The Effects of Single-Serve Packaging on Consumption Closure and Judgments of Product Efficacy

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Despite the prevalence of single-serve and multi-serve package formats in the pharmaceutical and functional food and beverage industries, prior research has yet to explore the effects of such package formats on consumers' perceptions of product efficacy. Building on the resource availability, product packaging, and psychological closure literature, the authors demonstrate across seven studies that when processing capacity is low, consuming a particular serving/dosage of a product from a smaller resource inventory (i.e., the entirety of a single-serve package) may subjectively feel *more adequate* than consuming the *same amount* from a larger resource inventory (i.e., a multi-serve package, namely one in which additional servings/doses remain after consumption). Results indicate that differences in felt consumption closure underlie perceptions of product adequacy. Importantly, perceived product adequacy is shown to affect consumers' actual product efficacy experiences (i.e., task performance), expectancies, and judgments. The implications of this research for marketers, consumers, and the public health community are discussed.

Keywords: packaging, closure, product efficacy, single-serve, multi-serve, product performance, product expectations, product judgments

Marketers offer products in a variety of package formats—from large containers to smaller single-serve, individually wrapped, and travel-size alternatives. Although much of prior research has focused on the effects of portion, serving, and package size on

consumption of foods (for a review, see Zlatevska, Dubelaar, and Holden 2014), little inquiry has been made into the effects of product packaging on consumers' perceptions of product efficacy. This is surprising given the variety of packaging alternatives present in the pharmaceutical and functional food/beverage industries—the market for "efficacious" products or those that claim to provide health benefits beyond nutrition. For example, sales of single-serve energy shots reached over an astounding $771 million in US convenience stores in 2010 and are expected to grow 98% between 2011 and 2016 (Convenience Store Decisions [CSD] 2011, 2012). Marketers in these industries are increasingly adding single-serve options to their product lines, seeking to capitalize on the growing demand for such package formats (Butschli 2014; Forgrieve 2014; Gonzalez 2014). Considering that packaging decisions affect firms' top and bottom lines, investigating the multitude of effects of product packaging on consumers' responses, and particularly those responses that are less observable in the marketplace, is not only theoretically but also substantively

important. In this work, we explore one such response: consumers' product efficacy perceptions and experiences.

Consumers' efficacy-related responses, in particular, are of interest for several reasons. First, perceptions of product efficacy (the power or capacity of a product to produce a desired effect) affect product adherence (i.e., proper usage; Berg et al. 1993). Lack of medication adherence has been called "America's other drug problem" because it leads to significant and unnecessary health problems (National Council on Patient Information and Education 2007). Second, over 40% of people switch brands and choose alternative medications for any specified condition due to perceptions of poor efficacy (Rees 2006). Thus in addition to adjusting their use of a target brand at their discretion or ceasing consumption of the product in general, consumers may also switch to competing brands. Third, consumers' inferences about—and actual experiences of—product efficacy are highly malleable and often biased by factors that have little to do with a product's actual efficacy (Chae, Li, and Zhu 2013; Faro 2010; Ilyuk, Block, and Faro 2014a; Kramer et al. 2012; Posavac et al. 2010; Samper and Schwartz 2013; Wang, Keh, and Bolton 2010; Wright et al. 2013; for a review, see Ilyuk et al. 2014b). As such, exploring the effects of marketing actions on consumers' efficacy perceptions is crucial. In this research we demonstrate that package formats (i.e., single-serve vs. multi-serve) can affect consumers' judgments and experiences of product efficacy for functional food and beverages (e.g., energy enhancers), pharmaceuticals, and grocery items.

We build on extant research on the effects of resource availability, product packaging, and psychological closure on consumption to make several important theoretical and substantive contributions. To the best of our knowledge, this work is the first to implicate package format (i.e., single-serve vs. multi-serve packages) as a source of product efficacy experiences, expectancies, and judgments, and the first to explore perceptions of (in)adequate consumption as an antecedent to these efficacy responses. Further, we find evidence that adequacy perceptions are due to differences in felt "consumption closure," a concept that we introduce in the present research to reflect the state experienced by consumers when a package is finished after consumption. Finally, whereas prior work has shown how available resources may change consumption levels, this research uniquely demonstrates how available resources affect behavioral outcomes when consumption is *fixed*. We next discuss the relevant literature and derive our hypotheses.

THEORETICAL BACKGROUND

Decades of marketing research have highlighted the profound effects of packaging on a variety of consumer responses including product inferences (e.g., size, volume, quality, and healthfulness perceptions), attention, brand impressions, choice, purchase intentions, willingness to pay, and consumption (Chandon and Ordabayeva 2009; Deng and Kahn 2009; Deng and Srinivasan 2013; Folkes and Matta 2004; Ordabayeva and Chandon 2013; Orth and Malkewitz 2008; Sevilla and Kahn 2014). As previously recognized by marketing scholars (Argo and White 2012), perhaps the most commonly studied attribute of product packaging is its size. The general finding from this stream of research, which we use as a basis for our theorizing, is that consumption quantity increases for larger (vs. smaller) packages since larger packages contain larger portions that induce people to consume more (for a review, see Zlatevska et al. 2014; for notable exceptions, see Argo and White 2012; Coelho do Vale, Pieters, and Zeelenberg 2008; Scott et al. 2008).

Importantly, this finding is in line with research in other (nonpackaging specific) domains on the effects of available resources on consumption. For example, it has been shown that larger credit limits (Soman and Cheema 2002), budgets (e.g., mental accounts; Heath and Soll 1996), and other resource inventories such as stockpiled food (Chandon and Wansink 2002) effectively increase consumption quantity. Indeed, in many contexts, the accessible resource inventory (as defined by product packaging or otherwise) positively affects consumption volume (Folkes, Martin, and Gupta 1993; Morewedge, Holtzman, and Epley 2007).

Increased consumption as a function of available resources may be due to several factors. First, a larger pool of accessible resources (e.g., larger serving, portion, and package sizes) may simply signal larger consumption norms (Wansink 2004). People may decide to consume a certain amount of their available resources (e.g., unit bias; Geier, Rozin, and Doros 2006) thereby increasing consumption when available resources (e.g., portion sizes) increase and decrease consumption when these resources decline (Wansink, Painter, and North 2005). In addition, products available in large quantities (e.g., nonscarce resources) may be perceived as less costly and/or desirable, thus reducing the replacement costs for consumption and potentially increasing use (Lynn 1992; Worchel, Lee, and Adewole 1975). Likewise, perceived inexpensiveness of a product may increase consumption volume. Since consumers (often rightly) infer that larger resource accounts, such as larger packages, have a lower per unit cost (Yan et al. 2014), they may use the product more freely (Haws and Winterich 2013; Wansink 1996).

These findings collectively suggest that, for a variety of reasons, available resources positively affect consumption quantity. It is unknown, however, how available resources (e.g., multi-serve packages) would affect behavioral outcomes when consumption is *fixed*, that is, in contexts where dosage is more explicit and consumers are less likely to adjust consumption quantity during the initial consumption episode (e.g., consumption of "efficacious

products" like energy enhancers, supplements, and medication). The literature on resource availability presents the interesting possibility that the remaining resource inventory (i.e., the unconsumed quantity within a package) may affect efficacy judgments.

Consider consumer A, who is suffering from a headache. She takes a dose of two pain-relief tablets. In the case that the two pills come from a single-serve two tablet packet, she has effectively consumed—and completed—the entirety of the packet. But if she takes the two tablets from a multi-serve package (e.g., a bottle of 360 tablets), she has many more consumption units remaining in the package. In other words, single-serve packaging allows for a sense of completion; the package is finished and may be discarded. By contrast, since a multi-serve package necessarily results in an "unfinished" consumption experience (unless the consumed quantity is the final serving/dosage in the package), consumers may experience less psychological closure (i.e., felt closure) in the latter (vs. former) case.

Psychological closure is a desirable state in which a person perceives that an experience is complete. Indeed, extant work has shown that people desire completeness (Kivetz, Urminsky, and Zheng 2006; Nunes and Drèze 2006; Sevilla and Kahn 2014) and that perceptions of incompleteness (i.e., that a past event is unresolved or unfinished) leads to psychological unsettlement (Beike, Adams, and Wirth-Beaumont 2007; Beike and Wirth-Beaumont 2005). While a variety of interventions can foster psychological closure, important to the present research is the notion that physical acts can trigger this state. For example, prior research has shown that enclosing emotionally laden items, such as placing recalled regretful experiences in an envelope, can enhance felt closure and reduce negative feelings about the events (Li, Wei, and Soman 2010). In a consumer behavior context, Gu, Botti, and Faro (2013) find that physical acts signaling completion of the decision-making process (e.g., putting a lid over a set of options or closing a menu) can affect consumers' experience of "choice closure" (in which they perceive the decision as final) and ultimately their satisfaction with the chosen alternative.

Based on the research just cited, in the present work we introduce the concept of felt "consumption closure," a state characterized by perceiving the act of consumption as completed, resolved, or otherwise settled. We propose that completing the entirety of a package (as is the case with single-serve packaging) may facilitate felt consumption closure, whereas consuming from a multi-serve package (in which other consumption units remain) may impede it. We further propose that felt consumption closure has a unique consequence: perceived product adequacy. Specifically, we suggest that although the *objective* consumption quantity does not change, and neither should perceived adequacy, consuming a fixed amount of an efficacious product from a single-serve package may subjectively feel *more adequate* than consuming the same amount from a multi-serve package. Feelings of (in)adequacy—a previously unexplored antecedent of perceived product efficacy—may, in turn, affect both efficacy perceptions and actual product experiences.

This reasoning is in line with the limited yet growing body of research showing that efficacy perceptions and experiences are indeed highly malleable and often affected by product-, marketer-, and consumer-related factors that have little to do a product's *actual* efficacy. For example, prior research has shown that such factors may include price (Samper and Schwartz 2013), the product's origin (Wang et al. 2010), the manufacturer's profitability information (Posavac et al. 2010), the presence of negative product attributes (e.g., side effects; Kramer et al. 2012), and consumers' concurrent activities (Ilyuk et al. 2014a). Importantly, these factors have been shown to affect not only inferences about product efficacy, but also actual product experiences (e.g., increased mental acuity) in a placebo-like manner. Notwithstanding inquiries about its color (Roullet and Droulers 2005) and typicality (Wright et al. 2013), however, research to date has neglected the effect of packaging on consumers' product efficacy perceptions and experiences. In the next section, we hypothesize when package formats might affect such judgments and experiences.

