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Facebook digital traces for survey research: Assessing the efficiency and effectiveness of a Facebook ad–based procedure for recruiting online survey respondents in niche and difficult-to-reach populations

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Abstract

Survey-based studies are increasingly experimenting with strategies that employ digital footprints left by users on social media as entry points for recruiting participants and complementary data sources. In this perspective, the Facebook advertising platform provides unique opportunities and challenges through its marketing tools that target advertisements based on users' demographics, behaviors, and interests. This paper presents a procedure that employed the most recent developments in Facebook marketing tools to evaluate the efficiency and effectiveness of an innovative method for recruiting niche and traditionally hard-to-reach respondents. Although the multiple innovations introduced in the method hinder a proper comparison with previous studies, the survey provides evidence concerning the efficacy of the procedure and offers scholars a set of implementations to design future comparable Facebook ad–based surveys. Challenges, opportunities, and results for effectiveness are discussed in light of a previous survey on Italian adults carried out with a panel-based CAWI method.

Keywords: web survey, Facebook, digital footprints, conspiracy theories

Introduction

Internet survey research is increasingly employing social network sites as entry points for recruitment and sources of big data on the interviewees' online activities and demographic profiles, which can be combined with self-report information. In this strand of studies, together with Twitter (Vaccari & Valeriani, 2015), increasing attention is devoted to Facebook, that is, a dominant data broker, with more than 2 billion monthly active users (Facebook, 2018b). The Facebook advertising platform, in particular, has been adopted in an emerging body of survey research that offers promising alternatives to trackers installed on panelists' devices (Revilla & Ochoa, 2018), to snowball sampling starting from Facebook group members (Brickman Bhutta, 2012), and to the apps developed to access Facebook data (Kosinski, Matz, Gosling, Popov, & Stillwell, 2015).

In light of this stream of existing literature, this paper introduces an innovative procedure for efficiently and effectively recruiting survey respondents in niche and difficult-to-reach populations through Facebook ads. Strategies and techniques are presented and discussed in the context of a study on a sample of Italian participants who believe one or more conspiracy theories. Supporters of conspiracy theories are hard-to-reach populations, given the distinctive self-sealing quality of their communities (Sunstein & Vermeule, 2009) and their high distrust of scientific institutions (Comunello, Mulargia, & Parisi, 2017).

The procedure designed and developed for this study employed the newest marketing tools available on the platform to improve the performances and enable better measurement of the results. In addition to introducing the procedure, the paper assesses its efficiency and effectiveness.

Efficiency is evaluated against the performances reported by previous studies in terms of the response and completion rates and cost per respondent. To estimate the effectiveness, defined as the degree to which we reached the intended population, as a benchmark we relied on a set of questions that test the respondents' agreement with three controversial conspiracy theories

included in a survey on adult Italians conducted by the National Election Studies (ITANES) consortium via computer-assisted web interviewing (CAWI) in 2016 (Mancosu, Vassallo, & Vezzoni, 2017). An effective method for reaching the intended target group (supporters of conspiracy theories) would produce a degree of support for conspiracy theories higher than what was observed for the general population in the ITANES study.

We were specifically interested in understanding whether users' interests—identified by Facebook based on likes and other traces of digital interactions (Facebook, 2018a)—are an effective means of estimating not only offline socio-demographic profiles, personality traits, health conditions, voting behaviors, and political affiliations (as observed by previous survey studies) but also opinions on controversial and unverified issues. The effectiveness of Facebook as a system for targeting people with potentially stigmatizing opinions through digital traces of interactions is relevant for survey research beyond the study of conspiracy theories.

In the next section, we analyze survey studies that employed the Facebook ad system and its digital traces. Results from these studies are used to identify the limits of existing approaches and as a benchmark to test the efficiency and effectiveness of the study procedure. We then describe the study and present the methodology and the overall campaign strategy (micro-target cohorts, ad design, and result measurements). We then present the findings with specific reference to the efficiency and effectiveness of the survey. Finally, we discuss the findings in light of lessons learned and future developments.

