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Despite the tremendous resources devoted to marketing on Facebook, little is known about its actual effect on customers. Specifically, can Facebook page likes affect offline customer behavior, and if so, how? To answer these questions, the authors conduct a field experiment on acquired Facebook page likes and find them to have a positive causal effect on offline customer behavior. Importantly, these likes are found to be most effective when the Facebook page is used as a platform for firm-initiated promotional communications. No effect of acquired page likes is found when customers interact organically with the firm's page, but a significant effect is found when the firm pays to boost its page posts and thus uses its Facebook page as a platform for paid advertising. These results demonstrate the value of likes beyond Facebook activity itself and highlight the conditions under which acquiring likes is most valuable for firms.

Keywords: Facebook, social media, online marketing, field experiment

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What Are Likes Worth? A Facebook Page Field Experiment

Firms are devoting increasingly larger portions of their marketing budgets to social media. According to a recent survey of CMOs, they expect to spend 10.7% of their budget on social media in the next year, and they expect that number to rise to 23.8% over the next five years (CMOsurvey.org 2015). Interacting with customers on Facebook is one of the most common forms of social media marketing. Indeed, 84% of *Fortune* 500 companies have a Facebook page (Barnes and Griswold 2016), and there are more than two billion connections between U.S. local businesses' Facebook pages and their customers (Facebook 2013).

Although tremendous resources are allocated to marketing through Facebook pages, firms struggle to understand and quantify the effect of this marketing on their customers' behavior outside of Facebook. This difficulty arises largely because there is a high degree of self-selection among Facebook page likers. As such, correlational approaches that simply compare the behavior of page likers with nonlikers tend to yield biased estimates that are difficult to correct statistically. Thus, there is a need for an experimental approach to measure the effect of page likes (Gordon et al. 2016).

To address this self-selection issue, we developed a simple experimental method that measures the effect of acquired Facebook page likes (i.e., page likes solicited by the firm) on customer behavior outside of Facebook. In collaboration with Discovery Vitality, an incentive-based health and wellness program, we invited a random subset of its customers to like their Facebook page. This manipulation created an exogenous shock to the liking process, which enabled us to measure a positive causal effect of an acquired like on offline customer behavior.

In addition to measuring the overall effect of acquired Facebook page likes on offline customer behavior, we explored the promotional mechanism through which page likes operate. This is an essential question for marketers because Facebook pages enable both customer-initiated social interactions and firm-initiated promotional communications. If one or the other promotional mechanism emerges as dominant in influencing customer behavior, firms can accordingly optimize resources. To investigate the promotional mechanism, we also conducted a quasi experiment that leveraged Facebook's

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content filter in order to manipulate how customers interacted with the Facebook page. During the first four months of the intervention (which we refer to as the "organic" period), customers had limited exposure to firm-initiated communications. Here, the page functioned mainly as a platform for customer-initiated social interactions (i.e., word of mouth). During the second part of the intervention (which we refer to as the "boosted" period), the firm paid Facebook to boost some of its posts. During that time, the page functioned mainly as a traditional advertising platform that enabled firm-initiated promotional communications. We found no effect of acquired likes on offline behavior during the (customer-driven) organic period but a significant effect during the (firm-driven) boosted period. This suggests that Facebook pages may be most effective when used as a traditional advertising platform for firm-initiated promotional communications rather than a platform for customer-initiated social interactions.

Our findings provide four unique contributions to the online marketing literature. First, we present a simple method that firms can use to measure the effect of acquired Facebook page likes on their customers' behavior. Second, we demonstrate that acquired Facebook page likes can positively affect offline customer behavior. Third, we isolate the promotional mechanism through which likes translate into behavioral change. Finally, we define some boundaries of this effect by exploring the customers' intervention response heterogeneity.

BACKGROUND AND LITERATURE

Although limited research has specifically focused on how Facebook page likes affect customer behavior, there has been extensive research on related online promotional activities. For example, Facebook pages can function as a platform that enables firm-initiated promotional communications, making them similar to paid online advertising platforms. Similar to running paid ads, firms can post promotional and informational content to the news feeds of customers who have liked their page. They can also pay to display these posts on the news feeds of customers who might not be reached organically.

Many studies have shown that paid online advertising influences customer behavior. Manchanda et al. (2006) find that exposure to online ads increases repeat purchasing. Lewis and Reiley (2009) randomize exposure to online ads and find that they lead to an increase in sales. These effects are moderated by numerous factors, such as ad exposure history (Braun and Moe 2013; Chatterjee, Hoffman, and Novak 2003; Manchanda et al. 2006), degree of customization (Joshi, Bagherjeiran, and Ratnaparkhi 2011; Lambrecht and Tucker 2013; Urban et al. 2014), ad obtrusiveness (Goldfarb and Tucker 2011), exposure time (Goldstein, McAfee, and Suri 2011), privacy control availability (Tucker 2014), and customers' purchase funnel stage (Hoban and Bucklin 2015).

Alternatively, Facebook pages can function as a platform that enables customer-initiated social interactions, which makes them similar to online word-of-mouth platforms. Customers can generate word of mouth by interacting with each other and the firm on the firm's Facebook page, as well as by commenting, liking, and sharing brand-related content (Berger and Schwartz 2011; Hennig-Thurau et al. 2004; Wojnicki and Godes 2008). Research has shown that online word of mouth affects customer choices on a variety of platforms, including forums (Godes and Mayzlin 2004; Stephen and Galak 2012), blogs (Dhar and Chang 2009; Onishi

and Manchanda 2012; Stephen and Galak 2012), social networks (Hennig-Thurau, Wiertz, and Feldhaus 2014; Rui, Liu, and Whinston 2013; Trusov, Bucklin, and Pauwels 2009), review sites (Archak, Ghose, and Ipeirotis 2011; Chevalier and Mayzlin 2006; Chintagunta, Gopinath, and Venkataraman 2010; Clemons, Gao, and Hitt 2006; Dellarocas, Zhang, and Awad 2007; Duan, Gu, and Whinston 2008; Liu 2006; Moe and Trusov 2011; Tirunillai and Tellis 2012; Zhu and Zhang 2010), and aggregate online sources (King, Racherla, and Bush 2014; Sonnier, McAlister, and Rutz 2011).

While Facebook pages share features with both online paid advertising and word-of-mouth platforms, they also differ in important ways. For example, unlike with online paid ads, customers must actively like a firm's Facebook page in order to receive its posts organically (i.e., without the firm paying). The posts themselves also encourage much more interaction than paid ads, such as commenting, liking, and sharing. Moreover, Facebook page posts typically have more varied content than paid ads and may not even be directly promotional. Likewise, Facebook pages differ from traditional online word-of-mouth platforms because the page content is largely under the firm's control, not the customers'. Firms post most content themselves, and they control how and when customers are able to interact with it. These key differences suggest that neither existing stream of research specifically answers the question of whether getting customers to like a firm's Facebook page influences their offline brand engagement, and if so, how.

