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Estimating the impacts of calorie labels in fast-food settings using a novel comparison: Comparing California drive-through and in-store purchases☆

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ABSTRACT

Prior studies assessing the impact of calorie labels in fast-food settings have relied on comparisons across local and state jurisdictions with and without labeling mandates; several well-designed studies indicate a small reduction of calories purchased as a result of the labels. This study exploits a staggered roll-out of calorie labels in California to study the same issue using a novel comparison of in-store purchases with calorie information and drive-through purchases without calorie information at the same locations. With this design, consumers in both the treatment and comparison groups have been subject to the same social signals associated with the policy change and may have been exposed to calorie information during prior purchases, narrowing the intervention under study to the impact of posted menu labels at the point of purchase. Transactions (N = 201,418,976) at 424 unique restaurants at a single fast-food chain were included and a difference-in-differences design was used to examine changes one and two years after the implementation of labels at in-store counters compared to baseline. Using this comparison of consumer purchases within the same jurisdictions, we found no meaningful impact of posted calorie labels at the point of purchase, suggesting that such labels did not induce behavioral change. Additional methods to strengthen the impact of labeling policies are worthy of further study.

1. Introduction

More than one-third of all U.S. adults and nearly half of adults aged 20–39 years consume fast food on a given day (Fryar et al., 2018). Approximately 70% of fast-food sales occur at drive-through windows (QRE Advisors, 2021). Because fast food is usually energy dense and highly processed, fast-food consumption (as well as consumption of sit-down restaurant meals) have been associated with higher caloric intake than consumption of food prepared at home (Jarlenski et al., 2016; Nguyen & Powell, 2014; Vercammen et al., 2019). One policy aimed at informing consumers about the caloric content of food products is to place calorie labels on menus. Calorie labeling has been introduced across multiple localities and nations to encourage consumers to purchase less calorie-dense menu items. In 2010, the requirement to post such labels on menus and menu boards became United States federal law under the Affordable Care Act and was implemented in 2018.

The primary motivation for calorie label policies is to educate consumers on the assumption that knowledge will lead to behavioral change. As described in one review of these public health laws, “Nutritional information should be provided on restaurant menus as a strategy to educate consumers … and the underlying premise of menu labeling is that consumers who are educated about the nutritional content of restaurant foods will make healthier choices when eating out …” (Armstrong, 2008). Supporting this hypothesis, research on federally required “nutrition fact labels” on packaged foods has found them to be

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effective in reshaping consumer selection of healthier options (Armstrong, 2008). Whether and to what degree menu labeling in fast-food settings would similarly impact consumer choices was an open question and the use of scientific evidence in the myriad policy debates within the U.S. that preceded the adoption of the various labeling bills was, therefore, limited. (Armstrong, 2008; Payán & Lewis, 2019). Indeed, the restaurant industry challenged the legislation both for its potential negative impacts on the economic health of the industry and on the grounds that there was little evidence that fast-food labels changed behavior or obesity rates (Armstrong, 2008).

Researchers have examined the impacts of calorie labels on fast-food purchases. Given the substantial barriers to randomizing calorie label mandates, some of the most well-designed studies have relied primarily on comparisons between fast-food purchasing trends over time in locations with, vs. without, newly implemented calorie label requirements (Bleich et al., 2015; Essman et al., 2023; Kiszko et al., 2014; Swartz et al., 2011). This use of "natural experiments," which exploits federalism's patchwork of public health policies within the U.S. to estimate policy impacts, is not limited to the study of calories labels; these difference-in-differences analyses across jurisdictions have been used to study the impacts of a wide array of such policies including tobacco restrictions (Page et al., 2012), speed limits (Hunter et al., 2023), and pandemic-related mask requirements (Lyu & Wehby, 2020). Overall, studies using a cross-jurisdictional comparison (that is, across cities, counties, or states) to estimate the impacts of calorie labels suggest small reductions in calories purchased in jurisdictions where the policy is enacted as compared to jurisdictions where it is not (Bleich et al., 2015; Roberto & Petimar, 2023; Swartz et al., 2011). In our own analyses using this approach, we found a small but statistically significant reduction of 26 calories purchased per transaction in the two years after implementation of the law in California, although statistically significant impacts were not found in the other locations under study (Rummo et al., 2023).