HYPOTHESES AND OVERVIEW OF STUDIES

Researchers have noted that distracting or engaging situations foster a context in which people are particularly influenced by package and portion sizes (Wansink and Kim 2005; Wansink et al. 2005). For example, Wansink and colleagues (2005) show greater consumption of food items from larger packages when people are distracted by competing tasks. Accordingly, efficacy judgments may not be unconditionally driven by package format. Instead, reliance on irrelevant "resource inventory" information may be more likely when processing capacity (PC) is limited (e.g., when consumers are cognitively busy).

Consider the case in which consumer A is on the go, immersed in her work, or distracted by others (e.g., loud children) while taking a headache reliever. Under these circumstances, because either ability or motivation to engage in analytical judgment (i.e., product evaluation) is low, heuristic processing is likely (Chen and Chaiken 1999; Evans 1989, 2006; Petty and Cacioppo 1981; for a review, see Evans 2008). Since heuristic processes are fast, belief based, and relatively effortless, whereas analytical processes require access to central working memory of limited capacity, time pressure and working memory load should increase levels of biases (De Neys 2006; Ein-Gar,

Shiv, and Tormala 2012; Evans and Curtis-Holmes 2005). In other words, when consumers' PC is limited, judgments often depend on initial affect (feelings) about a target, but these judgments may change when PC is not limited and cognitions—thoughts about the consumption context—arise (Shiv and Fedorikhin 1999). Thus we hypothesize that consumers are more likely to be affected by the unconsumed quantity within a package when PC is low and less likely when PC is high (e.g., when they are not distracted or cognitively busy), resulting in differences in inferred or experienced efficacy based on package format in the former case but not in the latter. Formally stated:

> **H1a:** When PC is low, product efficacy experiences, expectancies, and judgments will be higher (vs. lower) when consumption occurs from a single- (vs. multi-) serve package.

> **H1b:** When PC is high, product efficacy experiences, expectancies, and judgments will not differ as a function of package format.

> **H2:** Perceptions of product adequacy will mediate the effect of package format on efficacy experiences, expectancies, and judgments when PC is low but not when PC is high.

> **H3:** Differences in felt consumption closure will underlie perceptions of product adequacy.

In a series of seven studies, we test these hypotheses across three different product categories: energy enhancers (studies 1, 2, 5, and 6b), medication (studies 3 and 6a), and breath fresheners (study 4). In all of the studies, we manipulate the available resource inventory. Consumption occurs from either a single-serve package where participants consume the entirety of a package or a multi-serve package where they consume a portion of the total package contents (see Table 1). Where possible (studies 1, 2, and 5), we test the effects of packaging on *actual* product efficacy experiences (i.e., increased mental acuity as evidenced by actual performance on cognitive tasks). Given the inability to test the effects on actual product efficacy experiences due to the nature of the utilized products, we gauge product efficacy *expectancies* in study 3 and subjective product efficacy *judgments* after consumption in study 4. In the final

three studies (studies 5, 6a, and 6b) we test consumption closure as the antecedent to perceptions of product adequacy.

STUDY 1: TESTING THE EFFECTS OF PACKAGE FORMAT ON PRODUCT EFFICACY EXPERIENCES

The purpose of study 1 was to test whether consumption of a fixed quantity of a purportedly efficacious product from a single-serve package would be perceived as more adequate and efficacious than consumption of an equivalent amount from a larger resource inventory (i.e., a multi-serve package).

Design, Stimuli, and Procedure

A total of 99 ($M_{age} = 23$; 68% female) were recruited for the experiment in return for course credit. Participants were randomly assigned to one of four conditions based on a 2 (package format: single-serve vs. multi-serve) $\times$ 2 (PC: high vs. low) between-subjects design. An instruction sheet and a task booklet were placed at each workstation. All participants were told that they would be performing a reading comprehension task while consuming Gatorade G Series Pro 02 Perform. They read that "Gatorade G Series Pro 02 Perform is designed to enhance and help sustain performance. Although the product is marketed as a source of replenishment during exercise, the active ingredients in Gatorade G Series Pro 02 Perform enhance and help maintain high performance during both physical and cognitive tasks. In fact, Gatorade G Series Pro 02 Perform is formulated with potassium, calcium, magnesium, and electrolytes—elements that help replenish acuity when performing various mental activities." Participants read that they would be given one ounce of Gatorade G Series Pro 02 Perform powder and asked to mix the powder in the water bottle provided at their workstation. Given that the one ounce of powder would have resulted in the water overflowing, we removed one ounce of water from each bottle before the experiment began.

TABLE 1

STIMULI USED ACROSS ALL STUDIES TO MANIPULATE THE AVAILABLE RESOURCE INVENTORY

	Consumption quantity (serving/dosage)	Available resource inventory	
		Single-serve package format	**Multi-serve package format**
Study 1	1 ounce of Gatorade powder	1 ounce individually wrapped Gatorade powder packet	32 ounce Gatorade powder container
Study 2 Study 5	5 Sport Beans	5 count Jelly Belly Sport Beans packet	15 count Jelly Belly Sport Beans packet
Study 3 Study 6a	2 Advil tablets	2 tablet travel-size Advil packet	360 tablet Advil bottle
Study 4	1 Life Savers mint	1 mint individually wrapped Life Savers	14 mint Life Savers pack
Study 6b	8.4 ounces of Red Bull	8.4 ounce can of Red Bull	16.8 ounce can of Red Bull

To manipulate PC, we informed participants that we were also interested in their memory and asked them to memorize a list of objects without outside aid (without writing them down); that is, we imposed a cognitive load. Those in the low PC condition were shown a list of seven objects to memorize, whereas those in the high PC condition were presented with only two objects. The procedure was adapted from Patterson and Stockbridge (1998).

Once participants indicated that they were ready to begin the task, the experimenter poured one ounce of Gatorade G Series Pro 02 Perform powder into a water bottle at the participants' workstations. We chose for the experimenter (vs. participants) to open and pour the product to control for any differences in effort associated with consumption from the two package formats. Those in the multi-serve package condition were given a one ounce scoop from a container of Gatorade (total = 32 ounces) whereas those in the single-serve package condition were given the equivalent from an individually wrapped one ounce packet. Participants were asked to drink the mixture as needed while they performed the task. The reading comprehension task contained 21 questions based on six reading passages (about social, physical, and biological sciences) taken from a practice Graduate Management Admission Test (GMAT) study guide. After participants completed the task, they were asked to complete a questionnaire.

Task performance was measured by the percentage of questions that participants answered correctly across all of the reading passages. To gauge perceptions of product adequacy (i.e., perceptions of consuming an adequate amount of Gatorade powder to enhance performance), we asked participants to complete the following items ($\alpha = .76$) anchored from 1 = Strongly disagree to 7 = Strongly agree (reverse coded): "I felt like I did not get enough Gatorade G Series Pro O2 Perform powder mix," "I feel like I was given only a part of what I actually needed for 1 bottle of water," and "I feel like I wasn't using as much powder mix as I should be (for an entire water bottle)." To ensure that all participants realized that the amount they were given constitutes one (entire) serving of Gatorade, we asked, "I feel like the amount of powder mix given to me was one whole serving" (1 = Strongly disagree, 7 = Strongly agree). We also asked participants to consider the GMAT task that they worked on and to indicate their responses to "How motivated were you to be accurate?" "How involved were you in the task?" "How committed were you to doing the task well?" and "How much attention did you pay to the task?" (all anchored from 1 = Not at all, 7 = Very much). Finally, participants were asked to recall the list of objects that they were asked to memorize at the beginning of the experiment, to indicate how well they usually perform on standardized tests (1 = Not well at all, 7 = Very well) and to provide demographic information.

Results

Efficacy Experiences. To assess efficacy experiences, we quantified participants' performance on the GMAT task. As hypothesized, an analysis of covariance (ANCOVA) revealed a significant package format by PC interaction on task performance, controlling for how much participants drank during the experiment (in ounces) and how well participants usually perform on standardized tests ($F(1, 93) = 5.44$, $p < .05$). Neither of the main effects was significant (all F's less than 1). In support of hypothesis 1a, contrast analysis indicated that in the low PC condition, task performance was higher when participants were given Gatorade powder from the single-serve package ($M = 50.33\%$) than an equivalent amount from a multi-serve package ($M = 40.01\%$; $F(1, 93) = 4.21$, $p < .05$). However, in support of hypothesis 1b, when PC was high, there was no difference in task performance between the two package conditions ($M_{\text{single-serve}} = 43.38\%$ vs. $M_{\text{multi-serve}} = 49.40\%$; $F(1, 93) = 1.56$, $p = .21$; see row "Study 1," columns 3 and 4 of Table 2). Both quantity consumed during the task ($F(1, 93) = 11.83$, $p = .001$) and usual performance on standardized tests ($F(1, 93) = 9.05$, $p < .005$) were significant covariates in the model; those who consumed more of the drink during the experiment and those who usually perform relatively well on standardized exams performed better on the GMAT task.

Perceived Product Adequacy. An analysis of variance (ANOVA) on perceived product adequacy revealed a significant package format by PC interaction ($F(1, 95) = 5.91$, $p < .05$). Neither of the main effects was significant (all F's less than 1). Consistent with our theorizing, contrast analysis showed that when PC was limited, perceptions of having an adequate quantity of Gatorade were higher for those who received one ounce of powder from a single-serve package ($M = 5.65$) than from the multi-serve package ($M = 4.78$; $F(1, 95) = 3.80$, $p = .05$). However, when PC was high, there was no significant difference in perceptions of adequacy between the two package conditions ($M_{\text{single-serve}} = 4.85$ vs. $M_{\text{multi-serve}} = 5.48$; $F(1, 95) = 2.18$, $p = .14$; see row "Study 1," columns 5 and 6 of Table 2).