One relevant exception that does examine the impact of Facebook on offline behavior is an ambitious field experiment by Bond et al. (2012) run in collaboration with Facebook. On Election Day, November 2, 2010, all 61 million Americans of voting age who logged in to Facebook were randomly assigned to one of three conditions: (1) users who were shown a message encouraging them to vote, along with the pictures of six friends who indicated that they had voted; (2) users who were shown the same message but without the social proof; and (3) a control group, who saw no message. The results show that users in the first condition were 2% more likely to vote than users in either of the other conditions. While this finding clearly suggests that Facebook activity influences offline behavior, it does not allow marketers to generalize the results to their own advertising experience. First, Facebook users did not opt in to see this message; it was presented to all American adults who logged in to Facebook that day. This intervention does not capture the effect of actively choosing to like and follow a specific firm's Facebook page. Second, the message appeared and remained at the top of users' news feeds for the entire day, a feature that is exclusively available to Facebook itself. Finally, even under those extraordinary circumstances, the results were mixed. While the encouragement message with social proof influenced voting behavior relative to the no-message control group, the encouragement-only message without the social cue did not. Therefore, open questions remain about whether and how acquiring Facebook page likes translates into changes in offline customer behavior. We explore these questions in the following field experiment.

METHOD

Discovery Vitality Program

We ran this experiment in collaboration with Discovery Vitality, a large-scale and long-running incentive-based

wellness program that is a branch of Discovery Health, a large private health insurer in South Africa (for a full description of the program, see https://www.discovery.co.za/portal/individual/vitality). The program's structure shares some similarities with other common loyalty programs, such as frequent flier miles. Vitality customers earn points for healthy behaviors such as exercising, purchasing healthy groceries, receiving vaccinations, and engaging in other preventive health activities. An accumulation of points leads to higher status levels, which, in turn, lead to greater benefits and rewards. Importantly, the points are not based on self-reported activity but, rather, on real behaviors tracked by the firm (e.g., healthy grocery purchases are tracked through supermarket scanner panel data). Examples of points-earning activities, status categories, and rewards available at each status level are included in Web Appendix A. Discovery Vitality is a branch of the Vitality group, which is the world's largest incentive-based wellness program.

Discovery Vitality Facebook Page

At the study's inception, Discovery Vitality had a Facebook page (https://www.facebook.com/discoveryvitality) with approximately 100,000 likes. The purpose of this page was to create a community around the Vitality program to promote healthy behaviors and increase engagement and loyalty to Vitality and its parent company, Discovery Health. The page typically posted one or two items per day, with a mix of links, images, and status updates designed to engage Vitality customers and promote program-related activities (for examples, see Web Appendix B).

Sample

Vitality sent an e-mail invitation to participate in the study to all new customers who had joined between January 1, 2013, and June 30, 2013, and who had an active e-mail address (N = 71,663). The June 30 cutoff ensured at least six months of preintervention data for all customers in the study. We focused exclusively on new Vitality customers because they were less likely to have already liked the Vitality Facebook page—a key screening criterion.

Survey Invitation and Screening

On February 18, 2014, the entire sample was sent an e-mail with an invitation to complete an online survey about the relationship between Facebook and health behavior (the survey link was included in the e-mail; for the full text, see Web Appendix C). Customers who did not click on the survey link received reminders on February 20 and February 25. Those two reminder e-mails contained the survey close date (March 1). A total of 7,470 customers consented to participate in the study and completed the survey (10.4% response rate).

The online survey began with a brief consent form asking customers to agree to participate in a study that examined the relationship between Facebook and health behaviors. They were then presented with two screening questions. Customers were first asked whether they had a Facebook account. Those who did not (1,380 customers; 18.5% of survey completers) were thanked and screened out. The remaining customers were next asked whether they had already liked the Vitality Facebook page. Those who had (2,036 customers; 27.3% of survey completers) were allowed to complete the survey but were excluded from the subsequent Facebook page like

randomization scheme (described next). Thus, our analyses exclusively focus on the value of acquired (i.e., firm-solicited) Facebook page likes. Although these screening criteria have some implications for the generalizability of the results to all Facebook users (a point we return to in the general discussion), the randomization occurred after the screening questions and ensured that these exclusions added no endogeneity to the design (for graphical representation of the experimental timeline and survey flow, see Figure 1).