The enactment and implementation of legislation requiring posted calorie labels in fast-food settings may influence consumer decisions through several different mechanisms. Consistent with the laws' stated intent, calorie labels may educate the consumer about their fast-food options; the consumer learns which items have fewer calories and may thus be encouraged to choose those options. Simply stated, once educated, the consumer will choose less caloric options. But there are at least two additional processes that may be at play when calorie label policies are implemented. By enacting policies aimed at changing consumer behavior, government may send a social signal indicating to consumers that this behavior is considered undesirable or otherwise problematic (Leicester et al., 2012). The government's action and the resulting policy debate and media coverage may help signal the importance of considering the nutritional content of fast-food purchases even before or without the display of the actual menu information. Studies of health-promoting taxes, such as those on tobacco and soda, have suggested such a signaling effect (Alvarado et al., 2021; Brockwell, 2013).

Further, beyond education and signaling, the visual display of calorie information may represent a behavioral nudge at the immediate point of purchase (for information on behavioral nudges see, for example, Thaler and Sunstein (2009)). Calorie label laws implicitly assume that the immediate reminder provided by the posted menu labels will nudge the consumer to make a new and different choice beyond information already made available through printed materials, short-term informational campaigns or public service announcements. Even though the consumer may already have been exposed to calorie information when making previous purchases or through other mechanisms and may thus already understand which items are most and least caloric, the calorie label is intended to further encourage a lower-calorie selection. In using a cross-jurisdictional design, previous studies have tested the effects of all three of these causal mechanisms at once, since all three mechanisms are at work in U.S. calorie label policy. We note that labeling policies could also impact industry decision-making, such as through product reformulation, but we do not explore this in our paper.

In this paper, we use a different natural experiment to estimate the impacts of just one of these causal mechanisms on consumer purchases, namely, the point-of-purchase labeling requirement. We exploit a two-phase implementation of the calorie label legislation in one state. Although California enacted legislation requiring calorie labels in fast-food settings beginning January 1, 2011, such labels were required to be posted only inside the store, leaving drive-through menu boards without calorie labels. The requirement for calorie labels in drive-through lanes was not implemented until 2017 in anticipation of the forthcoming federal mandate. Of note, fast-food restaurants were required to make available to both in-store and drive-through consumers upon request printed information regarding calorie counts prior to the first phase of in-store menu postings; the availability of such information continued to be required afterwards (Armstrong, 2008). All venues in this study were part of a single fast-food chain which held tight control over the timing and content of menu boards, resulting in substantial consistency across venues.

We leverage California's staggered implementation to examine the impact of labeling on consumer behavior, specifically calorie content of purchases at the receipt-level, by comparing in-store transactions to drive-through transactions at the same location, before and after the in-store menu boards provided calorie labels. Thus, we utilize a difference-in-differences design within the same store to estimate the impact of posted labels on consumers' purchases.

Given our comparison of the responses of drive-through versus in-store consumers within the same store, we are comparing consumer responses within the same media markets and policy regimes. All fast-food restaurant clients in these areas were exposed to the same social signaling associated with the policy change and had the same opportunity to receive written calorie information and to read posted calorie information when making in-store purchases. Thus, the treatment condition that uniquely distinguished the treatment (drive-through) group from the comparison (in-store) group in our study was the immediate nudge of calorie information at the point of purchase, though we cannot be certain that drive-through customers were exposed to calorie information beforehand, either upon request or during prior in-store purchases. Further, because we compare consumers using the same store for either in-store or drive-through purchases, our study avoids confounding from unmeasured demographic, cultural, policy, health, economic, or other characteristics associated with residing in different geographic areas. Although there might still be some residual differences between consumers who mostly use drive-through windows, vs. those who largely prefer to go into the store, these are minimized by broad car ownership in California. While only 71% of New York households, for example, own cars, 93% of California households do so (Caporal, 2024). Given this, we expect that many in-store purchases will also be made by people who travelled by car. As a result, and since our analysis relies on comparisons within the same store location, we expect both consumer groups to come from or work near roughly similar residential locations (areas proximate to the store) which are correlated with a range of demographic, economic, and other characteristics.

We know of no other paper that exploits a staggered roll-out and comparison of in-person and drive-through settings to estimate the impacts of the labels at the point of purchase on consumer choices.