Mediation Analysis. We hypothesized that perceptions of product adequacy would mediate the effect of package format on efficacy experiences (i.e., task performance) in the low, but not in the high, PC condition (hypothesis 2). As such, we ran a test of mediation (Hayes 2013; model 8), including quantity consumed and usual performance on standardized tests as covariates. The analysis revealed that when the proposed mediator (perceived product adequacy) was included in the model, it had a significant effect on task performance ($\beta = 2.62$, $t = 2.31$, $p < .05$), controlling for all other variables. However, the direct interaction effect of package format and PC, which had been significant in the absence of the proposed mediator, became

TABLE 2

MAIN RESULTS FOR STUDIES 1–3: PRODUCT EFFICACY, ADEQUACY, AND MEDIATION ANALYSES

(1)	(2)	Efficacy experiences, expectancies, and judgments (3) (4)		Perceived product adequacy (5) (6)		Process evidence (mediation analyses) (7) (8) Package format → Perceived product adequacy → Efficacy experiences, expectancies, and judgments	
		Package format		Package format			
		Single-serve	Multi-serve	Single-serve	Multi-serve	Indirect effect	95% CI
Study 1	**PC low**	50.33%*	40.01%*	5.65*	4.78*	**−1.2292**	**−3.3866 to −.1206**
	PC high	43.38%	49.40%	4.85	5.48	.9293	−.0368 to 2.9676
	(Task 1)						
Study 2	**PC low**	62.71%*+	43.04%*	5.36***	4.11***	**−2.6335**	**−6.3777 to −.3599**
	PC high	44.17%+	55.19%	4.79	4.66	−.0995	−2.1286 to 1.3264
	(Task 2)						
	PC low	7.86*+	5.52*	.	.	**−.5365**	**−1.1073 to −.1671**
	PC high	5.53+	6.42			−.0408	−.4185 to .2552
	(Task 3)						
	PC low	2.59*	1.14*	.	.	**−.3610**	**−.7194 to −.1100**
	PC high	1.44	1.82			−.0274	−.2603 to .1789
Study 3	**PC low**	4.96*	4.30*	5.19**+	3.90**	**−.0781**	**−2254 to −.0043**
	PC high	4.48	4.70	4.08+	4.64	.0340	−.0139 to .1417

NOTE.—CI = confidence interval; PC = processing capacity. Columns (3) and (4) feature means of the relevant efficacy dependent variables for studies 1–3. Columns (5) and (6) feature means of perceived product adequacy (the proposed mediator) for studies 1–3. Columns (7) and (8) feature the results of mediation analyses. The CIs reflect conditional indirect effects analyses.

Significance between the single-serve and multi-serve package format conditions is indicated by * at the $p \leq .05$ level, ** at the $p \leq .01$ level, and *** at the $p \leq .005$ level. Significance between the PC high and low conditions is indicated by + at the $p \leq .05$ level.

marginally significant ($\beta = 3.01$, $t = 1.69$, $p = .09$). Importantly, and in support of our hypothesis, conditional indirect effects analysis using the bootstrap procedure with 5000 resamples revealed that perceived product adequacy mediated the effect of package format on task performance in the low PC condition, with a 95% confidence interval (CI) excluding zero (indirect effect = −1.2292; 95% CI, −3.3866 to −.1206]). However, perceived product adequacy did not mediate the effect of package format on task performance in the high PC condition because the 95% CI included zero (indirect effect = .9293; 95% CI, −.0368 to 2.9676]; see row "Study 1," columns 7 and 8 of Table 2).

Other Measures. One possible alternative explanation for the results just mentioned is that participants in the single-serve package format condition (i.e., those who received the entirety of a package) construed the one ounce of Gatorade powder as an entire serving, whereas those in the multi-serve package format condition (i.e., those who received a one ounce scoop from a larger container) did not. However, an ANOVA on the measure-gauging perceptions of having an entire serving did not support this alternative account. There was no main effect of package format ($F(1, 95) = 1.58$, $p = .21$) or PC (F less than 1), and no significant interaction (F less than 1), on this measure. Further, ANOVAs revealed no significant main or interaction effects of package format and PC on motivation to answer the GMAT questions accurately (all p's > .25), involvement (all p's > .26), commitment (all p's > .17), and attention (all p's > .30).

Discussion

Study 1 provides support for hypotheses 1a, 1b, and 2: when PC is limited, package format affects consumers' perceptions of product adequacy, which, in turn, affect actual efficacy experiences. More specifically, we find that participants in the single-serve condition perceive the same quantity of product as more adequate—and perform better on a task—than those in the multi-serve condition when PC is limited. Importantly, we find no reported differences across conditions in perceptions that the one ounce of Gatorade powder was an entire serving. Thus in support of our hypotheses, it appears that while all participants realized that the quantity consumed was one full serving, it felt more adequate when coming from a single- (vs. multi-) serve package when cognitive resources were constrained.

STUDY 2: HOLDING ACTUAL PACKAGE SIZE AND CONSUMPTION QUANTITY CONSTANT

In the marketplace, greater resource inventories positively correlate with larger package sizes. However, to provide a more stringent test of our hypothesized resource inventory account, in this next study we hold package size constant while varying the resource inventory (number of servings). By keeping actual packaging completely constant across all conditions, we also control for any inherent perceptual differences (e.g., shape, color) between the single-serve and

multi-serve package formats. Additionally, we have all participants consume the same quantity of product before beginning the task to eliminate individual differences in consumption levels.

Design, Stimuli, and Procedure

A total of 112 participants ($M_{age} = 23$; 55% female) were recruited for the experiment in return for course credit. Participants were randomly assigned to one of four conditions based on a 2 (package format: single-serve vs. multi-serve) $\times$ 2 (PC: high vs. low) between-subjects design. We chose Extreme Jelly Belly Sport Beans, energizing jelly beans formulated with caffeine, carbohydrates, electrolytes, and vitamins B and C, as the target product. Each packet contains 15 Sport Beans. However, the packets are conveniently resealable, such that if the top of the packet is cut off (i.e., below the "tear here" label), the packets can be opened and resealed—not appearing tampered with to a person who has never encountered the product before. Given the limited retail distribution of this product, we expected that this manipulation would allow us to maintain experimental credibility and feasibility. Indeed, none of the participants indicated awareness that the packets had been opened earlier. Before the experimental session, we manipulated the number of servings of Sport Beans in the packets. Half of the participants received a single-serve packet containing 5 Sport Beans; the other half received a multi-serve packet containing three servings (15 Sport Beans).

We placed a task booklet at each workstation. On the first page, participants read that we were interested in the effects of an energy-enhancing product on task performance: "You will be asked to eat Sport Beans: short-term energy-enhancing jelly beans that are formulated with caffeine, electrolytes, and energy-producing vitamins. Although the product is marketed as a source of energy during physical exercise, the active ingredients stimulate energy in general—for both physical and mental activities. Indeed, caffeine is known to increase energy levels, enhance mental acuity, and improve cognitive alertness and focus." Participants were told that the tasks would be timed and to perform the activities to the best of their ability. As in the previous experiment, to manipulate PC, we informed participants that in this study we were also interested in their memory. Those in the low PC condition were shown a list of seven objects to memorize, whereas those in the high PC condition were presented with only two objects.

On the next page, they read, "At your workstation, there is a packet of Sport Beans." Depending on the condition to which they were assigned, they read "Each packet of Sport Beans contains [number] of jelly beans," in which the accessible resource inventory was manipulated as either being 5 or 15 jelly beans. Subsequently, they read "In this study, you will be asked to consume a serving of 5 Sport Beans." When they were ready, participants were asked to raise their hand so that the experimenter could open the packet and give them 5 Sport Beans. Thus for those in the single-serve (i.e., 5 pack) condition, the experimenter emptied the entire contents of the package into each participant's hand. Those in the multi-serve (i.e., 15 pack) condition also received 5 Sport Beans from the experimenter. After all participants ate the 5 Sport Beans, they were instructed to turn to the next page of the booklet and begin task 1.

Task 1 was a reading passage followed by five comprehension questions taken from a Practice GMAT study guide. Task 2 was a word association task containing 20 word lists (Bowden and Jung-Beeman 2003). Task 3 was a creativity task in which participants were told that "Creative thought is a sign of enhanced mental acuity. In this task, please imagine you are interviewing at a top marketing firm. In order to test your aptitude for the business, you are given a short test. Your task is to create new names for a new pasta. Example of current pasta names include spaghetti, capellini, rotini, ziti, and rigatoni." Participants were given five minutes to perform each of tasks 1 and 2, and two minutes to complete task 3. Afterward, participants were given a questionnaire.

Task performance was measured by the percentage of questions answered correctly (task 1), the number of word associations that participants were able to complete properly (task 2), and the number of pasta names generated that did not end with an "i" (task 3). To gauge perceptions of product adequacy, we included the items used in the previous study ($\alpha = .75$) but slightly modified for the current product (e.g., "I feel like I did not have enough Sport Beans to improve my task performance," 1 = Strongly disagree, 7 = Strongly agree; reverse coded). In addition, we asked about perceptions of having an entire serving ("In this study, I consumed one serving of Sport Beans"; 1 = Strongly disagree, 7 = Strongly agree), and participants' level of motivation, involvement, commitment, and attention during the tasks. Finally, participants were instructed to recall the list of objects that they were asked to memorize at the beginning of the experiment, to indicate how well they usually perform on standardized tests and on word tasks (1 = Not well at all, 7 = Very well), and to provide demographic information.

Results

Efficacy Experiences. We coded for actual performance on each of the three tasks. An ANCOVA revealed a significant package format by PC interaction on GMAT performance controlling for how participants usually perform on standardized exams ($F(1, 106) = 6.96$, $p = .01$). Neither of the main effects was significant (all F's less than 1). Contrast analysis showed, in support of hypothesis 1a, that when PC was low, GMAT performance was higher in the single-serve,

5 pack condition ($M = 62.71\%$) than in the multi-serve, 15 pack condition ($M = 43.04\%$; $F(1, 106) = 5.73$, $p < .05$). However, in support of hypothesis 1b, when PC was high, there was no difference in performance between the two package conditions ($M_{single-serve} = 44.17\%$ vs. $M_{multi-serve} = 55.19\%$; $F(1, 106) = 1.85$, $p = .18$; see row "Study 2," columns 3 and 4 of Table 2). Usual performance on standardized tests was a significant covariate in the model ($F(1, 106) = 7.43$, $p < .01$); those who usually perform relatively well on standardized exams performed better on the GMAT task. Note that the degrees of freedom reflect the exclusion of one participant who had missing data on the covariate measure. Similarly, two participants had missing data on the relevant covariate measure for tasks 2 and 3 (usual performance on word tasks) and hence were excluded in the task performance analyses. However, the same pattern of results emerges when running the models without the covariate variables (i.e., when not excluding any participants from the analyses).