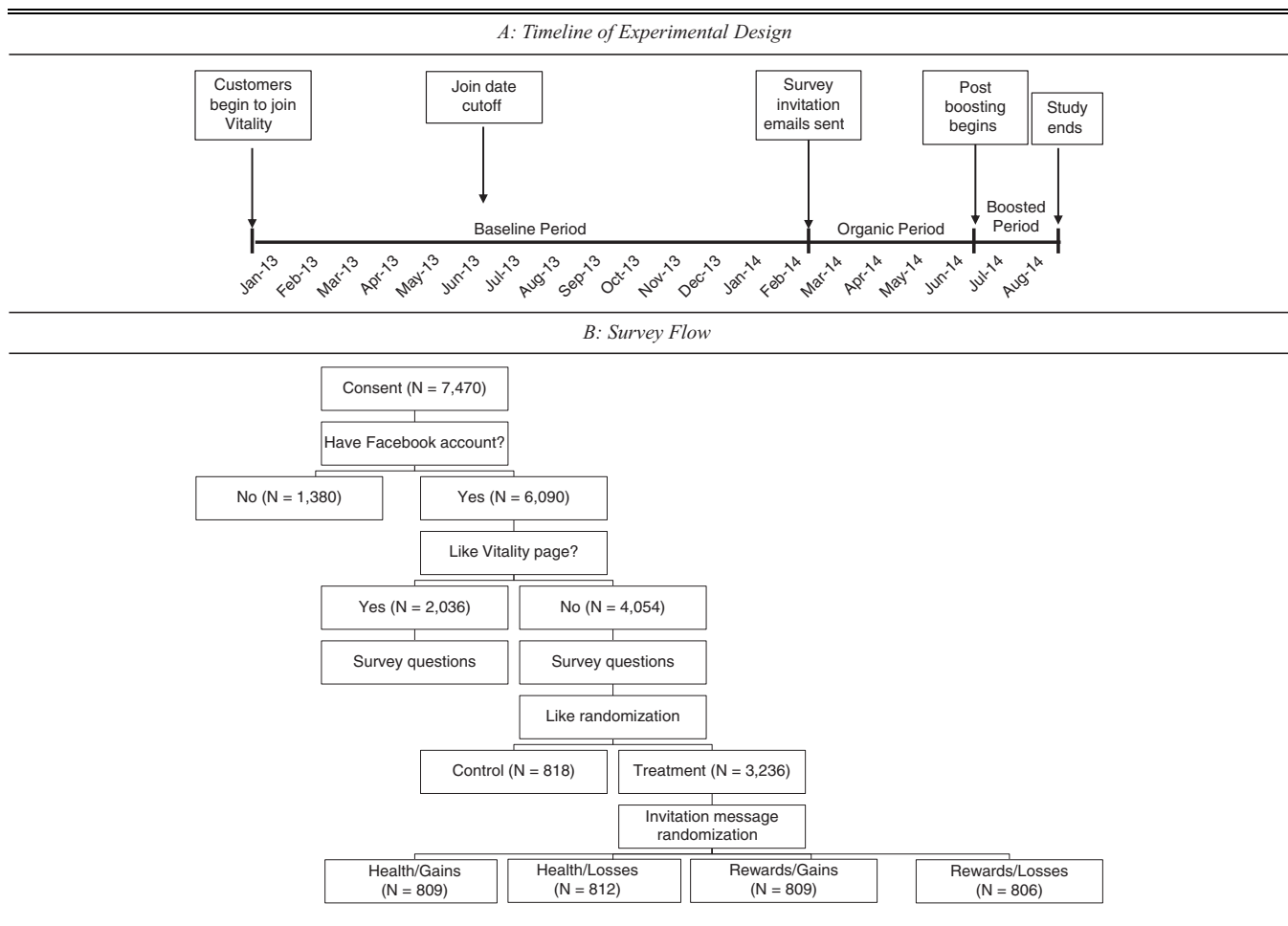### Experimental Intervention on Page Likes

After the initial screening, customers were asked a series of questions about their Facebook usage, Vitality program involvement, and overall health (for the full list of questions, see Web Appendix D). Next, the 4,054 customers who had not already liked the Vitality Facebook page were randomly assigned to either the treatment or the control condition. Customers in the treatment condition were invited to like the Vitality Facebook page. Customers in the control condition were not invited to like the Vitality Facebook page; their survey ended after they completed the initial questions about their overall Facebook usage and Vitality program participation. We oversampled customers in the treatment condition because we did not know, a priori, the response rate to our invitation to like the Vitality Facebook page.

Invitation Message Framing Manipulation

Given the large sample size of the treatment group, we also tested the most effective way to acquire likes by experimentally manipulating the framing of the invitation message itself with a 2 × 2 between-subjects design. The first message factor manipulated the way the value of the Facebook page was framed. For half of the customers, the invitation focused on improving health. For the other half, the invitation focused on the rewards that could be obtained through the Vitality program. The second message factor manipulated whether the value of liking the Facebook page was framed in terms of gains or avoiding losses (for the exact invitation wording in each of the four conditions, see Web Appendix D). These manipulations were not central to the primary research questions about Facebook activity and offline customer behavior; they merely represented the increasingly common A/B testing that firms are encouraged to implement when determining which message maximizes customer response (e.g., Gordon et al. 2016).

Customers in the treatment condition who responded "yes" to the invitation to like the page were automatically forwarded to Vitality's Facebook page to do so. Those who responded "no" were thanked and taken to the end of the survey. After the initial random assignment to treatment or control conditions, there was no further study-related contact between Vitality and the participants. That is, customers who liked the page were exposed to and interacted with Vitality's content whenever they logged in to Facebook exactly as they would with any liked page's content. Per normal business operations, all customers' activity in the Vitality program was recorded for the following six months; this is the data set we used to examine the effect of acquired Facebook page likes on offline brand engagement. Because we experimentally manipulated customers' propensity to like the page, the comparison between the two experimentally assigned groups provides a clean test of the causal effect of acquired likes with no endogeneity concerns (Hollis and Campbell 1999).

Figure 1
INSERT TITLE

A: Timeline of Experimental Design

Customers begin to join Vitality	Join date cutoff	Survey invitation emails sent	Post boosting begins	Study ends

Baseline Period   Organic Period   Boosted Period

Jan-13 Feb-13 Mar-13 Apr-13 May-13 Jun-13 Jul-13 Aug-13 Sep-13 Oct-13 Nov-13 Dec-13 Jan-14 Feb-14 Mar-14 Apr-14 May-14 Jun-14 Jul-14 Aug-14

B: Survey Flow

Consent (N = 7,470)

Have Facebook account?

No (N = 1,380)   Yes (N = 6,090)

Like Vitality page?

Yes (N = 2,036)   No (N = 4,054)

Survey questions   Survey questions

Like randomization

Control (N = 818)   Treatment (N = 3,236)

Invitation message randomization

Health/Gains (N = 809)	Health/Losses (N = 812)	Rewards/Gains (N = 809)	Rewards/Losses (N = 806)

Promotional Mechanism Quasi Experiment

We examined whether Facebook pages were most effective when used as a platform that enables firm-initiated promotional communications versus a platform that enables customer-initiated social interactions by conducting a quasi experiment that leveraged the Facebook content filter. Facebook uses an algorithm to filter what content appears organically on each user's news feed; otherwise, a typical user would be exposed to an average of 1,500 posts daily. The algorithm takes into account factors such as the user's interest in a particular creator's content, the type of post, and the post's recency (Constine 2014). As a consequence of this filter, the organic reach of Facebook page posts has been declining (Facebook 2014a) such that a typical post reaches only around 6% (2% for large pages) of a firm's page followers (Manson 2014). Facebook allows firms to overcome this filter by paying to boost their posts (i.e., paying to reach page followers who would not have seen the post organically). Boosted posts can be targeted to Facebook users according to many criteria, such as demographics and interests. Moreover, posts can be targeted using the "Custom Audiences" tool, which allows firms to reach specific sets of customers according to their personal information, such as e-mail addresses (Facebook 2014b).

To distinguish between the two likely promotional mechanisms (firm-initiated promotional communications vs. customer-initiated social interactions), customers were limited to interacting organically with the Facebook page during the first four months after the intervention. In other words, there were no boosted posts during this time period. During the last two months of the study, however, Vitality paid to boost two posts per week. These were specifically targeted (via Custom Audiences) at customers in the treatment condition who had liked the page. Vitality's social media team determined which posts were boosted, and they generally boosted informative posts that focused on how to get more points in their program.