Integrating Facebook digital traces in survey research

Fueled by the emergence of computational social science (Shah, Cappella, & Neuman, 2015), internet survey research is increasingly leveraging Facebook to recruit respondents and to integrate self-reported data with the digital traces left by users on this platform. A number of studies have leveraged (existing or ad hoc) thematic Facebook groups or pages to recruit people who opted in these spaces, asking users to share the survey invitation with friends, in a

process of snowball sampling that is enacted (and could be biased) by the platform's practices and algorithms (Brickman Bhutta, 2012). Furthermore, numerous studies have leveraged the Facebook developer platform to create apps in which users consented to share their digital footprints (demographic profiles, preferences, activities, and the structure of their online social network) and opted in for self-administered questionnaires (Kosinski et al., 2015). Finally, the Facebook advertising platform and its system of targetization have been adopted in the emerging body of survey research we discuss in the following sections.

Survey studies adopting the Facebook advertising system

The Facebook advertising system provides an alternative to the existing means of recruiting participants on the platform and to efficiently combine behavioral and self-reported data. This system allows scholars to reach articulated targets of platform users in a faster, more efficient, and controlled way than snowball techniques based on invites published in groups, on pages, or distributed via the messaging system. Moreover, cross-referencing and comparing the behaviors of different target groups with the responses obtained by participants belonging to those target groups provide an alternative to existing app-based methods to augment self-reported with aggregated observational data. In light of the increasing restrictions of application programming interfaces (APIs) and the stricter process for app authorization (Bruns, 2018), the Facebook ad system is an affordable and long-lasting option for survey research designs aimed at combining digital traces and self-reported data. Furthermore, the Facebook system of targetization enables researchers to consider digital traces gathered from activities carried out on private profiles, but without the expectation bias of the panelists installing trackers on their devices, engaged by research groups or firms (Revilla & Ochoa, 2018).

Through Facebook marketing tools, a researcher can launch campaigns from a page to recruit and sample survey respondents, by targeting advertisements to one or more audiences that—according with their digital footprints—have specific demographics (e.g., location, age, and

gender), behaviors (e.g., frequent travelers), and interests (e.g., in computers). In Facebook (2018a) terms, an audience is a subset of platform users potentially reached by an ad (a target).

The Facebook ad system has been employed mainly in medical and healthcare survey research (Arcia, 2014; Batterham, 2014; Chu & Snider, 2013; Fenner et al., 2012; Harris, Loxton, Wigginton, & Lucke, 2015; Kapp, Peters, & Oliver, 2013; King, O'Rourke, & DeLongis, 2014; Lohse, 2013; Lord, Brevard, & Budman, 2011; Ramo & Prochaska, 2012; Whitaker, Stevelink, & Fear, 2017). To this strand of medical and healthcare scholarship, we can add three surveys carried out in social science, through Facebook targeted ads, on Polish migrants (Pötzschke & Braun, 2017), voters in Brazil (Samuels & Zucco, 2014), and political activists in Germany and Thailand (Jäger, 2017). Targeted Facebook ads have also been employed in digital-age field experiments to estimate effects of political advertisements (Ryan & Brader, 2014) but only sometimes in combination with survey data, which were gathered by phone on recorded voters (Broockman & Green, 2014) and by the Amazon platform on its users (Ryan, 2012). Finally, some scholars have compared the demographics and data quality of surveys employing Facebook advertising, Google and Craigslist advertising, email invitations, market research panels, and party membership online referendums (Head, Dean, Flanigan, Swicegood, & Keating, 2016; Jäger, 2017; Stern, Bilgen, McClain, & Hunscher, 2017).

This body of social survey studies has pointed out that when compared with traditional web surveys, the Facebook ad system outperforms in diverse measures of efficiency, such as response rates and costs. Moreover, the available research has shown that the Facebook ad system is effective in reaching niche, hard-to-reach populations. In particular, compared with other modes of survey recruitment, Facebook's elaborations of users' digital traces seem to help researchers reach target populations that are under-represented in other modes of survey recruitment, and that are impossible or extremely expensive to address within the panels built

by many research firms. Moreover, the targetization of interests and behaviors, along with specific strategies for distributing surveys, seem to work well in involving respondents with offline stigmatizing lifestyles or health problems. Likes and shares (recorded by the Facebook ad system to create interested audiences) have been assumed to be effective in reaching political supporters.

In the following two sections, we describe in more detail these findings on the efficiency and effectiveness of survey studies employing the Facebook ad system and introduce the questions that this body of experimental work leaves open and that our study aims to address.

