Social Media Recruitment in Online Survey Research: A Systematic Literature Review

Zaza Zindel

Bielefeld University

Abstract

The growing percentage of the population on social media creates new and expanded opportunities for survey researchers. Recently, a growing number of studies have been using social media to recruit survey respondents. Many social media platforms have powerful targeting capabilities that can be used to recruit even rare or hard-to-reach populations. However, thus far, the survey research literature lacks a comprehensive overview of potentials and limitations. This literature review aims 1) to provide an overview of the current literature on the use of social media as a recruitment tool, 2) to highlight the potential advantages and disadvantages for survey research, 3) to identify current research gaps, and finally, 4) to provide practical guidance for researchers interested in integrating social media recruitment into their research.

The Internet has changed the social sciences dramatically by opening up new forms and fields of research, including the study of human behavior in online social networks (e.g., Ferg et al., 2021; Orehek & Human, 2017) and investigations of the Internet's impact on human (co-)existence (e.g., Erhardt & Freitag, 2021; Lu & Yu, 2019). The Internet also offers new forms of readily available data that can complement or, in some cases, replace primary data collection (e.g., Bach et al., 2021; Stier et al., 2020). Moreover, the Internet is itself a valuable tool for social research. Today, online research methods are used in most of the social sciences.

Given the potential of Internet technology and the unique features of online human behavior, social media (SM) sites offer a promising approach for recruiting survey participants. Platforms such as Facebook, Instagram, and Twitter connect hundreds of millions of users, all of whom represent potential respondents. Over the past decade, numerous studies have shown that it is possible to reach and recruit large numbers of participants for scientific surveys through SM (e.g., Grow et al., 2020; Kühne & Zindel, 2020; Pötzschke & Braun, 2017). The growing percentage of the population on SM creates new and expanded opportunities for the recruitment of participants in social research. Many SM platforms, in particular, Facebook, Instagram, and Twitter, have powerful targeting capabilities that can be used to recruit hard-to-reach populations. SM targeting tools allow researchers to track and reach users with specific demographic characteristics and interests based on their behavior both on the SM sites themselves and on other third-party websites that users interact with through their SM accounts. These features reduce the time and resources required to recruit rare and hard-to-reach populations. In light of the low effectiveness of traditional recruitment methods in reaching these groups, SM recruitment tools may prove to be an effective and efficient means of recruiting otherwise overlooked populations.

To decide whether SM recruitment tools could be useful for their own surveys, researchers need a better understanding of 1) which participants are likely to be reached through online surveys, 2) how other researchers have recruited similar samples via SM, and 3) what advantages and disadvantages SM recruitment strategies have compared to other recruitment strategies. To date, the lack of a comprehensive literature review on the role of SM in recruiting participants for social surveys makes it difficult for researchers to determine whether SM could be a viable method for their purposes.

To enable more informed decisions about the use of SM in survey recruitment, this research synthesis provides a broad overview of existing publications using SM recruitment. In reviewing the existing literature, my aim was to evalu-

————————

Direct correspondence to
    Zaza Zindel, Bielefeld University, Universitätsstraße 25, 33615 Bielefeld
    E-mail: zaza.zindel@uni-bielefeld.de