We predicted that if the Facebook page influenced behavior by providing a platform for customer-initiated social interactions, then we would observe effects on offline customer behavior (i.e., earning Vitality points) during the organic period. This period was when customers could use the page as a platform for word of mouth but were unlikely to be exposed to the firm's messages because of the Facebook content filter. Moreover, the organic period captures other potential social effects, such as the effect of liking the page itself and therefore signaling brand loyalty to one's friends. If, however, the Facebook page influenced behavior through more traditional advertising channels, such as by exposing

customers to firm-initiated promotions and information (e.g., Butters 1977; Grossman and Shapiro 1984; Kihlstrom and Riordan 1984; Nelson 1974), then we would observe no effects during the organic period but would observe an increase in offline activity during the boosted period (i.e., when Vitality paid to overcome the filter).

Data

Our analyses report data obtained from three sources: (1) customers' responses to the invitation survey, (2) aggregate Facebook activity data on the Vitality page recorded by Facebook Insights, and (3) points activity in the Vitality program (discussed next). Vitality logs each points-earning activity by each customer in its program. For each activity, the data include completion date, category and subcategory, status level of the household (at the time the activity was recorded), and number of points accrued. We obtained all points activity for each customer who completed our survey, beginning on the date they joined the Vitality program and ending six months after the random assignment to the experimental conditions. Customer points accumulation activity was the dependent variable we used to test for the effect of acquired Facebook page likes on offline behavior. Such points accumulation confers two key benefits to Discovery Vitality that make high points earners especially valuable to the firm. First, customers improve their health by engaging in points activities, which ostensibly lowers the firm's health care costs. Second, loyalty increases as customers move up in status levels because they receive more rewards and incur greater switching costs in moving to another health insurance provider, since switching would entail forfeiting hard-earned benefits. Table A1 in Web Appendix E provides basic descriptive statistics for the sample.
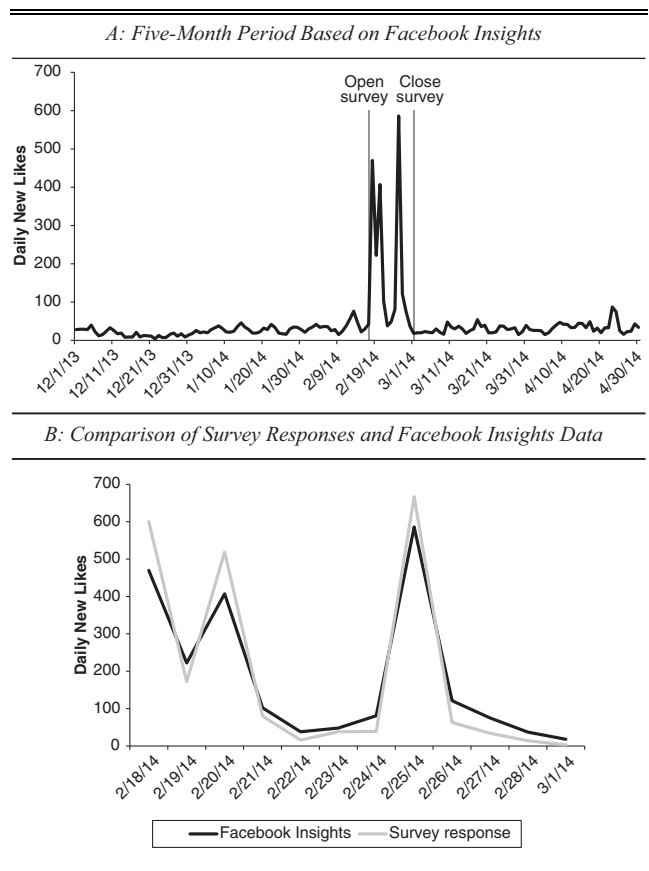
RESULTS

Facebook Page Like Invitation

We first examined customers' propensity to accept the invitation to like Vitality's Facebook page, as well as the factors that influenced their choice. Of the 3,236 customers randomly assigned to the treatment condition, 2,245 (69%) agreed to like Vitality's Facebook page and were forwarded to the page to do so. To address the potential concern that customers might have indicated that they would like Vitality's Facebook page in the survey but then might not have actually followed through, we examined the Facebook Insights data. Although we could not match individual survey responses to individual page likes, we could determine whether the overall survey response intentions corresponded to real Vitality Facebook page likes as measured by Facebook Insights.

Figure 2, Panel A, shows the number of new daily likes for Vitality's Facebook page from December 1, 2013 (two and a half months before launching the survey), through April 30, 2014 (two and a half months after lunching the survey). Clearly, there was a marked spike in likes during the survey period when the treatment group customers were invited to like the page. Indeed, the average number of daily likes was significantly higher during the 12 days that our survey was open (M = 183.8, SD = 194.6) than when it was closed (M = 28.1, SD = 13.0; t(149) = 9.5, $p < .001$).

As another measure of the effect of intentions to like on actual likes, we plotted the daily number of customers who responded in the survey that they would like the page and the

Figure 2

NUMBER OF DAILY NEW LIKES FOR THE VITALITY FACEBOOK PAGE

A: Five-Month Period Based on Facebook Insights

B: Comparison of Survey Responses and Facebook Insights Data

number of actual likes on each day according to Facebook Insights. Figure 2, Panel B, shows that these two measures are almost perfectly related (r = .99, $p < .001$). Moreover, the three notable spikes in the figure correspond to the day the initial invitation e-mail was sent and the two days when reminder emails were sent. Therefore, we have high confidence that the majority of customers who agreed to like the Facebook page in the survey actually went on to like the page.

An implication of this result is that active customers may be willing to like a firm's Facebook page if simply prompted to do so. This is an important finding for two reasons. First, although some customers find their own way to a firm's Facebook page, the relative ease of acquiring likes among those who have not done so illuminates a worthwhile path for marketing managers. Second, the statistical power of the subsequent analyses examining the effect of an acquired page like depends on customers' propensity to like the page. If relatively few customers assigned to the treatment condition actually accepted the invitation to like the page, the statistical power would be low because most of the customers assigned to the treatment group would be effectively untreated. The fact that such a relatively high percentage of Vitality's customers agreed to like the page in response to a simple request suggests that our method is viable for both initially acquiring Facebook likes and later measuring their impact on customer behavior.