2. Methods

2.1. Sample

This paper makes use of the same data set as our previously noted study that employed a cross-jurisdictional difference-in-differences approach and synthetic controls to estimate the impacts of calorie labels (Rummo et al., 2023). Taco Bell provided us with data from 10,575 Taco Bell restaurants in the U.S., including all unique restaurants that opened and closed during the study period and representing 5.33 billion transactions from 2007 to 2014. For the analyses in this paper, our sample was limited to California restaurants operating both in-store and drive-through service. We also required both settings to have monthly transaction data in the baseline period, which we defined as the three to eight months prior to the 2011 start of the required menu labels within stores. These restrictions yielded a sample of 424 restaurants and 201, 418,976 transactions.

Transaction data included the name, number, and price of items purchased; the date, time, and location of the purchase; how the order was placed (drive-through, eat-in, takeout); and the type and size of beverages in drive-through transactions. Of note, Taco Bell's menu has dozens of discrete menu items and combinations. We excluded beverage data from our analyses because Taco Bell began allowing consumers to fill their own fountain beverages for in-store purchases during the study period, leaving us unable to determine which beverages were consumed. The implications of this are further discussed below.

2.2. Measures

Our primary outcome is the mean calories purchased per transaction. We assigned calories and nutrients to unique menu items (n = 3517) using MenuStat, a nutrition database of foods and beverages served by national chain restaurants (New York City Department of Health and Mental Hygiene, 2018). Using both automated and manual matching of menu items with nutrition information (Rummo et al., 2023), we matched over 95% of total purchased items every quarter.

2.3. Statistical analysis

Recognizing possible variation in the precise date of implementation across stores and visibility of the labels to customers, we excluded data from two months before and two months after the formal start of the policy. Four restaurant-month observations (each from a different restaurant) were dropped due to implausible values in the primary outcome (<50% of that restaurant's mean calories per transaction during the study period). We compared the differences in the calories purchased per transaction before and after menu labeling implementation between in-store and drive-through settings across all California restaurants that operate in both settings. Findings are presented as difference-in-differences estimates calculated with two-way (store and month) fixed effects regression (see (Rummo et al., 2023) for additional methodological details).

We also examined differences in consumers' use of drive-through and in-store settings in terms of both time of day and types of items purchased. In order to ensure that were able to identify whether potential differences in when consumers make drive-through and in-store purchases underlie our main findings, we stratified our primary model by late night (00:00–03:59), breakfast (04:00–10:59), lunch (11:00–13:59), afternoon (14:00–16:59), dinner (17:00–20:59), and evening (21:00–23:59) hours, and then conducted our difference-in-differences analyses within meal time strata. Further, we analyzed counts of items transacted per restaurant-month by item category (taco, burrito, salad, other entrée, dessert, beverage). Given the structure of our dataset, we are not able to convert these counts into calories.

For all analyses, we estimated the average effect of menu labeling in two periods: a) 3–12 months and b) 13–24 months following menu labeling implementation date, using the mean of the monthly difference-in-differences estimates per period. In the first period, the information is more likely to be new and more salient to the consumer; in contrast, during the second period, consumers would have had time to repeatedly see and consider and/or potentially lose interest in the posted calorie counts.

To assess whether results were robust to key model specifications, sensitivity analyses included re-estimating our primary model using 1) data that excludes late night orders (a small percentage of orders that comprise a greater share of drive-through transactions and that could be different), 2) a 10-month baseline period, and 3) only restaurants that were open for at least 12, 15, 18, 21, and 24 months (separately) following menu labeling implementation, to detect potential confounding due to differential loss to follow-up. Statistical analyses were performed using R version 4.1.2.

3. Results

Drive-through orders comprised approximately 65% of all transactions in each period both before and after the implementation of calorie labels. Lunchtime and afternoon sales made up a larger share of all in-store transactions (36.6% and 23.1%, respectively, in the pre-period) than those for drive-through (27.5% and 19.5%; see Table 1). In contrast, evening and late-night sales were more common in the drive-through settings (16% and 4.4% in the pre-period) than in-store sales (5.7% and 0.1%). These patterns were consistent after implementation of the label policy. There was no difference between the two settings or over time regarding the type of foods ordered. In both study periods and in both restaurant settings, approximately 60% of sales included tacos and one-third included burritos (Table 1). The average unadjusted calories per purchase was greater within the drive-through group by approximately 160 calories both before and after the start of menu labels (See Fig. 1).