The same pattern emerged for task 2, the word association task. An ANCOVA revealed a marginally significant package format by PC interaction on word association task performance ($F(1, 105) = 3.75$, $p = .06$), controlling for how participants usually perform on word tasks. Neither of the main effects was significant (all F's less than 1). Contrast analysis showed that when PC was limited, word association task performance was higher in the single-serve, 5 pack condition ($M = 7.86$) than in the multi-serve, 15 pack condition ($M = 5.52$; $F(1, 105) = 3.84$, $p = .05$). However, in the high PC condition, there was no difference in task performance between the two package format conditions ($M_{single-serve} = 5.53$ vs. $M_{multi-serve} = 6.42$; F less than 1). Usual performance on word tasks was a significant covariate in the model ($F(1, 105) = 8.87$, $p < .005$); those who usually perform relatively well on word tasks performed better on the word association task.

Similarly, an ANCOVA on task 3 performance—generating new names for pasta—revealed a significant package format by PC interaction ($F(1, 105) = 4.21$, $p < .05$), controlling for usual performance on word tasks. Neither of the main effects was significant (all p's > .24). Contrast analysis showed that when PC was limited, performance was higher in the single-serve, 5 pack condition ($M = 2.59$) than in the multi-serve, 15 pack condition ($M = 1.14$; $F(1, 105) = 5.10$, $p < .05$). However, in the high PC condition, there was no difference in task performance between the two package conditions ($M_{single-serve} = 1.44$ vs. $M_{multi-serve} = 1.82$; F less than 1). Usual performance on word tasks was not a significant covariate in the model (F less than 1).

Perceived Product Adequacy. An ANOVA on the measure of perceived product adequacy revealed a significant main effect of package format ($F(1, 108) = 6.66$, $p = .01$), a nonsignificant main effect of PC (F less than 1), and a significant package format by PC interaction ($F(1, 108) = 4.27$, $p < .05$). Contrast analysis showed that when PC was limited, perceptions of having an adequate quantity of Sport Beans were higher for those in the single-serve condition ($M = 5.36$) than in the multi-serve condition ($M = 4.11$; $F(1, 108) = 10.61$, $p < .005$). However, when PC was high there was no significant difference in perceptions of adequacy between the two package conditions ($M_{single-serve} = 4.79$ vs. $M_{multi-serve} = 4.66$; F less than 1; see row "Study 2," columns 5 and 6 of Table 2).

Mediation Analyses. As in the previous experiment, to test our hypothesis that perceptions of product adequacy mediate the effect of package format on task performance in the low but not in the high PC condition (hypothesis 2), we ran a mediation analysis for each task (Hayes 2013; model 8), controlling for the relevant variable (usual task performance on standardized tests/word tasks). Conditional indirect effects analysis using the bootstrap procedure with 5000 resamples revealed that perceived product adequacy mediated the effect of package format on GMAT task performance in the low PC condition, with a 95% CI excluding zero (indirect effect $= -2.6335$; 95% CI, -6.3777 to $-.3599$]). However, perceived product adequacy did not mediate the effect of package format on task performance in the high PC condition (indirect effect $= -.0995$; 95% CI, -2.1286 to 1.3264]). The same pattern of results (significant mediation in the low, but not in the high PC conditions) emerged for the two other tasks (see row "Study 2," columns 7 and 8 of Table 2).

Other Measures. As in the previous experiment, an ANOVA revealed no significant effect of package format ($F(107) = 1.97$, $p = .16$) or PC (F less than 1), and no significant interaction (F less than 1) on the measure reflecting perceptions of consuming an entire serving. Further, ANOVAs revealed no significant main or interaction effects of package format and PC on motivation (all p's > .15), involvement (all p's > .17), commitment (all p's > .17), and attention (all p's > .58).

Discussion

In this study, by keeping the package completely constant across conditions, we provide further support for our theorizing that under limited PC, the accessible resource inventory (i.e., the quantity of servings remaining within a package) affects the perceived adequacy of a particular serving in producing the desired effect. Analyses of mediation show that such inferences, in turn, may affect actual product efficacy experiences, namely performance on cognitive tasks. We further show that, as in the previous study, there are no differences in perceptions of the five Sport Beans being an entire serving. Indeed, while participants equally acknowledged the consumption quantity as a full serving, those in the single-serve condition deemed it more

adequate than those in the multi-serve condition when PC was limited.

STUDY 3: TESTING THE EFFECTS IN A PRODUCT CATEGORY WITH UNAMBIGUOUS SERVING SIZES

In both of the previous studies, we found no differences across experimental conditions in perceptions of receiving an entire (full) serving. Thus whereas in some contexts larger packages may signal larger consumption norms, this is unlikely to be the case for efficacious products (e.g., functional foods and beverages, medication, etc.). Nonetheless, in this experiment we sought to replicate the effects of package format and PC in a product category in which servings are more familiar to consumers and misuse can result in substantial harm. Given that consumers are relatively aware of, and have experience with, dosages of popular over-the-counter (OTC) medication that treat common symptoms (e.g., headaches), evidence our effects in this product category would provide even stronger support for our hypothesis that, when PC is low (vs. high), the accessible resource inventory (as defined by product packaging) drives efficacy perceptions.

Stimuli and Pretest

We selected a popular brand of ibuprofen, Advil, as the target product in this experiment. The product is available in a variety of forms including tablets, caplets, gel caplets, and liquid-filled capsules. However, given that individually wrapped (i.e., single-dose/"travel-size") packets of Advil contain the medicine in tablet form (two tablet packets), we opted to use Advil-Ibuprofen coated tablets rather than another form of the medication in the larger package format condition. Hence we used two package formats of the same product: the single-dose packet (containing two tablets) and the multi-dose bottle (containing 360 tablets). Given that the bottle contains an image of the Advil tablet, whereas the packet does not, we digitally manipulated the packet to include the tablet and control for any differences in tangibility or inferences based on perceptual properties (e.g., color and shape) of the medication.

Admittedly, there still exist inherent differences between the two package formats. For example, consumers might find one of the packaging formats more difficult to open, more appealing, or more common; in other words, factors other than our available resource manipulation might intervene. To ensure that our stimuli control for these factors, we conducted a pretest on the same population as the main experiment. Sixty participants ($M_{age} = 22$; 37% female) were shown an image of either the single-dose two tablet Advil packet or the multi-dose 360 count Advil bottle and asked to complete the following measures (all anchored from 1 = Not at all to 7 = Very, with appropriately

modified descriptors): "How appealing is this packaging?" "How much do you like the packaging?" "How attractive is the packaging?" "How common is this type of packaging for headache medicine?" "How unique is this packaging" "How unusual is this type of packaging?" "How difficult do you think the packaging is to open?" "How often do you use medicine from this type of packaging?" and "How much do you prefer this type of packaging for medicine over other packaging alternatives?" ANOVAs on all of these measures revealed a nonsignificant effect of packaging (all F's less than 1). As such, we decided to retain these stimuli for the main experiment.

Main Study Design, Procedure, and Measures

A total of 102 participants ($M_{age} = 22$; 55% female) were recruited for the experiment in return for course credit. Participants were randomly assigned to one of four conditions based on a 2 (package format: single-dose vs. multi-dose) × 2 (PC: high vs. low) between-subjects design. Upon beginning the experiment, all participants were told that they would be asked to evaluate a product. We manipulated PC in the same way as in the previous experiments. Given our inability to inflict an actual physiological state in the present context (i.e., induce a headache in our participants) and use actual consumption in this experiment, we administered a hypothetical consumption scenario. Across all conditions, participants read, "Imagine that you wake up in the morning with a painful headache and a slight fever. It is the end of the semester and you have a full 10-hour day of classes ahead of you. There is no way that you can be absent because you have to take exams in several classes. You decide to take medication (Advil) to help you get through the day. Advil is a temporary pain reliever that blocks the body's production of prostaglandins (chemicals emitted during the inflammatory process that produce pain and fever)." Those in the single-dose condition read, "You open the 2-tablet travel packet below, and take both of them before going to school." Those in the multi-dose condition read, "You open the bottle below and take 2 tablets before going to school." An image of either a single-dose packet or a bottle was featured below the text.

Given that we could not measure actual efficacy *experiences* (i.e., akin to task performance in the previous experiments), we used efficacy *expectancies* in this experiment as our main dependent variable. Participants completed the following items ($\alpha = .85$; all anchored from 1 = Not at all to 7 = Very, with appropriately modified descriptors): "How effective do you think this medicine will be?" "How powerful do you think this medicine will be?" "For how long do you think this medicine (the two tablets) will relieve pain?" "How much do you think this product does what it claims?" and "How long-lasting do you expect the two tablets to be?" We also asked perceptions of product

adequacy (i.e., "The two tablets seem like only a portion of the amount I would need to relieve my headache," $1 =$ Strongly disagree, $7 =$ Strongly agree; reverse coded) along with participants' experience with Advil and general use of medication. These measures included product familiarity ("How familiar are you with Advil?"), frequency of Advil use ("How often do you take Advil?"), and frequency of pain medication use in general ("How often do you take pain relievers?"). Finally, participants were instructed to recall the list of objects that they were asked to memorize at the beginning of the experiment and to provide demographic information.

Results

Efficacy Expectancies. An ANOVA revealed a significant package format by PC interaction on efficacy expectancies ($F(1, 98) = 4.10$, $p < .05$). Neither of the main effects was significant (all p's $> .31$). As predicted (hypothesis 1a), contrast analysis indicated that in the low PC condition, efficacy expectancies were higher when participants imagined consuming the medication from the single-dose packet ($M = 4.96$) than from the multi-dose bottle ($M = 4.30$; $F(1, 98) = 4.59$, $p < .05$). However, in support of hypothesis 1b, in the high PC condition, there was no difference in efficacy expectancies between the two package format conditions ($M_{\text{single-dose}} = 4.48$ vs. $M_{\text{multi-dose}} = 4.70$; F less than 1; see row "Study 3," columns 3 and 4 of Table 2).

Perceived Product Adequacy. In line with the results from the previous experiments, an ANOVA on the measure of perceived product adequacy revealed a significant package format by PC interaction ($F(1, 98) = 6.71$, $p = .01$). Neither of the main effects was significant (all p's $> .31$). Contrast analysis showed that, as expected, when PC was limited, perceptions of product adequacy were higher for those in the single-dose condition ($M = 5.19$) than in the multi-dose condition ($M = 3.90$; $F(1, 98) = 6.53$, $p = .01$). In the high PC condition, there was no significant difference in perceptions of adequacy between the two package conditions ($M_{\text{single-dose}} = 4.08$ vs. $M_{\text{multi-dose}} = 4.64$; $F(1, 98) = 1.23$, $p = .27$; see row "Study 3," columns 5 and 6 of Table 2).