Table 1

PREDICTORS OF ACCEPTING THE INVITATION TO LIKE VITALITY'S FACEBOOK PAGE

	Survey Controls (Model 1)	Demographic and Survey Controls (Model 2)	Invitation Manipulation (Model 3)	Invitation Manipulation with Demographic and Survey Controls (Model 4)
Vitality involvement	.06** (.02)	.07*** (.02)		.07*** (.02)
Self-rated health	−.09*** (.03)	−.09*** (.03)		−.09*** (.03)
Facebook activity	.33*** (.03)	.34*** (.03)		.34*** (.03)
Gender (male)		−.19** (.08)		−.19** (.08)
Age		.01** (.004)		.01** (.004)
Rewards focus			.54*** (.11)	.54*** (.11)
Gains focus			.27** (.11)	.25** (.11)
Rewards × Gains			−.46*** (.15)	−.43*** (.16)
Constant	−.58*** (.24)	−.74*** (.23)	.53*** (.07)	−1.02*** (.24)
Observations	3,236	3,236	3,236	3,236
Log-likelihood	−1,897.8	−1,891.6	−1,980.5	−1,879.5

**p < .05.
***p < .01.
Notes: Dependent variable is a positive response to the invitation to like the Facebook page. Binary logistic regression coefficients are shown. Standard errors are included in parentheses. We tested the robustness of the interaction effects to Ai and Norton (2003). The interaction effect was significant in both models. Model 3: $\beta = -.10$, SE = .03, Z = −3.03; Model 4: $\beta = -.09$, SE = .03, Z = −2.71.

We next conducted a logistic regression to examine the customers' survey responses as predictors of the propensity to like the Facebook page. The first column of Table 1 shows the effects of customers' self-rated involvement with Vitality, perceptions of their own health, and a six-item composite measure of their Facebook activity (Cronbach's $\alpha = .88$). Customers who were more active on Facebook and who were more involved with Vitality were more likely to accept the invitation to like the page. Self-rated health was a negative predictor. This suggested that the Facebook page had particular appeal to customers who potentially benefited the most from the information shared on the page. The second column of Table 1 adds gender and age as controls, which did not affect the previous measured predictors' estimates.

Finally, we examined the effect of the invitation's message framing. As shown in the third and fourth columns of Table 1, customers were more likely to accept the invitation when it focused on Vitality program rewards rather than on health benefits per se. In addition, customers were more likely to accept the invitation when it was framed in terms of gains rather than losses. However, there was a significant interaction between these two factors. As Table 2 shows, the rewards focus was more effective when framed in terms of losses (Kahneman and Tversky 1979), but the health benefits focus was more effective when framed in terms of gains (for the demographic predictors of liking the page split by invitation condition, see Table A2 in Web Appendix E). Although we had no strong theoretical predictions about the invitation framing manipulations, the results illustrate how sensitive the liking process is to small descriptive changes to the invitation. Consistent with previous research, these results highlight at least two factors that firms can (and should, if sample size permits), manipulate through A/B testing to determine or increase their customers' propensity to like their Facebook page.

The Effect of Page Likes on Customer Behavior

Our primary analyses examined the effect of acquired Facebook page likes on offline customer behavior. We split the six months following the like invitation manipulation into the organic (first four months) and boosted (last two months) periods. Examining customers' behavior during the organic period allowed us to test the Facebook page's potential as a platform for customer-initiated social interactions. Likewise, examining customers' behavior during the boosted period allowed us to test whether the page affected behavior when it served as a platform for firm-initiated promotional communications.

All of our statistical tests were run on log-transformed data because the points data were highly skewed. Figure 3 shows the mean total log points accumulated by condition and time period (normalized by number of months in each time period to make them directly comparable). We formally tested the effect of liking the Facebook page on points activity by estimating its local average treatment effect.[1] Specifically, we estimated a linear difference-in-differences regression model with effects for accepting the invitation to like the Facebook page (yes vs. no), time period (baseline vs. organic postintervention vs. boosted postintervention) and the critical interaction between these variables, with experimental condition as the instrumental variable for the decision to like the page (Angrist and Krueger 2001) and robust clustered errors to account for the repeated measures (Bertrand, Duflo, and Mullainathan 2004).[2]

The estimates in the "No Controls" column of Table 3 show no effect of liking the page during the organic period (like page × organic period) but a significant effect of liking the page during the boosted period (like page × boosted period). There were also significant main effects of time period, which were driven by seasonality inherent in the Vitality program (e.g., many customers begin the calendar year trying to be healthy but participate less later on). The random assignment ensured that

[1]This is also commonly referred to as the average treatment on the treated effect.

[2]Table A3 in Web Appendix E provides the corresponding average treatment effect (intention-to-treat) model, comparing the effect of the experimentally assigned groups, independent of whether they accepted the invitation to like the page.

Table 2

PERCENTAGE OF CUSTOMERS WHO ACCEPTED THE
FACEBOOK LIKE INVITATION, BY CONDITION

	Health Focus	*Rewards Focus*
Gains frame	69.1%	70.8%
Losses frame	63.1%	74.6%

this seasonality affected both groups equally, and thus it did not reflect a design confound. For robustness purposes, we estimated this model with additional survey response controls (second column of Table 3), survey and demographic controls (third column of Table 3), and customer-level fixed effects, which control for any preexisting differences across the customers (fourth column of Table 3). None of these controls affected the key regression estimates.

On the basis of these analyses, we estimated an increase of 43.91 points per month as a consequence of a Facebook like during the boosted period. For comparison, the median customer accumulated 469 points per month during the boosted period (see Table A1 in Web Appendix E). While an approximately 8% increase in points may seem modest, it is important to remember that Vitality boosted only two posts per week (out of the roughly 14 weekly posts). It may be that the effect of liking would have been larger if the firm had paid to boost more posts. Moreover, the preceding estimate conservatively included all customers in the sample, including 391 customers who logged zero activity during roughly the year and a half of data collected. Conditional on a customer having nonzero activity during that time frame, we found that the effect of page likes during the boosted period translated into an estimated 72.91 points per month (relative to a median of 675 total monthly points for this subsample).

Figure 3

MEAN LOG MONTHLY POINTS BY PERIOD AND EXPERIMENTAL
CONDITION
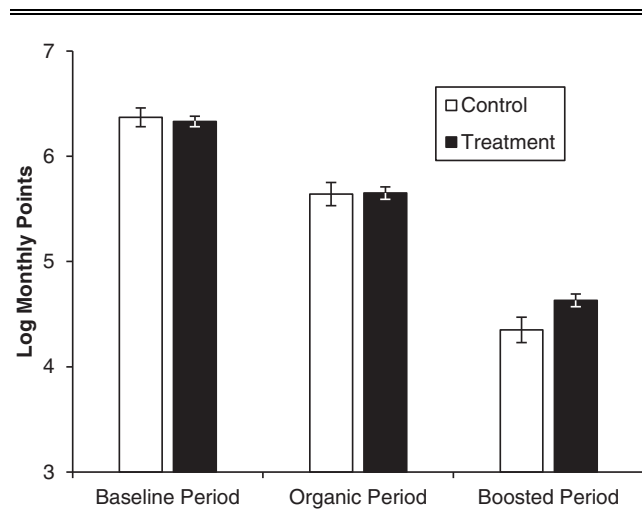
Notes: Error bars show standard errors.