Surveying through the Facebook advertising system: parameters of efficiency

According to the emerging body of survey research employing a Facebook ads–based procedure, the method outperforms in diverse metrics of efficiency when compared with traditional web surveys. In particular, the Facebook ad system seems to give more control to researchers of survey performances with sustainable monetary and time costs. Researchers can optimize the campaign at any time, by reallocating resources and changing strategies, based on the measures that Facebook offers (see, among others, Arcia, 2014). This type of control of recruitment is delegated in traditional web surveys to research firms whose strategies for recruiting panels and minimizing bias are sometime unclear (American Association for Public Opinion Research [AAPOR], 2016).

On the Facebook dashboard system, researchers manage directly diverse metrics of performances to estimate the response rate for this mode of online surveys. Previous studies employing a Facebook ads–based procedure often report information on clicks (to the promotion page and/or to the survey), reach (the number of users who viewed the ads, including those who did not click it), and impressions (the number of times the ads were on screen potentially including multiple views by the same people). One of the most frequently used measures for the response rate in previous studies is the ratio of clicks to the reach, called click-through rates (CTRs). In these studies, the CTRs ranged from 0.04 (Kapp et al.,

2013; King et al., 2014) to 4.07 (Pötzschke & Braun, 2017). This variation may depend on the type of clicks that have been considered, changes in platform functionalities over time, competition from other advertisers in the audience set, and the scholar's decisions on topics, ad designs, incentives, budget, duration of the campaign, numbers of advertisements, size of the target population, and comment management.

Moreover, surveys developed through a Facebook ads–based procedure seem to outperform for their cost-efficiency. As well as CTRs, the costs of these studies are hardly comparable, depending on a number of factors. However, the costs (estimated at between US$0.05 and US$29.00 per participant) have been judged to be convenient in previous studies, when compared with traditional web surveys on online panels. A promising way to save costs of data gathering is to assume as acceptable the quality of demographic data available on Facebook profiles and skip entirely typical questions related to demographics in web-based questionnaires linked by the ads, as observed by Kosinski et al. (2015).

In addition to other modes of computer-assisted web surveying (Fricker, 2008; Shah et al., 2015), the sampling procedure enabled by the Facebook ad system does not avoid non-response and self-selection bias. This system is not informative about who chose not to opt in the survey and for what reasons (Pötzschke & Braun, 2017).

Although previous studies provided useful reflections and data on the diverse measures of efficiency of this mode of surveying, most did not leverage the most recent implementations of the Facebook system of targetization and tools to measure campaign performances. As selling ads has become the main source of revenue for Facebook (Facebook, 2018b), its system optimization has required significant investments over time. At the end of 2017 (when this study was conducted), survey researchers could arrange services, functionalities, and performance metrics that were unavailable during the majority of previous surveys. In light of previous studies and their limitations, our aim was to test the efficiency of an innovative procedure for surveying a target population through the Facebook ad system, that is, a

procedure that leveraged the most recent implementations in Facebook marketing tools to produce a more precise measure for the response rate, to optimize completion, to track respondents outside the target group, and to reduce costs in terms of money and time.

The effectiveness of Facebook ad targets to survey hard-to-reach populations

The exploratory survey studies that used Facebook marketing tools emphasized the effectiveness of the Facebook ad system for recruiting and sampling hard-to-reach populations, usually underrepresented in other forms of surveys.

The surveys used Facebook demographic targeting of ad audiences to reach linguistic minorities, older participants, the economically disadvantaged, and rural women (Harris et al., 2015; King et al., 2014; Lohse, 2013). The combined use of behavior and interest targeting enabled Pötzschke and Braun (2017) to sample migrants whose names were not included in telephone listings. Medical survey research confirmed that Facebook behavior and interest targeting is particularly effective in surveying people with specific health conditions (Arcia, 2014; Batterham, 2014; Chu & Snider, 2013; Fenner et al., 2012; Harris et al., 2015; Kapp et al., 2013) or with specific, offline, stigmatizing behaviors (King et al., 2014; Lord et al., 2011; Ramo & Prochaska, 2012). In experimental studies that adopted Facebook ads, users' likes for political pages and their interests were assumed to reflect potential voters and political affiliations (Broockman & Green, 2014; Jäger, 2017; Ryan & Brader, 2017).

The underlying assumption behind this body of survey studies is that platform data can be connected to offline socio-demographic profiles, health conditions, behaviors, and preferences. An interest targeting system, in particular, based on digital likes and other forms of platform-enabled interactions (Facebook, 2018a), seems to be effective in reaching respondents with sensitive health problems, unhealthy lifestyles, and specific political preferences.