ate the methodology and effectiveness of survey recruitment, highlight advantages and disadvantages for survey research, identify current research gaps, and provide practical guidance for further research. I examined: (1) the effectiveness of SM sampling strategies for the targeted populations, (2) the cost-effectiveness of these approaches, and (3) the comparability and quality of the various approaches based on the demographic distribution of the SM samples.
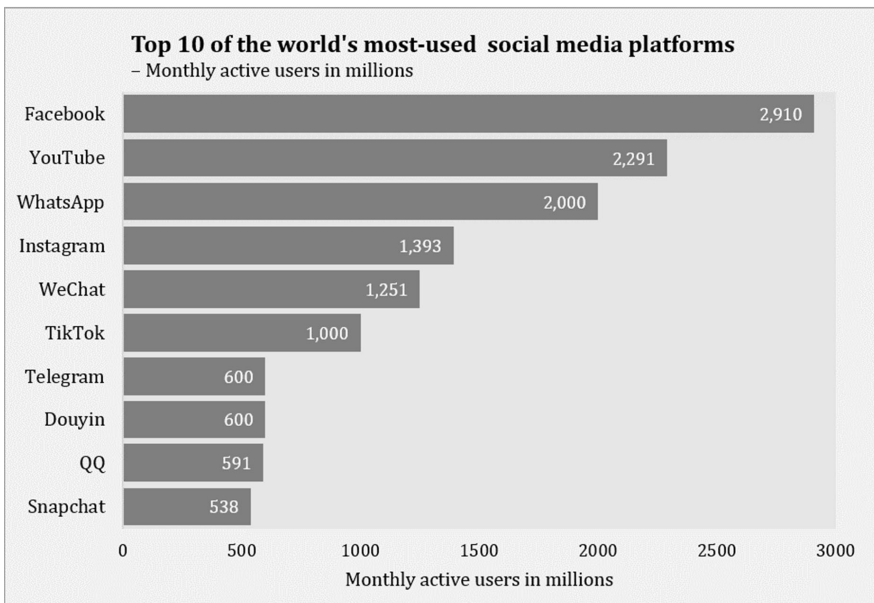
Background

Social Media Platforms

The rise and spread of SM platforms is a complex and important social and cultural phenomenon of the twenty-first century (for a detailed overview of the history and development of SM, see, e.g., Dijck, 2013; Boyd & Ellison, 2008). SM platforms employ a variety of interactive and computer-based technologies that enable users to share information, personal messages, and other content, such as videos and images, in communities and networks that they create themselves. Obar and Wildman (2015) describe the four main features of SM platforms. They are (1) interactive web-based Web 2.0 applications that consist of (2) user-generated content that is shared via (3) service-specific profiles created by the users themselves and through which they (4) connect with others, thereby developing social networks.

The various SM platforms offer users different forms of expression, including news feeds on Facebook and Twitter, discussion forums on Reddit, live streams on Instagram and YouTube, private messages on WeChat and WhatsApp, and videos on TikTok. Figure 1 presents an extrapolation of the top 10 most widely used SM platforms by people all over the world. Based on the latest figures reported by Kepios et al. (2021),[1] Internet users worldwide spend an average of 2 hours and 27 minutes per day using SM. Furthermore, approximately 57.6% of the global population is represented on at least one SM platform. This creates abundant opportunities to connect with the members of a population and recruit them to participate in online surveys.

---

1   Since almost none of the SM platforms regularly publish figures on their active user base, most insights come from projections based on the platforms' self-serving advertising systems. The data reported here are based on the metadata report by Kepios et al. (2021). Furthermore, please note that users do not necessarily represent unique individuals, as it cannot be ruled out that multiple or fake accounts are included in the extrapolation.

Top 10 of the world's most-used social media platforms
– Monthly active users in millions

Platform	Monthly active users in millions
Facebook	2,910
YouTube	2,291
WhatsApp	2,000
Instagram	1,393
WeChat	1,251
TikTok	1,000
Telegram	600
Douyin	600
QQ	591
Snapchat	538

Monthly active users in millions

Sources: Facebook, as of September 30, 2021 (Facebook, October 25, 2021); Telegram, as of November 8, 2021 (Telegram, November 8, 2021); all other metrics, as of October 17, 2021 (Kepios Pte. Ltd. et al., 2021).

Figure 1   The World's Top 10 Most-Used Social Media Platforms

In addition, some studies have found differences in the composition of users of different SM. For example, Hargittai (2020) found that younger populations (ages 18-34) were more likely to be active on platforms such as Facebook, Reddit, Twitter, and Tumblr. Women were slightly more likely to use Facebook, whereas men were significantly more likely to use Reddit. More highly educated populations tended to use Twitter more frequently. Hellemans et al. (2020) found the same age effects and gender differences, reporting more male users on Twitter and more female users on Instagram and Facebook. Understanding patterns of SM use on different platforms is essential for recruiting survey participants. Before deciding to use a particular SM platform, it is crucial first to understand which population groups are more strongly represented on which SM and which are unlikely to be reached.

