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Using Behavioral Science To Inform Policies Limiting Sugary-Drink Portions: Reply to Wilson and Stolarz-Fantino (2018)

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In 2012, New York City considered implementing a policy that would prevent restaurants from selling sugary drinks in excess of 16 oz. In our 2017 article, "Psychologically Informed Implementations of Sugary-Drink Portion Limits," we considered two plausible ways that restaurants might comply with such a policy and the effects of both on people's propensity to buy and consume sugary drinks (John, Donnelly, & Roberto, 2017). In three experiments, we assessed the impact of providing free refills (e.g., offering a regulation-size, 16-oz cup with unlimited refills), which led people to consume more, especially when the drinks were served by a waiter. In a final experiment, we tested bundling (i.e., dividing the contents of a 32-oz cup into two regulation-size, 16-oz cups); this led people to purchase fewer ounces of sugary drinks but did not affect the amount they consumed. In each laboratory experiment, participants made real ordering decisions, paid for their beverages, and consumed those beverages. The findings from the bundling experiment ran counter to Wilson, Stolarz-Fantino, and Fantino's (2013) findings on beverage bundling with 100 undergraduates making hypothetical purchasing decisions. In that study, they concluded that "restricting larger-sized drinks may have the unintended consequence of increasing soda consumption rather than decreasing it" (Abstract) if companies respond to the policy by offering beverage bundles.

Wilson and Stolarz-Fantino (2018) offer two primary critiques, one specific to our research and one more broadly applicable to policy-relevant social science. First, they argue that our laboratory context was not sufficiently representative of the marketplace; in particular, we used linear pricing for beverages (instead of restaurants' more common nonlinear pricing structure), and therefore our results cannot inform our understanding of how this policy might play out in the real world. Second, they argue that "for their research to have policy implications, John et al. would need to demonstrate that their menus are profit maximizing" (p. 1376). We address both critiques in turn below.

Specific Point: Experimental Test of Bundling Combined With Linear Versus Nonlinear Pricing

Wilson and Stolarz-Fantino (2018) suggest that because our experiments used linear pricing (e.g., a 24-oz drink cost twice as much as a 12-oz drink) instead of nonlinear pricing (e.g., a 24-oz drink costs less per ounce than a 12-oz drink), which is prevalent in the marketplace, our results cannot inform how this policy might play out in the real world. For their argument to be true, the portion-cap policy would need to interact with pricing. Specifically, nonlinear pricing, relative to linear pricing, would have to be particularly likely to increase the appeal of larger sizes when implemented on bundled menus relative to regular menus. By contrast, if the effect of bundling on purchasing is the same regardless of pricing structure, this would suggest that our original conclusion that bundling does not backfire and cause people to consume more would likely hold with nonlinear pricing. We felt this was a fair question that we

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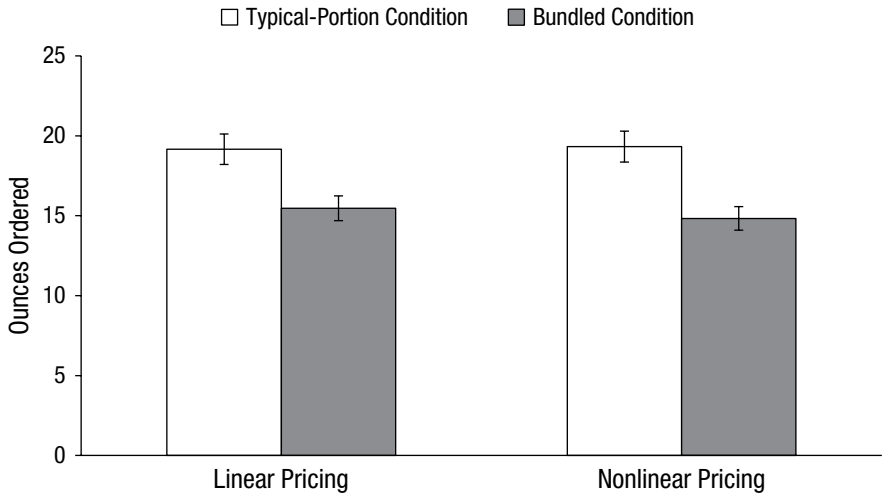

Fig. 1. Ounces ordered as a function of pricing (linear vs. nonlinear), separately for the typical-portion and bundled conditions. Error bars indicate ±1 *SEM*.

could attempt to answer empirically by replicating and expanding their original study.