Calorie information posted on menu boards had negligible impacts on calories purchased (Table 2). In the first 9 months after implementation, calories for labeled in-store purchases increased by a small but statistically significant 5.4 (95% CI: 3.7, 7.0) calories per transaction relative to those made at the unlabeled drive-through window. In the second year, this reversed but again the impact, now in the opposite direction, was only −5.1 (95% CI: 7.3, −2.9) calories.

Our findings do not appear to be driven by differences between the timing of in-store and drive-through meals. When we estimated impacts by time of day, we found a pattern similar to our main findings. That is, small impacts that reverse direction over the two study periods, even as the size of the estimates vary by meal time. Further, we confirmed that the larger volume of late-night transactions from drive-through windows did not contribute to our findings by re-estimating our model with the exclusion of late-night transactions from our data. Our findings remain unchanged in our other sensitivity analyses using a different baseline period and excluding some restaurants based on months open.

4. Discussion

Prior studies using cross-jurisdictional comparisons to estimate the impacts of calorie labels in fast-food settings have demonstrated small reductions in average calories purchased (Bleich et al., 2017; Essman et al., 2023; Kiszko et al., 2014; Swartz et al., 2011). This result was true of our earlier work using the same transaction data from the same restaurants as in this paper, but with a cross-jurisdictional difference-in-differences design and synthetic controls (Rummo et al., 2023). In those prior studies, one cannot disentangle the signaling effect of the legislation, the educational effect of new information, and the nudge provided by the calorie signage. In this paper's analyses, where both the treatment and comparison groups experienced the same signals, we observed negligible effects, that is, the smallest of increases in calories purchased, followed by similarly small decreases.

While we can be confident that both our treatment and comparison groups received the same social environment signals, we cannot be certain as to whether either had prior exposure to posted calorie information. Parsing out the two possibilities, on the one hand, if crossover occurred between purchase occasions, then both the in-store and drive-through purchase groups would have been exposed to calorie labels such that our findings would speak specifically to the availability of labeling information at acute in-store points-of-purchase and therefore underscore the absence of effect from this discrete labeling exposure, If, on the other hand, crossover did not occur and consumers who contributed to

Table 1
Descriptive statistics of transactions, overall and by time of day and item category.

	In-store (treated)						Drive-through (comparison)					
	Calories[a]		% sales[b]		Count of items sold[c]		Calories[a]		% sales[b]		Count of items sold[c]	
	Pre[d]	Post[e]	Pre[d]	Post[e]	Pre[d]	Post[e]	Pre[d]	Post[e]	Pre[d]	Post[e]	Pre[d]	Post[e]
	Mean (SD)		*%*		*Mean (SD)*		*Mean (SD)*		*%*		*Mean (SD)*	
Overall	1012 (99)	1029 (102)	100.0	100.0	25961 (9136)	22850 (8222)	1175 (121)	1188 (121)	100.0	100.0	52125 (23307)	49396 (43210)
Time of day												
Late Night [00:00–03:59]	908 (1357)	876 (937)	0.1	0.1	628 (1024)	1144 (2109)	1311 (1218)	1294 (267)	4.4	4.4	6234 (8241)	5114 (9048)
Breakfast [04:00–10:59]	890 (136)	905 (134)	7.0	6.7	2131 (2094)	1760 (1944)	927 (149)	941 (134)	5.3	4.9	3228 (3841)	3320 (22581)
Lunch [11:00–13:59]	970 (91)	981 (92)	36.6	36.4	9920 (4692)	8616 (3970)	1050 (106)	1054 (103)	27.5	27.5	14485 (8428)	13808 (21605)
Afternoon [14:00–16:59]	967 (109)	986 (114)	23.1	23.8	5908 (3192)	5265 (2773)	1091 (125)	1106 (123)	19.5	19.9	10195 (7634)	9570 (7832)
Dinner [17:00–20:59]	1130 (125)	1155 (130)	27.6	27.7	7925 (4034)	7060 (3638)	1337 (152)	1355 (154)	27.2	27.8	15574 (8983)	15337 (16071)
Evening [21:00–23:59]	1078 (185)	1082 (155)	5.7	5.4	2276 (2289)	1759 (2025)	1288 (124)	1290 (123)	16.0	15.6	10811 (11302)	8957 (8887)
Item Category												
Burrito	484 (124)	507 (162)	32.4	32.7	5540 (1995)	5001 (1919)	479 (124)	502 (162)	33.5	32.8	11633 (4320)	10701 (4078)
Dessert	236 (65)	235 (65)	3.7	3.6	641 (316)	558 (350)	236 (65)	236 (65)	3.3	3.2	1131 (529)	1039 (586)
Other Entrée	170 (94)	162 (98)	2.5	2.5	426 (298)	377 (282)	166 (96)	154 (100)	3.0	3.1	1047 (602)	1001 (630)
Salad	856 (71)	794 (73)	0.6	0.5	101 (73)	77 (54)	857 (70)	796 (73)	0.6	0.5	210 (141)	162 (109)
Taco	292 (79)	292 (81)	60.8	60.7	10405 (3738)	9286 (3381)	294 (77)	294 (77)	59.7	60.4	20729 (7131)	19688 (6935)