Beyond survey studies that adopted a Facebook ads–based procedure, scholars have often seen likes and shares as declarations of preferences for a certain product or figure—enabling predictions of voting results (Jungherr, Jürgens, & Schoen, 2012) and box-office results (Asur & Huberman, 2010). In psychological and marketing research, specific sets of Facebook likes (mainly gathered through Facebook APIs) have been correlated with specific personality traits and used to automatically predict a range of highly sensitive personal attributes (Kosinski et al., 2015).

In light of this previous research, this study aimed to test whether the Facebook interest targeting system is an effective means for estimating opinions on controversial and unverified issues. In particular, we aimed at testing the effectiveness of a Facebook ads–based procedure to recruit survey participants who believed conspiracy theories. Supporters of conspiracy theories are hard-to-reach populations, given the distinctive self-sealing quality of their communities (Sunstein & Vermeule, 2009) and their high distrust of scientific institutions (Comunello et al., 2017). The effectiveness of Facebook as a system in targeting people with potentially stigmatizing opinions through digital traces of interactions is relevant for survey research beyond the study of conspiracy theories.

Efficacy and effectiveness of surveying through the Facebook ad system: targeting users interested in conspiracy theories

Unverified conspiracy theories are forms of 'problematic information' (Jack, 2017) that can be defined as explanations for events through the causal agency of a group of individuals acting in secret (Sunstein & Vermeule, 2009). Given its popularity worldwide, Facebook is a valuable source of data about the diffusion of this kind of problematic information (Giglietto, Iannelli, Rossi, & Valeriani, 2017). Until now, studies that analyzed (massive) Facebook datasets to estimate users' engagement in unverified conspiracy theories gathered information only from public activities, profiles, and groups (Bessi et al., 2016). In contrast, Facebook

advertising tools enable scholars to leverage digital traces gathered from activities conducted in private profiles that are inaccessible, unless intrusive trackers are used to monitor panels. We developed an exploratory study aimed at understanding the effectiveness of using the online traces elaborated by Facebook as users' interests and demographics to reach a sample of the Italian population who actually endorsed controversial and unverified conspiracy theories. The hypothesis was to observe in our Facebook ads–based sample a degree of support for conspiracy theories higher than that observed for the general population in the ITANES study conducted via CAWI in December 2016 on a non-probability sample of 3,027 Italian adults (Mancosu et al., 2017). In case of a degree of agreement equal to what had been observed by previous research the system would fail in its attempt to reach its target niche population. Moreover, in light of previous Facebook ad–based procedures for recruiting online survey respondents, this study aimed at testing the efficacy of an innovative procedure that leverages recent implementations in Facebook marketing tools to optimize survey completion, prevent responses by users outside the target groups, produce a more precise measure of the response rate, and minimize monetary and time costs.

Methodology

This study is based on an online survey of a non-probability sample of Italians (age and gender quotas estimated from the latest National Institute for Statistics public data) that, according to the Facebook ad system, are interested in certain conspiracy theories. We planned to launch invitations to participate in the survey through a set of ad targets of Italian adults interested in vaccines, chemical trails, and the moon landing. When we searched for these keywords, Facebook provided a set of options: 'vaccines controversy', 'chemtrails conspiracy', and 'moon landing'. In other words, in the case of the keywords 'vaccines' and 'chemtrails', Facebook suggested the presence of controversial themes, while 'moon landing' indicated a generic interest. As one of the goals was test the effectiveness of the Facebook interests targeting system in singling out users who supported controversial conspiracy

theories, we decided to exclude the generic keyword 'moon landing' and focus on Facebook interests that refer directly to such theories. We launched the survey campaign on Facebook in December 2017, asking the targets to tell us 'what they thought about some popular but controversial issues.'

Strategy for survey distribution

To launch the survey campaign, we created a new Facebook page (Social Media Italia News), as a page is required to run ads. We added a profile picture (the page title) and a cover image (tag cloud of keywords from the About section). In the About section, we wrote a short description of the research goals ('to investigate opinions on controversial information') and the names of the researchers involved in the project. We kept the advertisement text short and engaging, without referring to the university in the ads. This decision was driven by previous studies that showed how universities' recruitment processes are highly problematic for this target population, given its distrust of scientific institutions (Comunello et al., 2017). We then registered a domain (http://www.socialmediaitalia.news/) to host the web survey.