Recruiting Population Members via Social Media

SM serves as a recruitment tool for researchers by allowing the creation and placement of content or advertising designed to reach target audiences. This can

be accomplished through various approaches, which can be broadly divided into unpaid and paid strategies.[2]

Unpaid recruitment strategies encompass a variety of approaches. One of these is to reach potential participants and share survey invitations through groups. These may be existing groups that are thematically suited to the planned survey (e.g., Zimmer & Imhoff, 2020) or new groups or communities created explicitly to recruit target populations (e.g., Brickman Bhutta, 2012). Groups can also serve as a starting point for private messaging: Group members who are identified as potential survey participants can be contacted via private message and sent a survey invitation (e.g., Pagoto et al., 2014).

Another approach is to use profile pages in SM networks. Here as well, one can either use existing content or create new content. When working with other institutions to conduct a survey, the partner institutions can share an invitation link on their profile pages (e.g., Al-Shaqsi et al., 2020). The invitation can also be shared on a page created specifically for the survey project and maintained by the project team. When using SM platforms that are primarily based on visual content, such as Instagram and TikTok, it is often convenient to publish videos inviting people to participate. These videos may be posted for potential participants to find in the "explore" section of SM platforms, alongside an array of other videos that have been shared publicly. Such videos often introduce the survey and invite SM users to participate. Rather than including the survey link, they usually include a note that the link for participation can be found in the profile description of the account that posted the video.

Paid strategies make use of promotion options and SM advertising. Most SM platforms currently offer their services to users free of charge and rely on an advertising revenue model. Researchers can purchase advertising on the platforms for a limited period and either promote existing content (e.g., Barnes et al., 2021) or place new ads for the research project at hand. Most SM platforms provide a sophisticated advertising targeting system that allows specific audiences to be identified based on multiple parameters, such as demographic characteristics, interests, or behaviors (i.e., digital activities, device usage, purchase behavior, etc.) (e.g., Meta Inc.; Twitter Inc.). These targeting options are the result of both the data entered by users on their own profiles as well as the behavior of the users on the platforms. The targeting parameters can be used to customize ads to reach very specific or rare populations. In addition, ads can be placed in different positions on a site depending

---

2   It is worth noting that the distinction between paid and unpaid advertising is not clear-cut. The paid approaches are based on purchasing advertising space on the platforms. Nevertheless, in most cases, users have the option of sharing ads and promoted content in their own networks or, for example, on their profiles. Promoted content is also not necessarily created for this purpose but may already exist prior to the use of a paid strategy and thus already have reached SM users.

on the platform and end device of the target group – in the newsfeed, at the edge of the screen, or between "stories" (i.e., user-generated videos or images only visible for a limited period of time, usually 24 hours; see Figure 2). For a more detailed description of ad design on SM, see, Pötzschke & Braun (2017). Finally, ads can either link directly to an external survey website or point the user to an SM profile page that contains a link to the survey.

SM sites differ in several respects that strongly influence the conditions under which they might be suitable. For example, whereas Facebook allows for all the advertising options mentioned above, platforms like Instagram and TikTok do not have topic-specific groups that could be used for recruitment. Moreover, while Facebook, Instagram, and WeChat have very detailed demographic targeting options, Reddit and Twitter, for example, provide only a minimum amount of demographic information. Additionally, registration standards vary widely between platforms. Whereas platforms like Facebook, TikTok, and WeChat require detailed verification of new accounts, others like Twitter or Reddit do not, leading to a potential disparity between the number of accounts and the number of actual users. Furthermore, behavioral norms, site rules, and opportunities for different types of targeting vary with the current state of algorithmic updates, both across SM sites and over time. For an extensive overview of the different paid and unpaid strategies as well as the targeting options available on a selection of SM platforms, see Table 1.