These results have important implications for understanding the value of Facebook page likes. First, they demonstrate that acquired likes can translate into offline behavioral change. To our knowledge, this is the first causal demonstration of the effect of Facebook page liking on customer behavior—and, specifically, effortful behaviors that take place not only outside of Facebook but completely offline. In addition, the results provide valuable insight into the promotional mechanism through which acquired Facebook page likes influence behavior. Specifically, these results suggest that Facebook pages are most effective when used as a platform for firm-initiated promotional communications, that is, as a form of traditional advertising rather than as a platform for social interactions.

One potential concern with our study was that there might have been social effects of the Facebook like during the organic postintervention period that were difficult to detect because they occurred immediately after customers liked the page but did not persist for the full four months of the organic period. For instance, immediately after liking the page, customers might have had higher loyalty due to the act of liking itself; or, having just liked the page, customers might have engaged in brand-relevant word of mouth that did not persist for four months. To test the possibility of a short-lived organic period effect, we split the organic period into two parts on which we conducted separate analyses: "early organic" (the first two months) and "late organic" (the second two months). The results are presented in Table A4 of Web Appendix E. We found no effect of page liking during the early organic period or during the late organic period. This suggests that it is unlikely the overall null effect in the organic period was driven by an overly lengthy time frame.

Next, although experimental condition was randomly assigned, the organic vs. boosted period comparison was based on a quasi experiment. This raised some concerns that these time periods were confounded with the time of the year. Our fixed-effects difference-in-differences model controlled for many potential confounds in this comparison, including seasonality, which affected the treatment and control groups equally. As such, random assignment ensured that the only difference between these two groups was whether or not they were invited to like the Vitality Facebook page. Of course, the one factor that this model could not control for was whether Vitality's Facebook page happened to become more effective during the boosted period, for reasons independent of the boosting itself. For example, it may have been that Vitality happened to have particularly engaging conversations, events, or content on its page during that period. We attempted to rule out this possibility by examining the data of "existing likers" (i.e., those who indicated in the invitation survey that they had already liked the Vitality Facebook page and were consequently excluded from the page like randomization and the subsequent boosting intervention). If Vitality's Facebook page was particularly engaging during the boosted months, then we would expect to see an analogous increase in activity for the existing likers, who had liked the Vitality page but were not exposed to the boosting intervention. If, however, the effect was driven by the boosted posts, the existing likers would show no positive effect during this period. Table A5 in Web Appendix E shows the results

Table 3

CUSTOMERS WHO LIKED THE PAGE ACCUMULATED MORE POINTS DURING THE BOOSTED PERIOD

	No Controls		Demographic Controls		Demographic and Survey Controls		Fixed Effects	
Like page × Organic period	.08	(.17)	.08	(.17)	.08	(.17)	.08	(.17)
Like page × Boosted period	.46**	(.19)	.46**	(.19)	.46**	(.19)	.46***	(.17)
Like page	−.06	(.14)	−.06	(.14)	−.23*	(.13)		
Organic postintervention period	−.74***	(.11)	−.74***	(.11)	−.74***	(.11)	−.74***	(.11)
Boosted postintervention period	−2.02***	(.12)	−2.02***	(.12)	−2.02***	(.12)	−2.02***	(.11)
Gender (male)			−.11	(.09)	−.29***	(.08)		
Age			.001	(.004)	.01**	(.004)		
Vitality involvement					.65***	(.02)		
Self-rated health					.06**	(.03)		
Facebook activity					−.10***	(.03)		
Constant	6.37***	(.09)	6.37***	(.16)	4.13***	(.22)	6.34***	(.03)
Fixed effects	No		No		No		Yes	
Observations	12,162		12,162		12,162		12,162	
Clusters	4,054		4,054		4,054		4,054	
R^2	.05		.05		.20		.05	

*$p < .1$.
**$p < .05$.
***$p < .01$.

Notes: Dependent variable is the log monthly number of points accumulated in the Vitality program in each period. Robust standard errors (included in parentheses) are clustered at the customer level. Treatment condition and demographic controls are collinear with the fixed effects and are dropped from the final specification. Experimental condition is used as the instrumental variable for liking the page.

of the difference-in-differences model that includes the existing likers. This group showed no effect of Facebook liking during the boosted period. This further suggests that the increase in customer activity among the new likers was specifically due to the paid boosting intervention and not some other event that just happened to occur during the boosted period.

Heterogeneity in the Effect of a Like

The preceding analyses provided a general estimate of the manipulation's effect on offline behavior. However, we were also interested in how acquiring Facebook likes affected different segments of the Vitality population. More specifically, we examined the heterogeneity of the liking effect by testing three potential moderators: customers' self-reported ratings of their involvement with Vitality, the type of points (i.e., activity) being earned in the program, and the self-reported composite measure of Facebook activity. These results were obtained through exploratory post hoc analyses and should be interpreted with caution.

Table 4 presents the regression analyses reported previously, median-split by low versus high self-rated Vitality involvement. We found a large effect of page liking during the boosted period for low-involvement customers but no effect for the highly involved. That is, Facebook likes were especially effective at engaging customers who reported being relatively apathetic toward the Vitality program. Indeed, when we examined the percentage of customers who had some (nonzero) activity during the boosted period, we found that 63.3% of customers in the control condition were active during this period, while 66.7% of customers in the treatment condition were active during this period ($\chi_{(1)} = 3.29$, $p = .07$). Thus, another way to quantify the effect of Facebook page likes is to say that they increased the percentage of Vitality customers who were active by 3.4 percentage points.

We believe that the reason why the information shared on Vitality's Facebook page mainly affected low-involvement customers is that Facebook posts are typically targeted at a broad audience. Therefore, they contained general brand information, which highly involved customers were likely to already know but that low-involvement customers were not. Such results would be consistent with some of the existing literature on online advertising. Although that literature has not directly examined the effect of brand loyalty on the effect online advertising, it has examined the moderating role of prior interactions with a firm's website. For example, Chatterjee, Hoffman, and Novak (2003) find that display ads were more effective on new and less frequent visitors, which is consistent with our findings. Hoban and Bucklin (2015) also find that display ads were effective at creating awareness among customers who had not previously visited the firm's website. However, they also find that ads could be effective as reminders for customers who had previously created an account.