After setting up Facebook ads, we defined 12 micro-targets based on the demographics and interests in the vaccines controversy and the chemtrails conspiracy of the Italian population on Facebook (Table 1). Using data from the National Institute for Statistics on the structure of the Italian population for the same age and gender cohorts, we estimated the quotas of respondents per micro-target based on a goal of 1,000 respondents (Table 1).

[Table 1 about here]

Using TypeForm PRO, we designed a seven-question online survey. To estimate the effectiveness of the Facebook ads–based procedure in reaching supporters of conspiracy theories, as a benchmark we relied on three 10-item Likert scales included in a survey on adult Italians conducted by the ITANES consortium via CAWI in December 2016 (Mancosu et al., 2017). These scales measured the respondents' agreement with three statements that referred to widely debated conspiracy theories. The first related vaccines to several immune

system adverse effects. The second connected the vapor trails left by aircraft to a clandestine program of large-scale weather modification directed by government officials. The third maintained that the moon landing never happened, and the proof was fabricated by NASA and the U.S. government. Due to the unavailability of ITANES dataset, we based our benchmark on data provided in the paper. To these three questions about conspiracy theories, we added four questions, carefully crafted to minimize confounding factors [see the questionnaire in the appendix (located in the Online Supplement to this article)]. We decided to use the brevity of the survey as an incentive in the call to participation (see below), thus we skipped questions about demographics and, as regard age and gender, we used the digital traces elaborated by Facebook, as this online information was validated by previous studies through self-reported data (Kosinski et al., 2015).

We used the URL of the survey as the landing page for the advertised posts. Age cohort and gender were automatically passed as parameters in this URL and saved as hidden fields in the TypeForm survey results. This allowed us to identify (and to exclude, given the research goals) users who responded as a result of the social sharing of ads, as their URL parameters, unlike the other respondents, were empty.

We optimized the campaign for conversions[1]. In this case, a conversion happened when a user clicked the ad and completed the survey. Conversions were tracked through Facebook Pixel (a tool used by the platform to monitor user activity performed on external websites) included on the thank you page of the survey. Once a user completed the survey, he or she was included in a list of respondents (the Pixel-based custom audience) who were automatically excluded from receiving further ads.

Ads Design

To avoid the risk of additional biases, we designed a shared template for all the posts advertised to the 12 micro-targets. We carefully crafted all the elements of the template, which looked as follows (Fig. 1). Each ad had recurring elements such as the profile picture

(A) and the page name (B) in the top left, followed by the advertising text (C), a picture (D), a headline (E), and the link to the website (F).

[Figure 1 about here]

The textual elements of the ad needed to be short and engaging to be effective. Thus, we decided to use a question in the advertising text and a call to action with an exclamation point in the headline. The words were carefully chosen to motivate the participants, as no incentive was offered. This is why we decided to introduce key elements such as the brevity of the survey and reassurances about its anonymity.

Considering the relevance that images have on social media, we created four ads for each micro-target (48 posts in total) using four different images. We selected the images from the set of stock photos freely available on the Facebook ads platform, using search terms such as 'vaccines', 'moon landing', 'chemtrails', and the more generic 'debate'. We did this to obtain one neutral image and three images related to the conspiracy theories investigated in this study: a photo of the moon landing, a photo of a child undergoing a vaccination, and a photo of the sky with trails left by a plane. Having more than one picture for each ad allows Facebook's algorithm to optimize the exposure on the desired target while reducing costs and maximizing campaign conversions.

Campaign strategy

During the course of the campaign, we also added three images related to chemtrails, the moon landing, and vaccines to improve the conversion rate by varying the visuals of the ad. Thus, we created 36 additional promoted posts. We selected these images from the set of stock photos freely available on the Facebook ad platform. We chose to make this change in the visuals to make the announcement potentially more interesting for users who had seen it several times without ever interacting with it and over time, had become accustomed to it. Although advertised posts were not visible on the page, the content was displayed in the news feed of the target audience, and users reached by the ad were allowed to interact with this

post. We discussed above our strategy for avoiding completion by users outside the target group, after the sharing of the ads. Regarding comments left under the advertised posts, we decided to hide them as they might influence in several ways other potential respondents reached directly by the ad.