Besides the varying characteristics of specific platforms that influence the use of SM platforms as recruitment tools, several other factors should also be considered when using SM strategies. In general, SM platforms offer both advantages and disadvantages in recruiting survey respondents, especially in comparison to more established offline or online methods. Table 2 provides an overview of the regularly cited advantages and disadvantages of SM recruitment. Where available, empirical evidence for the respective statements is given.
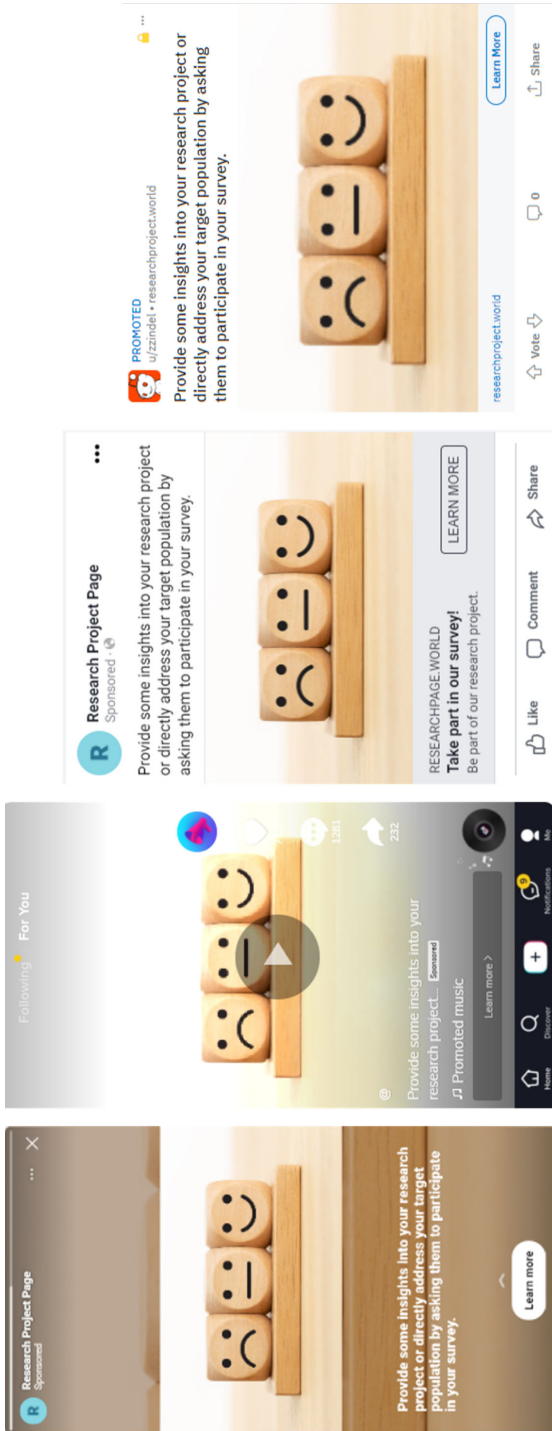
Note. From left to right: story ad on Instagram, video ad on TikTok, ad in the Facebook news feed, promoted post on Reddit. Source: Own creation.

Figure 2 Examples of Ads on Instagram, TikTok, Facebook, and Reddit

Table 1 Overview of the Different Paid and Unpaid Recruitment Strategies as well as Targeting Options for Selected SM Platforms

Social media platform	Unpaid strategies	Paid strategies	Targeting options
Facebook Meta Platforms February 4, 2004	- Via posts in own or other groups - Via profile post - Via private message	- Paid ads placed at various positions on the platform - Boosted post - Boosted page	- Location (very detailed, to within one mile of specific coordinates) - Demographics (e.g., age, gender, language, education, work, marital status) - Interests - Platform behaviors - Connections (through own Facebook page or events) - Devices
Instagram Meta Platforms October 6, 2010	- Via link in profile bio - Via private message	- Paid ads at various positions within the platform - Boosted post	- Location (very detailed, to within one mile of specific coordinates) - Demographics (e.g., age, gender, language, education, work, marital status) - Interests - Platform behaviors - Connections (through own Facebook page or events) - Devices
Twitter Twitter Inc. July 15, 2006	- Via individual tweet - Via private message to followers	- Paid Tweets at various positions within the platform (Tweet ads) - Promoted Twitter accounts (Follower ads) - Promoted trends (Trend Takeover)	- Location (detailed down to city and postal or zip code level) - Demographics (age, gender, language) - Devices - Keywords - Interests - Platform behaviors - Conversion topics