Importantly, we note that the involvement of our "low-involvement" group was only low relative to that of the other customers in this study. Indeed, these customers were involved enough to complete an invited survey and go on to like the firm's Facebook page. Perhaps a fairer characterization of this analysis is that the effect was strongest among the moderately involved or those who had previously not engaged much with the brand but who had an interest in doing so.

We next examined the types of activities the customers engaged in as a consequence of liking Vitality's Facebook page. First, we sorted the points-earning activities into "health" and "lifestyle" categories. Health activities were defined as those exclusively related to health care, which are usually performed infrequently (once or twice annually) by a health care provider (e.g., having one's cholesterol checked, getting a flu shot). Lifestyle activities were those that had a health/wellness component to them but were not exclusively related to health care (e.g., purchasing healthy groceries, going to the gym). As such, these activities were relatively frequent. Table A6 in Web Appendix E provides descriptive statistics for each of these categories.

Table 4

THE EFFECT OF A LIKE WAS MAINLY OBSERVED AMONG LOW–VITALITY INVOLVEMENT CUSTOMERS, HEALTH CARE
POINT–EARNING ACTIVITIES, AND LOW–FACEBOOK ACTIVITY CUSTOMERS

	Low Vitality Involvement	High Vitality Involvement	Health Care Points	Lifestyle Points	Low Facebook Activity	High Facebook Activity
Like page × Organic period	−.06 (.29)	.17 (.20)	.20 (.22)	−.16 (.14)	.47* (.26)	−.26 (.23)
Like page × Boosted period	.84*** (.29)	.01 (.20)	.47** (.22)	.01 (.14)	.80*** (.26)	.15 (.23)
Organic postintervention period	−.90*** (.17)	−.56*** (.13)	−1.75*** (.14)	.11 (.09)	−.93*** (.15)	−.51*** (.16)
Boosted postintervention period	−2.53*** (.17)	−1.48*** (.13)	−3.46*** (.14)	−.63*** (.09)	−2.19*** (.15)	−1.83*** (.16)
Constant	5.40*** (.05)	7.19*** (.04)	5.58*** (.04)	4.30*** (.03)	6.43*** (.05)	6.24*** (.05)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,787	6,375	12,162	12,162	6,276	5,886
Clusters	1,929	2,125	4,054	4,054	2,092	1,962
R^2	.06	.06	.13	.01	.05	.05

*$p < .1$.
**$p < .05$.
***$p < .01$.

Notes: Dependent variable is the log monthly number of points accumulated in the Vitality program in each period. Vitality involvement and Facebook activity levels are determined by a median split of their ratings for each of these measures on the initial survey. Health care points are earned by completing activities whose only purpose is health, whereas lifestyle points include points-earning activities whereby health is an additional benefit. Experimental condition is used as the instrumental variable for liking the page. Robust standard errors (included in parentheses) are clustered at the customer level.

The "Health Care Points" and "Lifestyle Points" columns of Table 4 show the regression analyses for both the health and lifestyle activity categories. Facebook likes affected the health but not the lifestyle activities. This is consistent with the previous findings and further suggests that the Facebook page provided general information and created awareness about some of the program features that less active customers were unlikely to know. So although most customers knew of Vitality's gym and healthy food benefits, some were less aware of other health-related activities that could earn points in the Vitality program.

The final variable we examined was the composite of self-rated Facebook activity to determine whether customers who were most active on Facebook showed a larger or smaller effect than their less active counterparts. On the one hand, there may have been more opportunities to expose heavy users to brand content. On the other hand, heavy Facebook users could have shown a smaller effect because they had more cluttered news feeds and were better able to ignore content than less experienced/active users. As before, the "low Facebook activity" variable should be considered low relative to that of the other customers in the study. These customers were still active enough on Facebook to have an account and like Vitality's Facebook page.

The rightmost two columns of Table 4 show the analyses median-split into low and high levels of Facebook activity. We found that most of the effect during the boosted period was being driven by customers who were relatively less active on Facebook. This suggests that clutter on the news feed of customers who are highly active on Facebook could be an impediment to the effect of likes, even when the firm pays to boost posts. It is also noteworthy that there was no effect of page liking among the highly active customers, who reported being most likely to create and participate in online word of mouth and social interactions through comments and liking. Taken together, these results further suggest that Facebook pages are most effective when used as a platform for firm-initiated communications rather than for customer-initiated social interactions.

GENERAL DISCUSSION

Facebook is at the forefront of firms' higher spending on social media marketing (CMOsurvey.org 2015). Although this is not surprising, given the social reach and power of the social media giant, firms actually know very little about the value of interacting with customers through Facebook. This knowledge gap includes a need to identify the promotional mechanism by which Facebook activity affects offline customer behavior. Our results provide some crucial insight into the value of acquiring Facebook page likes and sharing brand content on a firm's Facebook page—a now ubiquitous practice in social media marketing. In short, we make four distinct contributions to the marketing literature. First, we present a simple method that any firm can use to measure the effect of acquired Facebook page likes on offline customer behavior. Second, we demonstrate a causal effect of acquired Facebook page likes on real and effortful offline behavior. Third, we find that Facebook pages are most effective when used as a platform for firm-initiated promotional communications. Finally, we find that Facebook pages are most effective for customers with relatively low activity on Facebook and low involvement with the firm.

A key objective of this research was to develop a simple method that any firm could use to measure the value of an acquired like for its own Facebook page. We demonstrate how firms can randomize an existing database of customers into like conditions, and we show that the response rate to our invitation was sufficiently high to make this a viable method. This simple procedure overcomes the endogeneity inherent in page likes, which has been the main challenge associated with measuring their value. Additionally, this method easily adapts to testing the value of other forms of social media, not just Facebook. For example, a firm could just as easily invite a random subset of its customers to follow it on Twitter or Instagram and use this methodology to measure the effect on offline behavior.

Although our methodology is easily applied as is, it can be even further simplified in practice. First, a survey is not

necessary, and a firm could simply send e-mail invitations to a random subset of customers asking them to like the firm's Facebook page. Eliminating the survey might increase the response rate for page likes, but it could come at the cost of getting less information about customers. In addition, the request to like a page does not have to come through e-mail. For example, a small business could ask a random subset of their customers in person to like their Facebook page. In short, all that our method requires is a database of customers and the ability to invite a random subset of them. Finally, although we did not do so here, companies could offer customers in the treatment condition incentives to like their Facebook page, which would further increase response rates and, consequently, the statistical power to estimate the effects. Of course, incentives may also affect the response after the like occurs, so future research should also examine how offering rewards for Facebook engagement affects interactions with the firm.