Mediation Analysis. Mediation analysis (Hayes 2013; model 8) testing hypothesis 2 revealed that when the proposed mediator (perceived product adequacy) was included in the model, it had a significant effect on efficacy expectancies ($\beta = .12$, $t = 1.98$, $p = .05$). However, the direct interaction effect of package format and PC, which had been significant in the absence of the proposed mediator, was no longer significant ($\beta = .17$, $t = 1.49$, $p = .14$). Importantly, and in support of our hypothesis, conditional indirect effects analysis using the bootstrap procedure with 5000 resamples revealed that perceived product adequacy

mediated the effect of package format on efficacy expectancies in the low PC condition, with a 95% CI excluding zero (indirect effect $= -.0781$; 95% CI, $-.2254$ to $-.0043$]). However, perceived product adequacy did not mediate the effect of package format on efficacy expectancies in the high PC condition because the 95% CI included zero (indirect effect $= .0340$; 95% CI, $-.0139$ to $.1417$]; see row "Study 3," columns 7 and 8 of Table 2).

Other Measures. There were no main or interaction effects on familiarity, frequency of Advil consumption, or frequency of pain reliever consumption in general (all F's less than 1).

Discussion

This experiment shows that even in a product category where servings are more familiar to consumers, under low PC, efficacy expectancies of a dose of a medicinal product were higher when consumption was expected to occur from a smaller resource inventory—a single-dose packet—versus from a larger resource inventory: a multi-dose 360 count bottle. The effect was attenuated when PC was high. Together, studies 1, 2, and 3 provide converging support for hypotheses 1a, 1b, and 2, specifically that the remaining resource inventory affects consumers' inferences about a product's adequacy in providing the desired effect.

In all three studies, the resource inventory was always contained within one package. For example, the 360 Advil tablets were contained in one bottle of medicine. However, consumers may have access to large resource inventories that are not always contained within one package. For example, a consumer might purchase multiple single-dose (two tablet) packets of headache reliever in bulk. In study 3, the multi-dose 360 tablet bottle would be equivalent in units to 180 single-dose packets. What remains unknown is whether the units (number of servings) *within* a package, or across all packages available, are incorporated into consumers' judgments of product adequacy and efficacy. In the next study, we test this by manipulating the salience of the total resource inventory. With this manipulation, we also seek to provide preliminary evidence that differences in felt consumption closure underlie perceptions product adequacy (hypothesis 3).

STUDY 4: HOLDING THE AVAILABLE RESOURCE INVENTORY CONSTANT

In study 4, we selected *Wint O Green* flavor Life Savers as the target product because the mints come in both individually wrapped (single-serve) packets and in 14 mint (multi-serve) rolls. We hold constant the total, physically available resource inventory (all participants have access to 14 mints); those in the single-serve package format condition are exposed to 14 individually wrapped mints,

whereas those in the multi-serve package format condition are exposed to 14 mints contained within one package. We manipulate the *salience* of this available resource inventory (14 mints). PC is limited for all participants since reliance on the available resource inventory in judgments of product adequacy and efficacy was shown to occur only for consumers with low PC in the previous experiments.

We expect that, unless attention is called to the *total* resources available (i.e., to the quantity of units/servings physically present), consumption of an individually wrapped Life Savers mint (even when there are 13 other individually wrapped mints present) will result in greater perceived product adequacy and efficacy than consumption of a Life Savers mint from a 14 mint package. In other words, when the total available supply is not explicitly made salient, we expect that the units (i.e., number of servings) *within* a package—rather than across all packages available—will be incorporated into consumers' judgments. As described in the theoretical background, single-serve packaging likely facilitates the experience of consumption closure (even in the case where other single-serve packages are available) since the package from which consumption occurs is finished. Multi-serve packaging, in contrast, likely impedes such an experience since the package from which consumption occurs still remains incomplete.

However, we expect that making the *total available supply* salient will attenuate the effect, such that there will be no differences in perceived product adequacy and efficacy between the package format conditions. In this case, regardless of the quantity of units/servings present *within* a package, the total supply—across all packages—will be incorporated into subsequent product judgments because it is called to attention. Here, all of the unconsumed units/servings are now top of mind, likely diminishing the experience of consumption closure for those consuming from a single-serve package.

If this pattern of results emerges, it would provide support for the notion that product packaging indeed serves to define the naturally salient resource inventory during consumption. It would also provide preliminary evidence that differences in felt consumption closure may account for the observed effects of package format. Please note that one limitation of the chosen product is that the individually wrapped mints and those packaged in 14 mint rolls differ in size. Thus we conducted a pretest (detailed in the online appendix) to validate usage of the stimuli in the main study.

Design, Stimuli, and Procedure

A total of 84 participants ($M_{age} = 23$; 51% female) from the same population as the pretest were recruited to participate in this experiment in return for course credit. Participants were randomly assigned to one of four conditions based on a 2 (package format: single-mint vs. 14 mint roll) $\times$ 2 (total resource (TR) salience: salient vs. not-salient) between-subjects design.

At their respective workstations, participants were given the following instructions: "In this study, you will be asked to evaluate Life Savers mints. Life Savers mints are offered in a variety of flavors including *Spear O Mint*, *Wint O Green*, and *Pep O Mint*. We are interested in consumers' evaluations of how effective these flavors are at freshening breath. In this study, we would like to get your opinion on the *Wint O Green* flavor." Before they began the product evaluation task, participants were told that in this study, we were also interested in their memory. We asked all participants to memorize a list of seven objects; thus PC was limited for all participants.

Participants then read, "At your workstation, you will find several garlic-flavored croutons. Garlic is known to have a strong and potent aroma. In order to assess your evaluations of the breath mints, we ask you to eat all of these croutons now." At each workstation, we placed a cup containing three garlic-flavored croutons. Once participants finished eating, they proceeded to answer three questions about their breath: "How fresh do you think that your breath smells after eating these garlic-flavored croutons?" (1 = Not fresh at all, 7 = Very fresh), "How pleasant is your breath after eating these croutons?" (1 = Not pleasant at all, 7 = Very pleasant), and "To what extent do you think your breath has a garlic scent after eating these croutons?" (1 = Not at all, 7 = Very much).

Next, participants were told that "At your workstation, you will find Life Savers mints." Before the experimental session began, we placed a plate of either 14 individually wrapped "single-serve" Life Savers or one 14 mint roll at each workstation. Those in the TR salient condition were asked, "Please indicate how many Life Savers mints are at your workstation." Participants in the TR not-salient (i.e., control) condition were not given these instructions.

Then, everyone read, "At this time, please take one mint. Please do not chew the mint, but rather keep it in your mouth while you provide your evaluations." Once they took the mint, participants proceeded to the questionnaire. We asked about perceptions of product adequacy (i.e., "This mint is only a part of what I will actually need to completely freshen my breath," 1 = Strongly disagree, 7 = Strongly agree; reverse coded) and the efficacy scale used in the pretest ($\alpha = .88$; 1 = Not at all, 7 = Very, with appropriately modified descriptors): "How fresh do you expect your breath to be after eating this mint?" "How effective do you think this mint will be at freshening your breath?" "How confident are you that your breath will smell fresh after consuming this mint?" "How cool does your mouth feel after eating this mint?" "How refreshing is this mint?" "How clean does your mouth feel from eating this mint?" "How powerful do you think this mint is at freshening breath?" "For how long do you think this mint

will freshen your breath?" "How quickly did this mint begin to freshen your breath?" and "How fresh do you think others will think your breath is after you finish eating this mint?"

Participants then recalled the list of objects that they were asked to memorize at the beginning of the experiment, and they provided their general use of breath fresheners, mints, and Life Savers, along with demographic information.

Results

Perceived Breath Freshness After Consuming Croutons. An ANOVA revealed no significant main or interaction effects on perceptions of breath freshness (all p's $> .17$), pleasantness (all p's $> .10$), or garlic scent (all p's $> .43$) immediately after consuming the croutons.

Efficacy Judgments. An ANOVA on the measure of perceived efficacy revealed a marginally significant effect of package format ($F(1, 80) = 3.34$, $p < .10$), a nonsignificant effect of TR salience ($F(1, 80) = 2.08$, $p = .15$) and a significant package format by TR salience interaction ($F(1, 80) = 4.19$, $p < .05$). Contrast analysis showed that in the TR not-salient (control) condition, participants who took a mint from the single-serve individually wrapped packet perceived the mint to be more effective ($M = 5.09$) than those who took the mint from the 14 mint roll ($M = 4.42$; $F(1, 80) = 7.51$, $p < .01$). However, in the TR salient condition, there was no difference in perceived

efficacy between the two package conditions ($M_{\text{single-serve}} = 4.49$ vs. $M_{\text{roll}} = 4.52$; F less than 1). Further contrast analysis revealed that, within the single-serve (individually wrapped packet) condition, those in the TR not-salient condition perceived the mint to be more effective than those in the TR salient condition ($M_{\text{not-salient}} = 5.09$ vs. $M_{\text{salient}} = 4.49$; $F(1, 80) = 5.81$, $p < .05$). However, within the 14 mint (multi-serve) roll condition, there was no significant difference in efficacy perceptions between the TR not-salient and salient conditions ($M_{\text{not-salient}} = 4.42$ vs. $M_{\text{salient}} = 4.52$; $F < 1$; see row "Study 4," columns 3 and 4 of Table 3).