Findings

The Facebook ad campaign ran from December 6, 2017, until January 27, 2018. During this period, the ads were on screen 82,233 times (impressions) and 32,613 users viewed the ads (reach). In 53 days, we collected 1,140 conversions, that is, users who clicked the ad and completed the survey. Unlike the most common clicks—which can include users clicking to the promotion page and incomplete questionnaires— conversions—tracked through the implementation of Facebook Pixel in the survey procedure—take into account only completed questionnaires from users clicking from the ad.

Moreover, once a conversion was tracked, Pixel automatically stopped delivering ads to those who had completed the survey starting from the Facebook ad. This helped us to reach a sustainable number of multiple completions, which we identified through duplicate IPs (45), excluding these cases in the analysis of the effectiveness.

Furthermore, this procedure offered an efficient strategy for tracking responses resulting from social sharing of ads—through URL parameters passed from the ad to the survey. This allowed us to classify responses without parameters (26) as coming from users outside the target groups and exclude them.

Removing invalid responses resulting from duplicate IPs and social sharing of ads, 1,069 valid conversions remained, that is, completed questionnaires from users inside the target groups who clicked from the ad only once. Valid conversions allowed us to obtain a more precise measure of the response rate, that is, the ratio of valid conversions to the reach (the conversion rate). With 1,069 valid conversions and a total reach of 32,613 users, the

conversion rate was 3.28%. The average cost per valid conversion was €0.46 (total cost: €488).

[Table 2 about here]

As a result of the dataset cleanup, some categories were slightly over or under the expected quotas. For this reason, we applied a weight to individual responses (Table 3) to get similar distributions of age and gender as the official statistics of the Italian population.

[Table 3 about here]

To compare the results with Mancosu et al.'s (2017) study, we divided the respondents into three groups, based on the answers the respondents gave to the questions about conspiracy theories: those who answered 0 to the question about the plausibility of the conspiracy and therefore, 'absolutely do not believe'; those who answered from 1 to 5, and therefore, tend to believe; and those who answered from 6 to 10, and therefore, believe in the conspiracy. Figure 2 shows the comparison between the responses of the ITANES sample (3,027 individuals) and the sample we obtained through the Facebook ads (1,069 valid responses). The results were compared performing the non-parametric Kruskal-Wallis test (Hollander & Wolfe, 1973) using the stats package of R statistical software[2]. Moreover, to measure the impact that each sampling strategy had on the responses, we measured effect size as defined by Tomczak & Tomczak (2014). The Kruskal-Wallis test assesses whether the two samples originate from the same distribution, and we assume that as the null hypothesis. The responses for all three conspiracy theories show evidence of coming from the same distribution with p values of less than 0.01 suggesting that we cannot reject the null hypothesis. Thus, the data collected through Facebook reflect the distribution of the data Mancosu et al. (2017) obtained. Similarly, the effect sizes were very small or negligible (Moonlanding = 0.004, Vaccines = 0.002, Chemtrails = < 0.000).

[Figure 2 about here]

The first analysis of the data seems to reject the hypothesis: Through the use of Facebook ads, we did not reach a population that is significantly more likely to support controversial conspiracy theories. Nevertheless, as shown in Figure 2, the Facebook-based sampling strategy seems to result in increased polarization of the respondents. Indeed, if we compare how many conspiracy theories are supported by the respondents in the two samples (we define support for a theory when the respondent agrees with the statement with a value of 6 or more), the Facebook-based approach results in a higher number of respondents not believing in any conspiracy theory (68% vs. 53%). At the same time, this data does not clearly support the idea that Facebook ads managed to reach a more polarized population, as differences that were more nuanced could have been made hard to observe due to the transformation operated on the data to make it comparable with the ITANES data.

Discussion and conclusion

Although not originally intended for this target, the Facebook ad system opens up interesting opportunities to recruit survey respondents based on their digital traces and integrate these digital data with self-reported data. This exploratory study aimed at testing the efficacy of new functionalities of the Facebook ad system in survey research and the effectiveness of using digital traces on demographics and interests to estimate opinions and in particular, to reach people who support controversial issues. To test efficacy, we considered the implemented resources, costs, and results in terms of the response rate and survey optimization. To test effectiveness, we hypothesized we would observe in the sample of Italian adults targeted by Facebook as interested in conspiracy theories a higher rate of agreement with three statements compared to a sample of Italian adults extracted from a panel for a CAWI conducted by the ITANES and adopting identical statements.