[a] Mean calories per transaction.
[b] Percent sales (transactions) contribution in the defined period. Exception: for item category panel, percent sales are not at the transaction-level but at the item-count level.
[c] Mean count of items sold per restaurant-month.
[d] Defined as months −8 to −3.
[e] Defined as months 3–12.

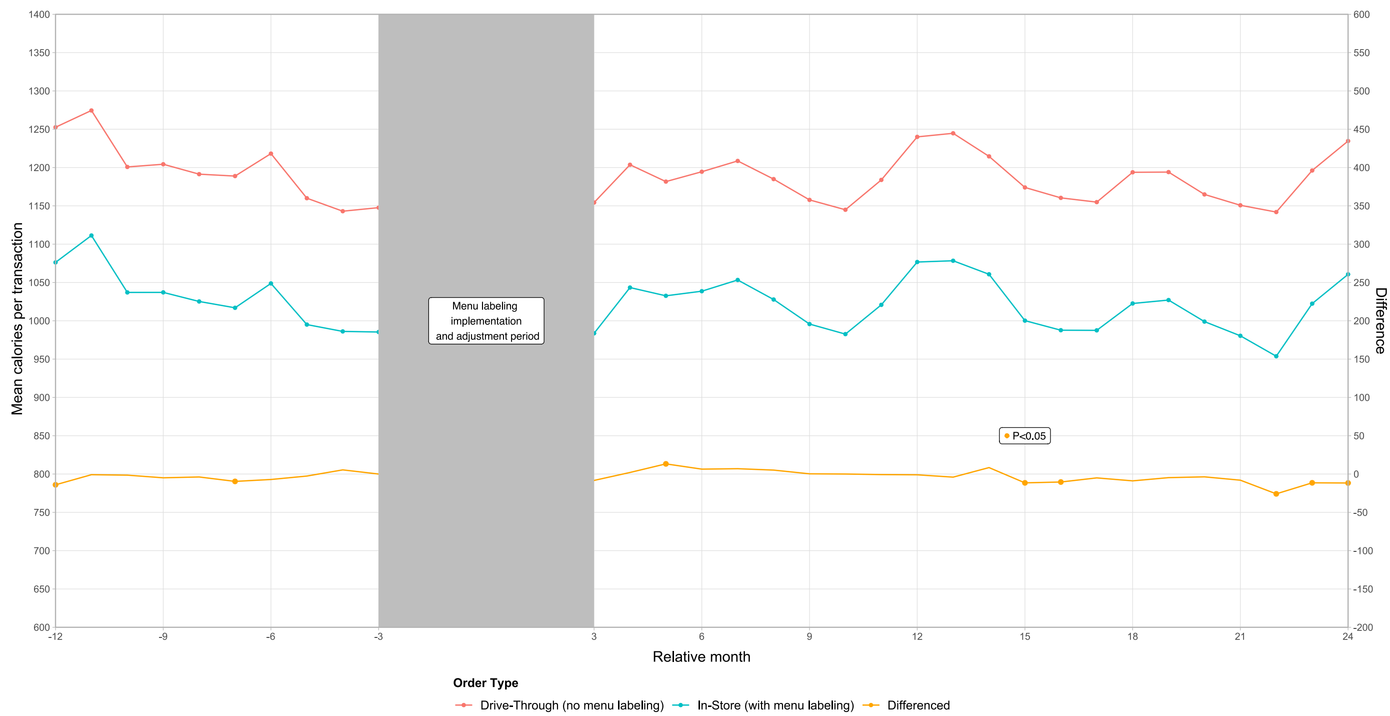

Fig. 1. Predicted calories from the fully adjusted difference-in-differences model, and their difference, between the treated and comparison groups.