Perceived Product Adequacy. An ANOVA on the measure of perceived product adequacy revealed a significant package format by TR salience interaction ($F(1, 80) = 3.92$, $p = .05$). Neither of the main effects was significant (all p's $> .20$). Contrast analysis showed that in the TR not-salient (control) condition, participants who took a mint from the single-serve packet perceived the mint to be more adequate ($M = 4.70$) than those who took the mint from the 14 mint roll ($M = 3.46$; $F(1, 80) = 5.27$, $p < .05$). However, in the TR salient condition, there was no difference in perceived adequacy between the two package conditions ($M_{\text{single-serve}} = 3.50$ vs. $M_{\text{roll}} = 3.77$; F less than 1). Further contrast analysis revealed that, within the single-serve (individually wrapped packet) condition, those in the TR not-salient condition perceived the mint to be more adequate than those in the TR salient condition ($M_{\text{not-salient}} = 4.70$ vs. $M_{\text{salient}} = 3.50$; $F(1, 80) = 4.67$,

TABLE 3

MAIN RESULTS FOR STUDIES 4 AND 5: PRODUCT EFFICACY, ADEQUACY, AND MEDIATION ANALYSES

(1)	(2)	Efficacy experiences, expectancies, and judgments		Perceived product adequacy		Process evidence (mediation analyses)	
		(3)	(4)	(5)	(6)	(7) Package format → Perceived product adequacy → Efficacy experiences, expectancies, and judgments	(8)
		Package format		Package format			
		Single-serve	Multi-serve	Single-serve	Multi-serve	Indirect effect	95% CI
Study 4	TR not-salient	5.09**+	4.42**	4.70*+	3.46*	.0992	.0115 to .2710
	TR salient	4.49+	4.52	3.50+	3.77		
Study 5		(Task 1)					
	DISP absent	68.81%**	51.41%**+	4.77***	3.46***++	2.1718	.3320 to 5.9452
	DISP present	62.58%	65.33%+	4.65	4.67++		
		(Task 2)					
	DISP absent	6.57*	4.75*++	.	.	.2242	.0145 to .6687
	DISP present	6.26	6.90++				
		(Task 3)					
	DISP absent	1.47	.85+	.	.	−.0344	−.2013 to .0545
	DISP present	1.32	1.76+				

NOTE.—CI = confidence interval; DISP = disposal; TR = total resources. Columns (3) and (4) feature means of the relevant efficacy dependent variables for studies 4 and 5. Columns (5) and (6) feature means of perceived product adequacy (the proposed mediator) for studies 4 and 5. Columns (7) and (8) feature the results of mediation analyses. The CIs reflect the indirect effect of the highest order interaction. Significance between the single-serve and multi-serve package format conditions is indicated by * at the $p \leq .05$ level, ** at the $p \leq .01$ level, and *** at the $p \leq .005$ level. Significance between the TR not-salient and salient conditions (study 4) and significance between the disposal-present and absent conditions (study 5) is indicated by + at the $p \leq .05$ level and ++ at the $p \leq .01$ level.

$p < .05$). However, within the 14 mint roll condition, there was no significant difference in perceived adequacy between the TR not-salient and salient conditions ($M_{\text{not-salient}} = 3.46$ vs. $M_{\text{salient}} = 3.77$; F less than 1; see row "Study 4," columns 5 and 6 of Table 3).

Mediation Analysis. To test whether perceptions of product adequacy mediate the interaction effect of package format and TR salience on perceived efficacy, we ran mediation analysis using the bootstrap procedure with 5000 resamples and a 95% CI (Hayes 2013; model 8). The analysis revealed that when the proposed mediator (perceived product adequacy) was included in the model, it had a significant effect on perceived efficacy ($\beta = .13$, $t = 2.68$, $p < .01$). However, the direct interaction effect of package format and TR salience, which had been significant in the absence of the proposed mediator, was no longer significant ($\beta = .13$, $t = 1.49$, $p = .14$). Importantly, and in support of differences in perceived adequacy driving the interactive effect of package format and TR salience on perceived efficacy, the bootstrapping analysis showed that the indirect effect of the highest order interaction was significant with a 95% CI excluding zero (indirect effect = .0992, 95% CI, .0115 to .2710]; see row "Study 4," columns 7 and 8 of Table 3).

Other Measures. There were no main or interaction effects on frequency of consumption of breath mints (all p's $> .11$), breath fresheners (all p's $> .14$), or Life Savers (all F's less than 1).

Discussion

Study 4 provides support for our theorizing that product packaging defines the naturally salient resource inventory during consumption when PC is limited (note that in this study, PC was limited for all participants). We find that participants in the single- (vs. multi-) serve condition perceived the mint as more adequate and effective when we did not reinforce the presence of (13) other mints. However, drawing attention to all of the mints available across all packages attenuated these participants' perceived adequacy and efficacy—to a level on par with those in the multi-serve condition. Thus the results of this study indicate that what remains *within* a package from which consumption occurs—rather than all available resources (across all packages present)—drive subsequent impressions of adequacy and efficacy. Importantly, these results also provide preliminary evidence that differences in felt consumption closure underlie perceptions of product adequacy. Although we do not explicitly test this variable (i.e., felt consumption closure) in the current study, it appears that the salience manipulation may have effectively reduced the experience of consumption closure for those in the single-serve package condition, thereby diminishing any beneficial effects of this package format. We more

directly test the role of consumption closure by manipulating (study 5) and measuring (studies 6a and 6b) it in the next set of experiments.

STUDY 5: MANIPULATING CONSUMPTION CLOSURE AS AN ANTECEDENT TO PERCEIVED PRODUCT ADEQUACY

Design, Stimuli, and Procedure

A total of 152 participants ($M_{\text{age}} = 22$; 59% female) were recruited for the experiment in return for course credit. Participants were randomly assigned to one of four conditions based on a 2 (package format: single-serve vs. multi-serve) × 2 (disposal: present vs. absent) between-subjects design. We used the same stimuli and procedure as in study 2; all participants received a packet of Extreme Jelly Belly Sport Beans containing either 5 (single-serve condition) or 15 (multi-serve condition) Sport Beans. They were asked to eat "one serving of 5 Sport Beans" and to perform three timed tasks. However, we made several important changes to the experimental design.

First, PC was limited for all participants. However, rather than asking participants to memorize a list of random objects, we told all participants that we were interested in how well consumers are able to remember items on a shopping list (e.g., cereal, apples, milk, detergent, etc.), thereby making the memorization task more realistic. Second, we asked participants to recall the shopping list right *after* consumption but *before* task performance. We hypothesized that PC should be limited only during the time of product consumption (when adequacy impressions are made) rather than during the entire length of the study; this timing of the recall stage would allow us to test this assumption directly. Third, in the previous studies we asked whether participants perceived the amount they consumed to be an entire serving in the post-task questionnaire. In this study, however, we wanted to reinforce more strongly the consumption of a full serving. Thus before participants began working the tasks, they were asked to indicate explicitly how many Sport Beans they ate. Fourth, unlike in study 2 where the experimenter opened and poured the product into participants' hands, in this study, participants consumed independently after reading the instructions—a change to, again, make the consumption process more natural. Given the greater interaction with the product in this setting, we concealed efficacy onset information on the back of the packets with small "Marketing Department" labels.

Consumption closure was manipulated by having participants dispose of the Sport Beans packets. In the disposal-present condition, the experimenter walked around the room with a garbage pail after participants finished eating the serving of five Sport Beans and asked them to throw

away the packet. In the disposal-absent condition, participants kept the packet at their workstations during the entire length of the study (i.e., the experimenter did not ask participants to throw away the packet). We expected that if participants in the multi-serve condition had the opportunity to dispose of the package (and hence signal "finishing" and consumption closure), then their adequacy perceptions and actual efficacy experiences would be on par with those in the single-serve condition.

As in study 2, task performance was measured by the percentage of questions that participants answered correctly (task 1), the number of word associations that participants were able to complete properly (task 2), and the number of pasta names generated that did not end with an "i" (task 3). We also measured product adequacy ($\alpha = .88$), participants' level of motivation, involvement, commitment, and attention during the task, along with participants' usual performance on standardized tests and word tasks.

In addition, we included measures to explore other potential alternative/parallel accounts for the previous findings, such as judgments of unit cost (Wansink 1996; Yan, Sengupta, and Wyer 2014) and sensory perception (e.g., perceptions of size and taste; Chandon and Wansink 2007; Scott et al. 2008). We include these items, results, and discussion in the online appendix. Finally, participants provided demographic information.

Results

Efficacy Experiences. As in study 2, we coded for actual performance on each of the three tasks. An ANCOVA revealed a significant package format by disposal interaction on GMAT performance controlling for how participants usually perform on standardized exams ($F(1, 147) = 4.81, p < .05$). Neither of the main effects was significant (all p's > .11). Contrast analysis showed that when participants did not throw away the packet (i.e., in the disposal-absent condition), GMAT performance was higher in the single-serve 5 pack condition ($M = 68.81\%$) than in the multi-serve 15 pack condition ($M = 51.41\%$; $F(1, 147) = 6.44, p = .01$). However, when participants threw away the packet (i.e., in the disposal-present condition), there was no significant difference in performance between the two package conditions ($M_{\text{single-serve}} = 62.58\%$ vs. $M_{\text{multi-serve}} = 65.33\%$; F less than 1). Further contrast analysis revealed that, within the multi-serve condition, performance was higher in the disposal-present condition ($M = 65.33\%$) than in the disposal-absent condition ($M = 51.41\%$; $F(1, 147) = 4.33, p < .05$). However, within the single-serve condition, there was no significant difference in performance between the disposal-present and disposal-absent conditions ($M_{\text{disposal-present}} = 62.58\%$ vs. $M_{\text{disposal-absent}} = 68.81\%$; F less than 1; see row "Study 5," columns 3 and 4 of Table 3). Usual performance on

standardized tests was not a significant covariate in the model (F less than 1).

The same pattern emerged for task 2. An ANCOVA revealed a significant package format by disposal interaction on word association task performance ($F(1, 147) = 4.24, p < .05$), controlling for how participants usually perform on word tasks (see row "Study 5," columns 3 and 4 of Table 3). Neither of the main effects was significant (all p's > .12). Usual performance on word tasks was a significant covariate in the model ($F(1, 147) = 12.20, p = .001$); those who usually perform relatively well on word tasks performed better on the word association task.

An ANCOVA on task 3 performance—generating new names for pasta—revealed a marginally significant package format by disposal interaction ($F(1, 147) = 3.50, p < .10$), controlling for usual performance on word tasks. Neither of the main effects was significant (all p's > .18). Although the pattern is consistent with the previous results, contrast analyses failed to reach significance (see row "Study 5," columns 3 and 4 of Table 3). Usual performance on word tasks was not a significant covariate in the model (F less than 1).

Perceived Product Adequacy. An ANOVA on the measure of perceived product adequacy revealed a significant main effect of package format ($F(1, 148) = 4.68, p < .05$), a marginally significant effect of disposal ($F(1, 148) = 3.36, p < .10$), and a significant package format by disposal interaction ($F(1, 148) = 4.99, p < .05$). Contrast analysis showed that when participants did not throw away the packet (i.e., in the disposal-absent condition), perceptions of having an adequate quantity of Sport Beans were higher in the single-serve ($M = 4.77$) than in the multi-serve condition ($M = 3.46$; $F(1, 148) = 8.68, p < .005$). However, when participants threw away the packet (i.e., in the disposal-present condition), there was no significant difference in perceptions of adequacy between the two package conditions ($M_{\text{single-serve}} = 4.65$ vs. $M_{\text{multi-serve}} = 4.67$; F less than 1). Further contrast analysis revealed that, within the multi-serve condition, perceptions of adequacy were higher in the disposal-present condition ($M = 4.67$) than in the disposal-absent condition ($M = 3.46$; $F(1, 148) = 7.84, p < .01$). However, within the single-serve condition, there was no significant difference in perceptions of adequacy between the disposal-present and disposal-absent conditions ($M_{\text{disposal-present}} = 4.65$ vs. $M_{\text{disposal-absent}} = 4.77$; F less than 1; see row "Study 5," columns 5 and 6 of Table 3).

