat in mind while interpreting the current results, it also affords an interesting opportunity for further research. Speculatively, we suggest that the direction of the size–quality effect may depend on the salience of competing heuristics. For some product categories (and perhaps in certain situations as well), a straightforward "bigger is better" heuristic might be more salient than the unit price–quality heuristic which leads to an advantage for smaller sizes. More broadly, package size may influence perceived product quality through a variety of different mechanisms. While the current investigation has focused on the intervening role of price perceptions in order to examine the size–quality link for packaged goods, future work may wish to expand the scope of this inquiry and examine other possible routes by which package size may influence quality judgments for different kinds of products and situations.

Another generalizability issue to consider is that package size in the present case was manipulated throughout using photos and descriptions. It is thus reasonable to question whether our results will obtain in the context of exposure to actual packages. Reassuringly, parallel research noted earlier (Mathur & Qiu, 2012; their Experiment 2) has found evidence for the same link between package size and perceived quality in the context of actual packages. While further work is needed to examine whether our other effects (such as those on choice and consumption) will also generalize to the case of real packages, this convergence on the basic effect is promising.

Finally, future investigations could fruitfully examine the possible moderating influence of individual difference variables on our basic size–quality effect. In particular, it could be argued that our effects are more likely to obtain for highly price-sensitive individuals, since they are the ones for whom package size is likely to induce considerations of unit price. Alternately, since all of our studies were carried out in Hong Kong, another boundary condition could be culture-based: i.e., it might be that those with an interdependent self-construal, because of their tendency towards holistic processing (Monga & John, 2007), are more likely to spontaneously engage in unit price considerations even when only given package size information.

Several interesting avenues can thus be pursued in order to further our understanding of how variations in package size influence product quality, and how these judgments are affected by price perceptions. We hope that the current paper provides a useful platform for further exploration of an area that is of clear importance to consumer researchers, but has only recently begun to receive the attention it deserves.

Acknowledgement

The authors would like to thank the editor, associate editor, and three anonymous reviewers for their constructive comments and guidance. This research is supported by the Research Grants Council of Hong Kong (GRF 640011, GRF 452813 and GRF 493113).

Appendix. Sample stimuli (experiment 1A)

Appendix. Sample stimuli (experiment 4)

References

Argo, J. J., & White, K. (2011). Packaging and over-consumption: The role of sensitivity to external controls. *Working paper*, University of Alberta.

Broniarczyk, S. M., & Alba, J. W. (1994). The importance of the brand in brand extension. *Journal of Marketing Research*, *31*(2), 214–228.

Chaiken, S. (1980). Heuristic versus systematic information processing and the use of sources versus message cues in persuasion. *Journal of Personality and Social Psychology*, *39*(5), 752–766.

Chaiken, S., Liberman, A., & Eagly, A. H. (1989). Heuristic and systematic information processing within and beyond the persuasion context. In J. S. Uleman, & J. A. Bargh (Eds.), *Unintended Thought* (pp. 212–252). New York: Guilford Press.

Coelho do Vale, R., Pieters, R., & Zeelenberg, M. (2008). Flying under the radar: perverse package size effects on consumption self-regulation. *Journal of Consumer Research*, *35*(3), 380–390.

Curry, D. J., & Riesz, P. C. (1988). Prices and price/quality relationships: A longitudinal analysis. *Journal of Marketing*, *52*(1), 36.

Elder, R. S., & Krishna, A. (2010). The effects of advertising copy on sensory thoughts and perceived taste. *Journal of Consumer Research*, *36*(5), 748–756.

Erdem, T. (1998). An empirical analysis of umbrella branding. *Journal of Marketing Research*, *35*(3), 339–351.

Feldman, J. M., & Lynch, J. G., Jr. (1988). Self-generated validity and other effects on measurement on belief, attitude, intention, and behavior. *Journal of Applied Psychology*, *73*(3), 421–435.

Granger, C. W. J., & Billson, A. (1972). Consumers' attitudes toward package size and price. *Journal of Marketing Research*, *9*(3), 239–248.

Herr, P. M. (1986). Consequences of priming: Judgment and behavior. *Journal of Personality and Social Psychology*, *51*(6), 1106–1115.

Holbrook, M. B., & Corfman, K. P. (1985). Quality and value in the consumption experience: Phaedrus rides again. In J. Jacoby, & J. C. Olson (Eds.), *Perceived Quality: How Consumers View Stores and Merchandise* (pp. 32–57). Massachusetts: D. C. Heath and Company.

Hui, M. K., Zhao, X., Fan, X., & Au, K. (2004). When does the service process matter? A test of two competing theories. *Journal of Consumer Research*, *31*(2), 465–475.