A key feature of our methodology is that it allows us to measure a causal effect of Facebook page likes on offline customer behavior. This is important because firms generally struggle to know whether or how much Facebook activity is affecting their customers when they are not on Facebook, which has led many marketers to question Facebook's value in their marketing mix (Clinch 2013; Dekel 2013). Nonetheless, our results show that Facebook activity can have a positive effect on offline customer behavior, and they can provide some reassurance to firms who devote resources to marketing through Facebook pages.

In addition, our results suggest that Facebook pages are most effective when used as a platform for firm-initiated promotional communications. We found no effect of page likes on subsequent behavior when the Facebook page acted as a platform for customer-initiated social interactions. So although Facebook is often hailed as a new form of marketing (e.g., Li, Bernoff, and Groot 2011), the mere act of liking the page, joining the brand community, and being able to participate in the online word-of-mouth discussions did not appear to influence offline behavior in our study. Rather, Facebook was most effective when Vitality paid to reach (and interrupt) customers with firm-relevant information.

To better understand the boundaries of the effect of acquired likes, we also examined the heterogeneity in the responses to the invitation. Page likes mainly affected customers with relatively low levels of Vitality involvement because the posts contained broadly targeted information that the most loyal and engaged customers were already likely to be familiar with. Indeed, most of the observed effect was driven by engagement with less common health activities, which the low-involvement customers were ostensibly unaware were part of the Vitality program. The effect of acquired page likes was also moderated by Facebook activity levels, with the strongest effect for the customers least active on Facebook. This suggests the possibility that news feed clutter has become a real impediment to reaching customers: those who spent more time on Facebook, and also tended to like more pages, showed little to no effect of liking the firm's page. This was true even when posts were boosted, which should be factored into budget considerations when estimating the cost to reach customers on Facebook.

Although identifying the factors that influence customers' willingness to like the Facebook page itself was not the central research question, we nonetheless examined some predictors

of this behavior. First, we find that 69% of active customers with a Facebook account who were invited to like the firm's page did so. This suggests that Facebook page likes are easily acquired, and firms should not assume that customers who have not previously liked their page are not interested in engaging with them on Facebook. A simple invitation is likely to yield desirable results. Of course, the actual response rate to the liking invitation will likely vary by firm.

Finally, we show that small changes in the framing of this request makes a big difference in terms of acquiring page likes. Customers were most responsive to invitations that focused on financial rewards from liking the page, versus identifying with Vitality's health community values. This finding was consistent with common marketplace behavior whereby firms offer discounts or free samples as an incentive for customers to like their brand's Facebook page. Interestingly, we found that the rewards-based focus effect was amplified by framing the page like as a way to avoid missed opportunities. This demonstrated that simple framing manipulations are easily implemented and can improve invitation response rates. More broadly, these results highlight the ease and importance of conducting A/B and multivariate tests to maximize customer response to firm-initiated promotions.

Limitations and Future Directions

While our results have important managerial implications, like any research, they have some limitations that are worth highlighting. First, we tested the effect of acquired Facebook page likes with one firm, which limits the generalizability of the effect size to other firms. The magnitude of this effect will likely depend on a variety of firm-specific factors, such as what it sells and what it posts on Facebook. Nonetheless, we believe that demonstrating that these likes can lead to positive changes in customer behavior is an important finding. Moreover, because our experimental methodology is easily applied, any firm can individually measure the effects of Facebook page likes for itself.

The same limitation applies to our finding that Facebook pages are most effective when used as a platform for firm-initiated promotional communications. Indeed, for some firms, Facebook may be more effective as a platform for customer-initiated social interactions. Nonetheless, the Vitality Facebook page had many features designed specifically to encourage social interactions (e.g., an app within the page for customers to share their health success stories, opportunities to ask questions of health experts). The Vitality Facebook page also focused on a topic that their customers were generally interested in (their own health). Therefore, it provided a fertile setting for finding customer-initiated social effects, and the fact that we found none suggests that the promotional mechanism results will likely generalize.

Another limitation relates to the sample used in this study and the two key screening criteria, which may affect generalizability to the firm's entire customer base. First, we could only examine the behavior of customers who completed the introductory survey. These customers were likely to be more engaged with the firm than the average customer because they were willing to participate for no compensation. Therefore, our effect may represent an upper bound on the propensity to like the page and the value of such likes. At the same time, given that we found that the page likes affected behavior by creating awareness among relatively less engaged customers, it may be

that if there were some way to get the least engaged customers to like the page, their behavior would be affected as well. Future research should continue to examine how prior firm engagement affects ongoing responses to online promotional activities (e.g., Hoban and Bucklin 2015).

Our research examined the value of only acquired (firm-solicited) likes, and it leaves open questions about the value and process by which organic (nonsolicited) likes affect offline behavior. Given that customers who chose to like the page on their own may be the most engaged, the effect of liking may be stronger among them. Conversely, it is also possible that the effect is weaker among them, as indicated by our finding that the effect was strongest for low-involvement customers. Similarly, it may be that customer-initiated social interactions play a larger role among organic likers because they were the most active and engaged with the brand on Facebook. Conversely, since we found no effect among the most active Facebook users, organic likers may also fail to show such an effect. Future research should examine how organic likers interact with Facebook and to what extent they differ from acquired likers. It is important to note, though, that given the overwhelming number of pages that a Facebook user can like (e.g., there are over 50 million small-business pages; Constine 2016), an increasingly large proportion of likes will be of the acquired type.

Finally, we have no information on the customers' social network, which could have led us to underestimate the effect of a Facebook page like. Although we were able to measure the effect of page liking on the behavior of the individual customers who chose to like the Facebook page, we could not measure its effect on the behavior of their friends and family who were also exposed to the firms' messages through the primary customer's sharing, liking, and selected news feed updates. In addition, Facebook pages may have additional benefits that were not captured in this research. For example, customers who have not liked a particular page may still engage with the page's content by searching for it on Facebook. Future research would benefit from measuring these secondary effects.

CONCLUSION

This research demonstrates that Facebook page likes are relatively easy to acquire and can cause a measurable and positive change in customers' offline behavior. However, acquiring page likes does not guarantee increased brand engagement. Firms must pay for ongoing reach because Facebook pages are most effective when used as platform for firm-initiated promotional communications, that is, when Facebook is treated as another traditional advertising platform. Thus, these findings suggest that marketers should think of resources devoted to developing and managing a presence on Facebook much as they would any other traditional media tool in the marketing mix.

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