Mediation Analyses. We ran mediation analysis for each task, controlling for the relevant variable (usual task performance on standardized tests/word tasks). When the proposed mediator (perceived product adequacy) was included in the model, it had a significant effect on GMAT task performance ($\beta = 3.17, t = 2.53, p = .01$). However, the direct interaction effect of package format and disposal,

which had been significant in the absence of the proposed mediator, became marginally significant ($\beta = 3.95$, $t = 1.72$, $p = .09$). Importantly, and in support of differences in perceived adequacy driving the interactive effect of package format and disposal on efficacy experiences, the bootstrapping analysis showed that the indirect effect of the highest order interaction was significant with a 95% CI excluding zero (indirect effect = 2.1718, 95% CI, .3320 to 5.9452].) The same pattern of results (significant indirect effect of the highest order interaction) emerged for the word association task, although not for the pasta task given that, as reported earlier, this measure failed to reach significance (see row "Study 5," columns 7 and 8 of Table 3).

Other Measures. Finally, ANOVAs revealed no significant main or interaction effects of package format and disposal on motivation (all p's > .11), involvement (all p's > .12), commitment (all p's > .25), and attention (all p's > .17).

Discussion

In support of hypothesis 3, study 5 demonstrates through moderation that perceptions of product adequacy and actual efficacy experiences are derived from differences in consumption closure: when participants engage in another activity that facilitates closure (disposing of the package after consumption), the previously observed effects of package format are attenuated. In other words, when those in the multi-serve condition had the opportunity to experience consumption closure by performing an act that signals "finishing," their adequacy perceptions and efficacy experiences were on par with those in the single-serve condition.

This study also rules out several potential alternative explanations (see the online appendix) and shows that the effects emerge when (1) PC is only limited during consumption and not necessarily during task performance, (2) PC is limited via a more naturalistic memory task, and (3) the consumed quantity is explicitly reinforced before task performance.

STUDIES 6A AND 6B: MEASURING CONSUMPTION CLOSURE AS AN ANTECEDENT TO PERCEIVED PRODUCT ADEQUACY IN A NATURAL ENVIRONMENT

The previous study provides support for the notion that consumption closure is indeed the link between package format (single-serve vs. multi-serve) and perceptions of product adequacy. In studies 6a and 6b, we seek to test this link more explicitly by measuring rather than manipulating felt consumption closure and to do so in a setting where PC is naturally low. Prior research has used a pre-exam setting

as a manipulation of low PC since students are generally preoccupied with thoughts about the exam and more cognitively loaded than they would be otherwise (Ein-Gar et al. 2012). Thus we administered short surveys to students in two classrooms just before their midterm exams. Note that this pre-exam setting necessarily limited the number of measures we were able to include. As such, we opted to focus on perceived adequacy and its proposed antecedent: consumption closure.

Study 6a

Design, Stimuli, and Procedure. Sixty undergraduate students ($M_{age} = 20$; 53% female) taking a Principles of Marketing course completed the survey just prior to taking their midterm exam. We used the same stimuli as in study 3. Students randomly received one of three package format versions of a short survey: single-dose, multi-dose (full bottle), or multi-dose (last two tablets remaining). All students read, "Imagine that you are currently experiencing a headache. You decide to take pain-relief medication, Advil." Those in the single-dose condition then read, "You have a single-dose packet of Advil containing 2 tablets. You take a dose of 2 tablets." Those in the multi-dose (full bottle) condition read, "You have a full bottle of Advil containing 360 tablets. You take a dose of 2 tablets," whereas those in the multi-dose (last two tablets remaining) read, "You have a bottle of Advil, with 2 tablets remaining. These are the last 2 tablets in the bottle. You take a dose of 2 tablets." Importantly, we included this additional experimental condition in which participants imagined consuming the last serving from a multi-serve package to provide further support for felt consumption closure as the underlying mechanism. The featured images were identical to those used in study 3.

After reading the hypothetical scenario, all participants completed 10 items pertaining to felt consumption closure after taking the two tablets. These items were compiled from Gu et al. (2013) and Beike and Wirth-Beaumont (2005) and modified for the present study ($\alpha = .76$, 1 = Not at all, 7 = Very much): "To what extent did you feel a sense of closure?" "To what extent were you still thinking about any remaining tablets?" (reverse coded), "To what extent did you feel a sense of completion?" "To what extent did you perceive the amount you consumed as "settled?" "To what extent were you still thinking about the amount of tablets you took?" (reverse coded), "To what extent did you perceive taking the 2 Advil tablets as "unfinished business?" (reverse coded), "To what extent did you perceive taking the 2 Advil tablets as a "closed book?" "To what extent did you think that taking the 2 Advil tablets was 'behind you'?" "To what extent did you experience complete closure?" "To what extent did you feel like you were 'finished'?" As in the previous studies, we also asked perceptions of product adequacy ($\alpha = .93$) along with

participants' experience with Advil, general use of medication, and demographics.

Results. An ANOVA revealed a significant effect of package format on the composite measure of felt consumption closure ($F(2, 57) = 3.54$, $p < .05$). Pairwise comparisons analysis showed that consumption closure was significantly higher for those in the single-dose condition than for those in the multi-dose (full bottle) condition ($M_{single-dose} = 4.96$ vs. $M_{multi-dose\ [full]} = 4.16$; $p < .05$). Similarly, consumption closure was significantly higher for those in the multi-dose (last two tablets remaining) condition than for those in the multi-dose (full bottle) condition ($M_{multi-dose\ [last\ 2]} = 4.89$ vs. $M_{multi-dose\ [full]} = 4.16$; $p < .05$). However, there was no significant difference between the single-dose and multi-dose (last two remaining) conditions ($p = .83$).

The same pattern emerged for perceptions of product adequacy ($F(2, 57) = 4.42$, $p < .05$). Perceived adequacy was significantly higher for those in the single-dose condition than for those in the multi-dose (full bottle) condition ($M_{single-dose} = 5.94$ vs. $M_{multi-dose\ [full]} = 4.44$; $p < .01$). Similarly, perceived adequacy was significantly higher for those in the multi-dose (last two tablets remaining) condition than for those in the multi-dose (full bottle) condition ($M_{multi-dose\ [last\ 2]} = 5.63$ vs. $M_{multi-dose\ [full]} = 4.44$; $p < .05$). However, there was no significant difference between the single-dose and multi-dose (last two remaining) conditions ($p = .56$).

Given that the ANOVAs on consumption closure and perceived adequacy revealed no differences between the single-dose and the multi-dose (last two tablets remaining) conditions—but significant differences between these two conditions and the multi-dose (full bottle) condition—we used an orthogonal contrast that compared the average of the single-dose and multi-dose (last two tablets remaining) conditions with the multi-dose (full bottle) condition. The dummy codes for the contrast were -1, -1, and 2 to indicate the single-dose, multi-dose (last two tablets remaining), and multi-dose (full bottle) conditions, respectively. As predicted, mediation analysis ([Hayes 2013](#); model 4) using the bootstrap procedure with 5000 resamples revealed that consumption closure mediated the relationship between package format and perceived product adequacy, with a 95% CI excluding zero (indirect effect $= -.1766$, 95% CI, $-.3818$ to $-.0444$). Note that other variations of contrast coding—comparing each of the single-dose and multi-dose (last two tablets remaining) conditions to the multi-dose (full bottle) condition (-1, 0, 1; 0, -1, 1) — yield analogous results.

There were no differences between conditions on product familiarity (F less than 1), frequency of Advil consumption ($F(2, 57) = 1.59$, $p = .21$), or frequency of pain reliever consumption in general (F less than 1).

Study 6b

Design, Stimuli, and Procedure. To even further bolster confidence in the consumption closure mechanism shown in studies 5 and 6a, as well as to replicate our results again in a more natural environment, we conducted study 6b. Sixty-two undergraduate students ($M_{age} = 20$; 50% female) taking another section of a Principles of Marketing course completed the survey just prior to taking their midterm exam. We sought to explore another variant of product packaging and thus presented students with one of three package formats of Red Bull (we thank the anonymous reviewer for this suggestion): single-serve (individual can), single-serve (in a 24 can carton), or multi-serve. All participants read, "Imagine that before this exam, you decide to drink an energy enhancer." Those in the single-serve (individual can) condition then read, "You have a can of Red Bull. Each can contains one serving of 8.4 fl. oz. You drink the entire can (8.4 fl. oz.)." An image of one Red Bull can appeared on the page. Those in the single-serve (in a 24 can carton) condition read, "You have a 24-pack of Red Bull. Each can contains one serving of 8.4 fl. oz. You take one and drink the entire can (8.4 fl. oz.)." An image of a carton of 24 Red Bull cans appeared on the page. Those in the multi-serve condition read, "You have a can of Red Bull. Each can contains two servings of 8.4 fl. oz. (16.8 fl. oz. total). You drink one serving (8.4 fl. oz.; half of the can)." An image of one larger Red Bull can appeared on the page. All students were asked to take a moment to imagine consuming the product and then to proceed to the survey questions. As in study 6a, participants completed items pertaining to consumption closure (i.e., from consuming 8.4 fl. oz. of Red Bull; $\alpha = .70$), perceived product adequacy ($\alpha = .75$), experience with Red Bull, general use of energy enhancers, and demographics.

Results. Based on the results of our studies 4, 5, and 6a, we hypothesized no differences between the single-serve (individual can) and the single-serve (in a 24 can carton) conditions. In both cases, the package from which consumption occurs is completed (and can hence be discarded), which, in turn, should lead to equivalent experiences of consumption closure. As predicted, an ANOVA revealed a significant effect of package format on the composite measure of consumption closure ($F(2, 59) = 5.59$, $p < .01$). Pairwise comparisons analysis showed that consumption closure was significantly higher for those in the single-serve (individual can) condition than for those in the multi-serve condition ($M_{single-serve\ [individual]} = 3.88$ vs. $M_{multi-serve} = 3.14$; $p = .01$). Similarly, consumption closure was significantly higher for those in the single-serve (in a 24 can carton) condition than for those in the multi-serve condition ($M_{single-serve\ [24-pack]} = 4.07$ vs. $M_{multi-serve} = 3.14$; $p < .005$). However, there was no significant difference between the single-serve (individual can) and the single-serve (in a 24 can carton) conditions ($p = .50$).