Jacoby, J., Olson, J. C., & Haddock, R. A. (1971). Price, brand name, and product composition characteristics as determinants of perceived quality. *Journal of Applied Psychology*, *55*(6), 570–579.

Kirmani, A., & Wright, P. (1989). Money talks: Perceived advertising expense and expected product quality. *Journal of Consumer Research*, *16*(3), 344–353.

Klayman, J., & Ha, Y. -W. (1987). Confirmation, disconfirmation, and information in hypothesis testing. *Psychological Review*, *94*, 211–228.

Krishna, A., & Johar, G. V. (1996). Consumer perceptions of deals: The biasing effects of varying deal prices. *Journal of Experimental Psychology: Applied*, *2*(3), 187–206.

Krishna, A., & Morrin, M. (2008). Does touch affect taste? The perceptual transfer of product container haptic cues. *Journal of Consumer Research*, *34*(6), 807–818.

Lambert, A. J., & Wyer, R. S. (1990). Stereotypes and social judgment: The effects of typicality and group heterogeneity. *Journal of Personality and Social Psychology*, *59*(4), 676–691.

Liberman, N., & Trope, Y. (1998). The role of feasibility and desirability considerations in near and distant future decisions: a test of temporal construal theory. *Journal of Personality and Social Psychology*, *75*(1), 5–18.

Lockwood, P., & Kunda, Z. (1997). Superstars and me: Predicting the impact of role models on the self. *Journal of Personality and Social Psychology*, *73*(1), 91–103.

Mathur, S., & Qiu, C. M. (2012). *Single package size as a signal of quality: Theory and evidence. Working paper*, Department of Marketing. McGill University.

McConnell, J. D. (1968). Effect of pricing on perception of product quality. *Journal of Applied Psychology*, *52*(4), 331–334.

Monga, A. B., & John, D. R. (2007). Cultural differences in brand extension evaluation: The influence of analytic versus holistic thinking. *Journal of Consumer Research*, *33*(4), 529–536.

Monroe, K. B. (2003). *Pricing: Making profitable decisions* (3rd ed.)Burr Ridge, IL: McGraw-Hill/Irwin.

Pelham, B. W., & Wachsmuth, J. O. (1995). The waxing and waning of the social self: Assimilation and contrast in social comparison. *Journal of Personality and Social Psychology*, *69*(5), 825–838.

Petty, R. E., & Cacioppo, J. T. (1984). The effects of involvement on responses to argument quantity and quality: central and peripheral routes to persuasion. *Journal of Personality and Social Psychology*, *46*(1), 69–81.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*(3), 879–891.

Raghubir, P., Inman, J. J., & Grande, H. (2004). The three faces of price promotions: Economic, informative and affective. *California Management Review*, *46*(4), 1–19.

Raghubir, P., & Krishna, A. (1999). Vital dimensions in volume perception: Can the eye fool the stomach? *Journal of Marketing Research*, *36*(3), 313–326.

Rao, A. R. (2005). The quality of price as a quality cue. *Journal of Marketing Research*, *42*(4), 401–405.

Rao, A. R., Lu, Q., & Ruekert, R. (1999). Signaling unobservable product quality through a brand ally. *Journal of Marketing Research*, *36*(2), 258–268.

Rao, A. R., & Monroe, K. B. (1989). The effect of price, brand name, and store name on buyers' perceptions of product quality: An integrative review. *Journal of Marketing Research*, *26*(3), 351–357.

Russo, J. E. (1977). The value of unit price information. *Journal of Marketing Research*, *14*(2), 193–201.

Russo, J. E., Krieser, G., & Miyashita, S. (1975). An effective display of unit price information. *Journal of Marketing*, *39*, 11–19.

Shiv, B., Carmon, Z., & Ariely, D. (2005). Placebo effects of marketing actions: Consumers may get what they pay for. *Journal of Marketing Research*, *42*(4), 383–393.

Shiv, B., & Fedorikhin, A. (1999). Heart and mind in conflict: The interplay of affect and cognition in consumer decision making. *Journal of Consumer Research*, *26*(3), 278–292.

Tellis, G. J., & Fornell, C. (1988). The relationship between advertising and product quality over the product life cycle: A contingency theory. *Journal of Marketing Research*, *25*(1), 64–71.

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, *117*(2), 440–463.

Wansink, B. (1996). Can package size accelerate usage volume? *Journal of Marketing*, *60*(3), 1–14.

Worchel, S., Lee, J., & Adewole, A. (1975). Effects of supply and demand on ratings of object value. *Journal of Personality and Social Psychology*, *32*(5), 906–914.

Yan, D., & Sengupta, J. (2011). Effects of construal level on the price-quality relationship. *Journal of Consumer Research*, *38*(1), 376–389.

Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, *37*, 197–206.