In a 2 × 2 between-subjects design, participants (N = 610 MTurk workers; age: M = 36.94, SD = 11.69; 43.9% female; 80.9% White) made a hypothetical drink choice from either a bundled or a regular menu, and we manipulated whether the pricing was linear or nonlinear. Our hypothetical design and menus were very similar to those used by Wilson et al. (2013), so we could more precisely test whether their 2013 finding that bundling increased sugary-drink ounces ordered would replicate. Moreover, using their menus allowed us to address their critique that our menus were "confusing and unappealing" (p. 1377). Although running a fully incentive-compatible study (as in our 2017 article) is preferable, we wanted to use highly similar methods as Wilson et al. (2013) did to attempt to replicate and extend their findings. Like Wilson et al. (2013), our primary outcome was the number of drink ounces ordered. The methods and results are detailed in the Supplemental Material available online, and the data and stimuli are posted on the Open Science Framework (https://osf.io/73puw/). We preregistered the study at https://aspredicted.org/x6ju5.pdf.

Consistent with our prediction that using nonlinear pricing would not change our results, and inconsistent with Wilson and Stolarz-Fantino's (2018) contention that it would, results showed no interaction between menu type (bundled vs. regular) and pricing (linear vs. nonlinear), $F(1, 606) = 0.25$, $p = .62$, $\eta^2 = .00$, Bayes factor = 0.14 (Fig. 1). Moreover, we did not conceptually replicate Wilson et al.'s (2013) original finding that people would (hypothetically) order more ounces from the bundled menu. Consistent with our original incentive-compatible lab experiment, results showed that bundling drinks larger than 16 oz into two smaller containers made them less, not more, appealing to consumers—main effect of bundling: $F(1, 606) = 25.27$, $p < .001$, $\eta^2 = .04$ (typical portion: M = 19.24 oz, SD = 10.91; bundled: M = 15.16 oz, SD = 9.04). (In the Supplemental Material, we also include an earlier nonpreregistered study that demonstrated similar results.)

Thus, although we appreciate Wilson and Stolarz-Fantino's (2018) concerns about our use of linear pricing, the available evidence suggests that this factor does not affect the attractiveness of the bundled options. Therefore, when it comes to bundling, we conclude, as we concluded in our 2017 article, that in the face of a portion limit on sugary drinks, bundled menus are unlikely to backfire. This result implies that if firms attempt to skirt portion-limit regulation by offering bundles, consumers will not be worse off, as Wilson et al. (2013) suggested. This is not to say, however, that the policy will achieve its goal of reducing consumption.

In their Commentary, Wilson and Stolarz-Fantino (2018) also note an interesting idea that neither of our paradigms allowed us to explore: Allowing customers to purchase two different drink flavors as part of a bundle might increase the appeal of the bundled option. Alternatively, this option might have no effect if consumers mainly stick with a favorite flavor. Future research could test these possibilities.

Broader Point: Profit Maximization as a Requirement for Policy Relevance

We agree with Wilson and Stolarz-Fantino (2018) that researchers seeking to understand a policy's influence

on consumers should test predictions about which strategies firms will likely use when implementing a policy. This is why they tested bundling and why we tested both free refills and bundling, both potential options that restaurants could pursue to circumvent the policy and maximize profits.

Research, however, that demonstrates the effectiveness (or lack thereof) of an intervention even without perfectly predicting a firm's response still has enormous value for setting policy. For example, a study showing that tobacco taxes are likely to decrease tobacco purchases can inform policymakers' decisions, even if there are tweaks that tobacco companies can make to their marketing or pricing that will reduce the taxes' effect. Further, such research can inform the design or modification of regulations to prevent companies from skirting them. Take, for example, payday loans. Although legal, payday loans may have adversely affected consumer welfare by causing bankruptcy (e.g., Skiba & Tobacman, 2009), and so regulations were created to avoid this outcome, with some states banning the practice altogether. Regulators can also disincentivize firms from exploiting regulation loopholes using legal instruments such as strict liability, which makes firms responsible for harm caused by their products, even in the absence of ill intent (Moss, 2004; Spence, 1977).

Innovative policies to limit portion sizes are rare and understudied, despite their potential to curb overconsumption of unhealthy foods without restricting consumer choice. More research studying variants of this policy using incentive-compatible designs and behavioral outcomes is greatly needed.

Action Editor

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Author Contributions

All authors contributed to the study design. Data were collected and analyzed by G. E. Donnelly. All authors interpreted the results. L. K. John and C. A. Roberto drafted the manuscript, and G. E. Donnelly provided critical revisions. All authors approved the final version of the manuscript for submission.

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Supplemental Material

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Open Practices

All data and materials have been made publicly available via the Open Science Framework and can be accessed at https://osf.io/73puw/. The design and analysis plans for this study were preregistered at https://aspredicted.org/x6ju5.pdf. The complete Open Practices Disclosure for this article can be found at http://journals.sagepub.com/doi/suppl/10.1177/0956797619851731. This article has received badges for Open Data, Open Materials, and Preregistration. More information about the Open Practices badges can be found at http://www.psychologicalscience.org/publications/badges.

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