The same pattern emerged for perceptions of product adequacy ($F(2, 59) = 4.44$, $p < .05$). Perceived adequacy was significantly higher for those in the single-serve (individual can) condition than for those in the multi-serve condition ($M_{\text{single-serve [individual]}} = 5.58$ vs. $M_{\text{multi-serve}} = 4.28$; $p < .01$). Similarly, perceived adequacy was significantly higher for those in the single-serve (in a 24 can carton) condition than for those in the multi-serve condition ($M_{\text{single-serve [24-pack]}} = 5.44$ vs. $M_{\text{multi-serve}} = 4.28$; $p < .05$). However, there was no significant difference between the single-serve (individual can) and the single-serve (in a 24 can carton) conditions ($p = .77$).

Given that the ANOVAs on consumption closure and perceived adequacy revealed no differences between the single-serve (individual can) and the single-serve (in a 24 can carton) conditions—but significant differences between these two conditions and the multi-serve condition—we used an orthogonal contrast that compared the average of the single-serve (individual can) and the single-serve (24 pack) conditions with the multi-serve condition. The dummy codes for the contrast were -1, -1, and 2 to indicate the single-serve (individual can), single-serve (in a 24 can carton), and multi-serve conditions, respectively. As predicted, mediation analysis (Hayes 2013; model 4) using the bootstrap procedure with 5000 resamples revealed that consumption closure mediated the relationship between package format and perceived product adequacy, with a 95% CI excluding zero (indirect effect = $-.1434$, 95% CI, $-.3081$ to $-.0389$]. Note that other variations of contrast coding—comparing each of the single-serve (individual can) and the single-serve (in a 24 can carton) conditions to the multi-serve condition (-1, 0, 1; 0, -1, 1) —yield analogous results.

There were no differences between conditions in product familiarity, frequency of Red Bull consumption, or frequency of consumption of energy enhancers in general (all F's less than 1).

Discussion

In study 6a, we find that reported closure from consuming the entirety of a single-dose packet and consuming the last two tablets of a multi-dose bottle is equivalent and significantly higher than reported closure from consuming the same dose from a full bottle of Advil. In support of hypothesis 3, as evidenced by mediation analysis and reinforced by the results of the condition in which participants imagined finishing the last dose of medicine in a multi-dose bottle, felt consumption closure is the underlying mechanism driving the effect of package format on perceptions of product adequacy.

In study 6b, we find that reported closure from consuming the entirety of an individual single-serve can (regardless if it was individually presented or in 24 pack carton) is significantly higher than reported closure from consuming

the same quantity from a multi-serve can of Red Bull. Mediation analysis once again provided support for hypothesis 3, namely that differences in felt consumption closure underlie perceptions of product adequacy. Moreover, the results of study 6b are in line with those of study 4, namely that the product contained within a package rather than across all available packages drives subsequent inferences. We turn to this point again in the general discussion section.

Overall, although we recognize the exclusion of a perceived product efficacy measure as a limitation of studies 6a and 6b (given the constraints imposed by the pre-exam setting discussed previously), our replication of previous findings in a more natural context (i.e., outside of the lab) provides evidence that the documented effects of package format likely arise in a variety of decision environments that consumers are likely to encounter.

GENERAL DISCUSSION

Across seven studies and three different product categories, we demonstrate that single-serve and multi-serve package formats may yield differential perceptions of product adequacy and efficacy. More specifically, we find that when consumers' PC is limited, consuming a particular serving/dosage of a product from a smaller resource inventory (i.e., the entirety of a single-serve package) subjectively feels more adequate than consuming an equivalent quantity from a larger resource inventory (i.e., a multi-serve package, namely one in which additional servings/doses remain after consumption). Results show that these perceptions of adequacy are due to differences in felt consumption closure and affect actual product efficacy experiences (i.e., task performance), expectancies, and judgments.

The present research makes several important contributions. To the best of our knowledge, it is the first to implicate package format—single-serve versus multi-serve packages—as a source of product efficacy experiences, expectancies, and judgments. Packaging decisions, and namely investments in single-serve/single-dose alternatives, are critical to marketing managers of "efficacious" products. First, the cost of production necessarily varies as a function of package format. In addition, consumers have been shown to respond both positively and negatively to such packaging changes; single-serve packaging is seen as convenient and aesthetically appealing (Phillips 2005), yet at the same time, wasteful and potentially contributing to current environmental problems (Worthington 2013). Thus understanding the variety of effects that single-serve and multi-serve package formats have on consumers' responses—and particularly those responses that are unobservable, or less observable, in the marketplace—is crucial

given that such packaging decisions affect firms' top and bottom lines.

Another theoretical contribution of the current research is the identification of a previously unexplored antecedent of product efficacy perceptions and experiences: feelings of (in)adequate consumption. Identifying and understanding the antecedents of perceived efficacy is critical because of its role as a major determinant of product (non)adherence (Berg et al. 1993). Nonadherence can manifest in decisions to (1) discontinue using a product or (2) misuse a product (i.e., adjust consumption quantity at one's own discretion). Industry studies show that about 30% of consumers stop taking medicine before the dosed supply is finished, and the World Health Organization estimates that globally only about 50% of consumers take their medicines as prescribed, translating into 125,000 deaths and over $100 billion in increased health care expenses and loss of productivity in the United States annually (Loden and Schooler 2000). Indeed, misuse of pharmacological products (e.g., caffeinated beverages) is a major public health concern; emergency department visits due to both pharmaceutical and energy drink misuse have increased tremendously over the last few years (Substance Abuse and Mental Health Services Administration [SAMHSA] 2013a, 2013b). This is particularly concerning because half of the energy drink market—the fastest growing segment of the US beverage market—consists of children, adolescents, and young adults (Seifert et al. 2011). Undeniably, understanding the driving factors of perceived product efficacy—including package format—which may in turn affect product nonadherence, can aid policymakers in initiatives to counteract any such potentially negative health consequences.

Although we do not study consequent nonadherence in the present research, we encourage extension of the present research that explores when package-driven efficacy perceptions may lead to product nonadherence versus firm-directed behavior (e.g., brand switching and (un)favorable word of mouth). For example, brand and/or product familiarity may play a role. It may be that for well-established brands, adjustment to consumption quantity (rather than, for example, brand switching) is likely to occur. Indeed, almost half of US adults take at least one OTC medication on a regular basis, and research has shown that nearly a quarter is likely to overdose unintentionally (Wolf, Di Francesco, and McCarthy 2012). Also, accidental overdose of acetaminophen, the active ingredient in the well-known medicine Tylenol, has alone resulted in more than 1500 deaths in the last decade and approximately 23,000 emergency department visits every year (Gerth and Miller 2013). In contrast, for new, less established brands, different efficacy experiences driven by package format may affect firm-directed behavior to a greater degree (i.e., increase the likelihood of consumers' (dis)continuing use of the brand in general, engaging in (un)favorable word of

mouth, etc.). We suggest that identifying the conditions under which these different outcomes are more (vs. less) likely to arise would be valuable both theoretically and practically.

Furthermore, we present the notion of "consumption closure" in the current work and show that it underlies perceptions of product adequacy (studies 5, 6a, and 6b). When consumers have the ability to experience closure, by completing the contents of a package or by disposing of an unfinished package thereby preventing any further use, the documented effects are attenuated. This suggests that consumers high in need for closure (Webster and Kruglanski 1994) may be more influenced by package format in their efficacy responses—a hypothesis that may be tested in future research. A fruitful extension of this work may be to identify other acts that may signal consumption closure. Also, while we currently study consumption closure in an "efficacy context," we suggest that this concept may be relevant in other domains where perceived satiety (akin to perceived adequacy) is a variable of interest.

In studies 1 to 5, we manipulated PC by imposing a cognitive load in the lab. However, in studies 6a and 6b, we demonstrated that the effects of package format indeed arise in a setting where consumers are naturally cognitive loaded (in the field). We suggest that a laboratory setting necessarily contributes to more attentiveness and focused decision making that would otherwise occur (unless cognitive load is explicitly induced) and that the documented effects are likely to arise in a variety of circumstances. Indeed, consumption of efficacious products (e.g., energy enhancers) is quite common in situations where consumers' PC is limited including during lectures, study sessions, work, sports, and other activities (Elliot 2011). However, future research would benefit from testing package-driven efficacy perceptions under other variations of cognitive constraint, such as divided attention tasks and time pressure.

Finally, in this research, we focused on single-serve and multi-serve package formats. Although we explore the presence of multiple single-serve packages in studies 4 and 6b, we believe that it would be interesting to investigate in more depth the influence of other package formats, such as when single-serve packages are physically attached to a larger resource inventory (e.g., plastic yokes, buy-one-get-one packaging, and multi-pack cartons of single-serve containers). Perhaps the degree of attachment between single-serve units (i.e., whether they are merely situated next to each other in a carton or bound together by additional packaging) may affect subsequent experiences of consumption closure. It would also be interesting to examine consumers' efficacy responses to blister packaging. Our findings suggest that each enclosed unit (pill) may serve as the salient resource inventory. Interestingly, studies suggest that blister packaging results in higher compliance rates than loose-pill alternatives, presumably because it

reduces confusion (Wade and St. Vrain 2005). The present research raises the possibility that better adherence may be driven by higher adequacy and efficacy perceptions elicited by such packaging. We believe that a test of this hypothesis would broaden our understanding of the role of product package format on consumers' efficacy experiences and judgments. We urge marketing scholars to pursue these avenues of future research—along with other potential antecedents of perceived product adequacy and efficacy—since such inquiries, we believe, would contribute both theoretically and substantively to our field.

DATA COLLECTION INFORMATION

The data for studies 1 to 5 (including the pretests for studies 3 and 4) were collected at Baruch College, City University of New York, between the fall of 2011 and the spring of 2015. The data were collected primarily by the first author in the marketing lab at the university. The data for studies 6a and 6b were collected in classrooms at Hofstra University during the spring of 2015. They were analyzed independently by the first author and jointly by the two authors.

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