Table 2
Difference-in-differences model estimates of calories purchased per transaction after implementation of menu labeling.

	Months 3–12, average monthly effect			Months 13–24, average monthly effect		
	Difference in menu labeling restaurants	Difference in comparison restaurants	DiD effect	Difference in menu labeling restaurants	Difference in comparison restaurants	DiD effect
Overall	15.9 (13.2, 18.7)	10.6 (9.5, 11.7)	5.4 (3.7, 7.0)	5.4 (1.7, 9.2)	10.6 (9.0, 12.1)	−5.1 (−7.3, −2.9)
New baseline[a]	9.1 (7.0, 11.1)	3.7 (2.8, 4.5)	5.4 (4.2, 6.7)	−1.4 (−4.5, 1.7)	3.6 (2.4, 4.9)	−5.1 (−6.9, −3.2)
Excluding late night orders	16.0 (13.2, 18.7)	11.0 (9.9, 12.1)	4.9 (3.3, 6.6)	5.7 (1.8, 9.5)	11.2 (9.6, 12.8)	−5.5 (−7.7, −3.3)
Time of day						
Late Night [00:00–03:59]	−2.0 (42.8, −46.9)	−22.2 (20.7, −65.1)	20.1 (22.1, 18.2)	−50.0 (5.5, −105.5)	−22.7 (21.3, −66.7)	−27.3 (−15.8, −38.9)
Breakfast [04:00–10:59]	18.1 (14.2, 22.0)	16.5 (15.3, 17.7)	1.6 (−1.2, 4.3)	−113.4 (−122.2, −104.5)	−112.0 (−115.0, −109.0)	−1.4 (−7.2, 4.4)
Lunch [11:00–13:59]	8.8 (6.7, 11.0)	0.8 (0.0, 1.6)	8.0 (6.7, 9.4)	8.9 (6.0, 11.9)	7.6 (6.4, 8.8)	1.3 (−0.4, 3.1)
Afternoon [14:00–16:59]	17.7 (14.5, 20.9)	13.1 (11.9, 14.4)	4.5 (2.5, 6.5)	12.6 (8.1, 17.2)	22.6 (20.8, 24.3)	−9.9 (−12.7, −7.1)
Dinner [17:00–20:59]	22.9 (19.6, 26.3)	16.0 (14.6, 17.3)	7.0 (5.0, 9.0)	35.7 (31.3, 40.1)	41.3 (39.4, 43.1)	−5.6 (−8.1, −3.1)
Evening [21:00–23:59]	3.4 (0.6, 6.2)	−1.4 (−2.7, −0.1)	4.8 (3.3, 6.3)	11.5 (4.8, 18.2)	5.7 (4.1, 7.2)	5.8 (0.7, 11.0)

[a] Extending the baseline months from [-3, −8] to [-3, −10].

drive-through transactions did not make prior in-store transactions thereby exposing them, then our findings would reflect in-store consumers potentially benefiting from cumulative exposure to labeling in addition to the discrete exposure at each transaction. In either case, this does not appear to be the case, as our results suggest labeling did not induce outcome differences under either exposure assumption set.

Based on these findings, it is possible that the previously identified impacts of calorie labels in other studies, including our own, derive primarily from the social signal of government action and surrounding debate and discussion about the issue (Rummo et al., 2023). Whether social signals associated with policy change may reshape consumer choices in this realm warrants further investigation.

A second possibility is that prior studies overestimated the policy impacts because they were unable to control for underlying and unmeasured differences in socio-political confounders between jurisdictions. Given this paper's findings, the likely importance of culture or politics in assessing the impacts of such policies also deserves more attention.

Our study has several limitations. First, we were unable to control for possible underlying differences between drive-through and in-store customers in our current analyses. Despite an extensive search, we could find no data to indicate whether or not such differences exist. Our difference-in-differences design should help to reduce this possibility that our null findings were somehow driven by such differences. Second, we did not test the impact of calorie labels on beverage purchases because specific data on the size and type of fountain drink were not recorded for in-store purchases. This is most problematic regarding sugar-sweetened beverages where consumers might be able to more readily use the calorie information since there are ready low-calorie substitutes (such as water or diet sodas). Third, using receipt data, we cannot be sure of the number of persons for whom the purchased food is intended, as food may be purchased for one or more individuals (e.g., a family). It is possible that this varies in some systematic way between drive-through and in-store purchases. However, the average number of calories per purchase does not suggest that this is the case. At any given time of day, drive-through orders appear to have only 10–15% additional calories, not enough to be a meal for an additional person. Fourth, as discussed at length above, those using drive-through windows may have been exposed to the labels during a prior in-store purchase; however, even if this were true, they were not provided with calorie information at the point of drive-through purchase which is the intervention this paper evaluates. Finally, this study looks only at purchases in one state and at one fast-food chain. It is possible that results would be different elsewhere.