Regarding efficacy, to optimize completion, we implemented Facebook Pixel in the survey and used URL parameters passed from the ad to the survey. These innovations enabled us to track valid conversions, that is, completed questionnaires from users inside the target groups

who clicked from the ad only once. Though the ratio of valid conversions to the total reach (the conversion rate), in place of the most common ratio of clicks to the total reach (CTRs), we obtained a better measure of the response rate. Indeed, unlike CTRs, the conversion rate does not take into account users clicking to the promotion page, multiple responses from the same user, respondents outside the target group, and incomplete questionnaires. Although the multiple innovations introduced in the method hinder a proper comparison of the conversion rate with previous CTRs, this study registered a value (3.28%) that outperforms almost all the click-through rates calculated in the available literature. Enabling better measurement of the response rate in this mode of surveying, the conversion rate could be added to the frame of references for those considering similar work.

The average cost per valid conversion (€0.46) and the time spent for recruiting (53 days) are decidedly more affordable when compared with those of many research firms working on online panels, with the advantage of deciding and controlling who is a 'valid respondent'. To maximize the campaign conversions and reduce the total cost, we directly and promptly managed the reallocation of resources (budget/time) on less performing ad targets or on less performing visuals for specific ad targets. Thus, in line with existing scholarship, this explanatory study confirmed greater control by researchers of survey optimization through Facebook marketing tools and performances of exposition for each ad target. Furthermore, through the implementation of Facebook Pixel in the survey, we easily monitored the performances of the conversion of each ad target, stopping the delivery of (and payment for) ads to a quota of the sample as it was filled. By adding this set of strategies and results to the existing literature on the efficacy of survey research employing the Facebook ad system, we hope to encourage further work that replicates and implements this methodology.

However, these good results for costs and the conversion rate do not depend only on the technical implementations. As seen above, during the analysis of previous studies, a number of factors could influence these parameters of efficiency, including the scholar's decisions on

topics, ad designs, and incentives. In this study, the high response rate and low costs also depend on the brevity of the web questionnaire (used as incentive in the advertising text): our seven questions required an average completion time of less than 2 minutes.

Regarding the effectiveness of the Facebook targeting system to reach people who support unverified controversial conspiracy theories, the results are inconclusive. We show that this Facebook survey reached a population largely similar to that reached by the ITANES survey. However, given the design adopted in this study (no matter that we attempted to correct the effect by structuring the sample per quotas of the Italian population) and the lack of directly comparable results from the general Italian population, a final assessment of the effectiveness of the method is not possible. On one hand, we are not able to discriminate whether the similarity between the responses collected through Facebook and those obtained from the web panel are real or the result of the pre-processing needed to make the results comparable. On the other hand, we are unable to verify whether the small observed difference pertains specifically to this group of respondents or to the entire Italian population on Facebook. The control group (Italian adult CAWI respondents) is composed of Facebook users and non-Facebook users. As Facebook users might not be identical to the general public, it could be theoretically possible that the share of participants in the Facebook sample simply represents the share of conspiracy believers from the general public within Facebook.

To avoid these limitations, future works should employ a target group of Facebook users not interested in conspiracy theories (e.g., the whole Italian population of Facebook excluded those with interests in such theories). Although this strategy would limit the extent of the results to the Italian population on Facebook, it could provide evidence concerning the effectiveness of the procedure.

In addition to these limitations, this study provides evidence concerning the efficacy of the procedure and offers scholars a blueprint for designing future comparable Facebook ad–based surveys. A wider range of different (addressing different target groups of hard-to-reach

audiences) but comparable studies are needed before making final conclusions about the effectiveness of systems for estimating opinions based on Facebook interests.

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Data Availability

Data are available for replication purposes from the corresponding author at liannelli@uniss.it.

Software Information

Data were analyzed using custom code written in R version 3.5.1. The code is available upon request to the corresponding author at liannelli@uniss.it.

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Notes

[1] This means that ads were not randomly displayed to users within each micro-target. The ads were instead generally displayed within each micro-target to users with characteristics similar to those who completed the survey.

[2] The software may be obtained from https://www.r-project.org.