In the end, it is worth recalling that no prior study has shown dramatic impacts of labels on calories purchased in fast-food settings. This may not be surprising as research has repeatedly suggested that in choosing fast-food establishments, consumers are more focused on cost, convenience, and time than the foods' nutritional value (Rydell et al., 2008). This may, indeed, make the fast-food setting less suitable for calorie label use than chain sit-down restaurants (where they are also required by federal law) or supermarkets. Some studies suggest that consumers may respond to labeling on menus in sit-down settings while evidence on supermarket labels has been equivocal (An et al., 2021; VanEpps et al., 2016). Calorie counts, especially, given the wide array of choices on many fast-food menus, may be difficult to use in the fast-food setting. If the goal of this policy is to reduce calorie consumption, it may be time to examine other non-numeric options for nudging consumers to behavioral change. There is some evidence to suggest that other labeling approaches, such as color coding or warning labels, may be more impactful than numeric counts (Song et al., 2021). There are other promising approaches beyond labeling that are focused less on information and more on behaviorally or affectively oriented nudges to move consumers towards healthier options, including healthier defaults in combo meals or the presentation of more appealing descriptions or photos of healthier food choices (Cadario & Chandon, 2020).

Beyond the impacts of calorie labels on consumer choice, it also remains possible that they have had some influence on the industry's offerings in these settings and thus on calories purchased and consumed, for example through new menu offerings or through reformulation of existing items (Zlatevska et al., 2018). There is some emerging evidence to suggest that this might be so though most work in this area is of a simple pre-post or comparative nature (Bleich et al., 2015; Bruemmer et al., 2012; Grummon et al., 2021). Further, one may argue that the consumer has the right to this information, regardless of its relationship to food choices (Korthals, 2014).

5. Conclusions

Making use of California's policy that exempted drive-through boards from mandated calorie labels, we used a novel counterfactual to estimate the impacts of such labels at the point-of-purchase on food choice. Unlike other studies using cross-jurisdictional comparisons, both our treatment and comparison groups were exposed to the same media markets and policy debates. In contrast to prior studies showing small effects of labels, we find no meaningful impacts on calories purchased, suggesting that the display of numeric labels at the point of sale do not, themselves, have the desired impact. To better inform consumer choices, calorie information at the point of sale may need to be coupled with media and educational campaigns, as well as being presented in formats other than calorie counts that are better tailored to the customer experience and setting. Rather than having a single set of regulations covering all food settings, we may need to consider better ways to meet the needs of customers when they make choices at a sit-down restaurant, in-store fast-food counter, or drive-through window. Finally, policies that go beyond such nutritional information at the point of service, such as sugary beverage taxes or more nutritional "defaults" on combo meals, may have greater or added value.

CRediT authorship contribution statement

Beth C. Weitzman: Writing – original draft, Conceptualization. **Lloyd Heng:** Writing – original draft, Visualization, Validation, Methodology, Formal analysis. **Tod Mijanovich:** Writing – review & editing, Methodology, Conceptualization. **Courtney Abrams:** Writing – review & editing, Project administration. **Pasquale E. Rummo:** Writing – review & editing, Methodology, Conceptualization. **Marie A. Bragg:** Writing – review & editing, Conceptualization. **Erilia Wu:** Validation, Methodology, Data curation. **Emil Hafeez:** Writing – review & editing, Validation, Methodology, Data curation. **Omni Cassidy:** Writing – review & editing, Conceptualization. **Juan A. Echenique:** Writing – review & editing. **Brian Elbel:** Writing – review & editing, Supervision, Project administration, Methodology, Funding acquisition, Conceptualization.

Ethical statement

All procedures were performed in compliance with relevant laws and institutional guidelines and have been approved by the appropriate institutional committee(s). It is not human subjects research.

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Declaration of competing interest

None.

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Data availability

The authors do not have permission to share data.

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