Figures and tables

Age cohort/ gender	Facebook's estimates of monthly active Italian users interested in vaccines controversy or chemtrails conspiracy		Expected quotas (based on the National Institute for Statistics) per micro-target (goal: 1000 respondents)	
	Male	Female	Male	Female
18–24	5000–6000	2000–2500	43	40
25–34	8000–9000	4000–4500	67	65
35–44	7000–8000	4500–5000	85	85
45–54	4500–5000	3500–5000	95	97
55–64	2500–3000	2000–2500	75	81
65+	1500–2000	1500–2000	115	152

Table 1. Facebook target population and quota sample of the Italian population

Figure 1. Template for the Facebook advertisement, as it appears in the desktop view on computers.

Duration	53 days
Impressions	82,233
Reach	32,613
Total conversions	1,140
Invalid conversions (duplicate IPs)	45
Invalid conversions (social sharing of ads)	26
Valid conversions	1,069
Conversion rate	3.28%
Total cost	€488
Average cost per valid conversion	€0.46

Table 2. Campaign performances

	Expected quotas % (based on the National Institute for Statistics)		Respondents % (N=1069)		Weight	
Age/Gender	Male	Female	Male	Female	Male	Female
18–24	3.32	3.23	3.46	3.37	1.24	1.19
25–34	7.1	6.11	7.39	6.17	0.91	1.05
35–44	8.54	8.09	8.7	8.23	0.98	1.03
45–54	10.06	9.34	9.45	9.35	1.01	1.04
55–64	8.45	8.27	8.42	8.33	0.89	0.97
65+	12.04	15.45	12.16	14.97	0.95	1.01

Table 3. Respondents per micro-target

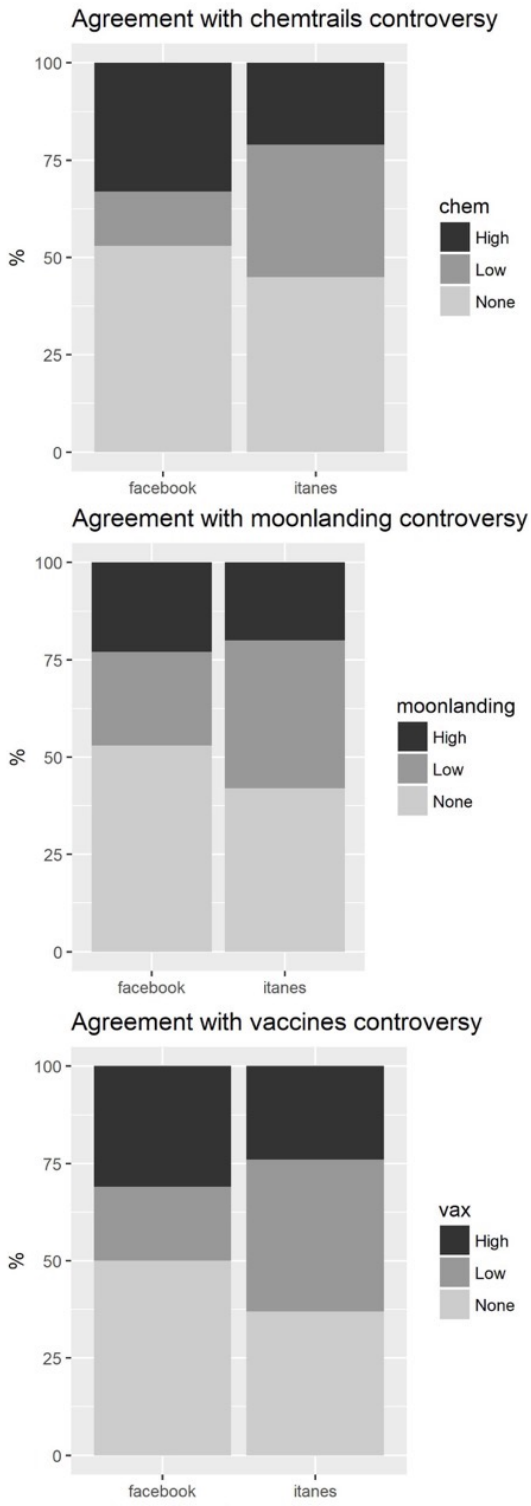

Figure 2. Distribution of the level of agreement with three conspiracy theories: comparison between the Facebook-based sample (n=1069) and the CAWI sample by the ITANES (n=3027)