Social media platform	Unpaid strategies	Paid strategies	Targeting options
Reddit Advance Publications June 23, 2005	▪ Via post in subreddit ▪ Via link in profile bio ▪ Via private message	▪ New created user posts or videos (promoted post) ▪ Boosted post (organic post) ▪ Reddit takeover ads (promoted posts, banner ads)	▪ Location at country level (also county level in the USA) ▪ Interests ▪ Specific communities (= subreddits) ▪ Devices
WeChat Tencent Holdings Limited January 21, 2011	▪ Via groups ▪ Via private message	▪ Sponsored posts on WeChat Moments ▪ Banner ads within WeChat articles ▪ Mini Program ads ▪ WeChat influencer collaboration	▪ Location ▪ Demographics (e.g., gender, age, marital status, education level) ▪ Interests ▪ Platform behaviors ▪ Devices
TikTok ByteDance September 2016	▪ Via private message to accounts the user follows ▪ Via link in profile bio	▪ Paid ads on TikTok's "For You" page ▪ Promoted videos	▪ Location (down to level of states or large metropolitan areas depending on the country) ▪ Demographics (age, gender, language) ▪ Interests ▪ Platform behaviors ▪ Devices

Table 2   Advantages and Disadvantages of the Use of Social Media for Survey Recruitment

Advantages	Statement	Empirical evidence (examples)
Costs	SM strategies are inexpensive.	Ali et al., 2020; Webler et al., 2020; Batterham, 2014.
Reach	SM enables recruitment of a larger number of participants.	Admon et al., 2016; Bennetts et al., 2019; Samuels & Zucco, 2014.
Variety of users	SM allows collection of data from a broad range of participants.	Chard et al., 2018; Perrotta et al., 2021; Pötzschke & Braun, 2017.
Fast turnaround	SM strategies recruit survey participants quickly.	Guillory et al., 2018; Reuter et al., 2019; Zhang et al., 2020.
Targeting options	Targeted SM strategies allow very specific audiences to be reached.	Guillory et al., 2018; Harfield et al., 2021; Pötzschke & Braun, 2017.
Follow-up	SM strategies may provide the option to easily (re-) contact participants for follow-up studies.	Bolanos et al., 2012; Ersanilli & van der Gaag, 2022.
Disadvantages	**Statement**	**Publication**
Under-coverage bias	SM strategies have no chance of reaching all target population members.	Bennetts et al., 2019; Lehdonvirta et al., 2021; Rosenzweig & Zhou, 2021.
Over-coverage bias	SM strategies have a (high) risk of reaching large numbers of invalid accounts and lead to a high number of duplicate responses and fraudulent enrollments.	Pozzar et al., 2020; Quach et al., 2013; Yuan et al., 2014.
Self-selection bias	SM strategies may reach participants who differ systematically from non-participants.	Canan et al., 2021; Lehdonvirta et al., 2021; Williamson & Malik, 2021.
Selection bias	Targeted SM strategies are influenced by unknown mechanisms of advertising algorithms that allocate the advertised content.	No empirical evidence.

Review Methodology

A systematic search was applied to identify the relevant literature. The overall goal was to identify research articles that used SM platforms to recruit respondents for social-science-related online surveys. For this, the Web of Science database was used to access the Social Sciences Citation Index (SSCI), a multidisciplinary citation database specifically focusing on journals in various disciplines of the social sciences. The search was conducted on October 5, 2021, and used a combination of the following search terms with the Boolean operator "OR" and then combined with the Boolean operator "AND":

> (("recruit*") OR ("participant recruit*") OR ("recruit* strategies") OR ("social media recruit*") OR ("online sampling") OR ("survey sampling")) AND (survey) AND (("social media") OR ("social network*") OR ("social networking") OR (Facebook) OR (Instagram) OR (YouTube) OR (WhatsApp) OR (Tumblr) OR (Twitter) OR (Myspace) OR (Snapchat) OR (TikTok) OR (Vimeo) OR (Flickr) OR (Clubhouse) OR (Reddit) OR (4chan) OR (8chan) OR (8kun) OR (Telegram) OR (LinkedIn) OR (Pinterest) OR (Badoo) OR (QZone) OR ("Sina Weibo") OR (WeChat) OR ("Tencent Weibo") OR (Youku) OR (Vkontakte) OR (Twitch) OR (Xing) OR (Kuaishou) OR (Douyin) OR (WEIXIN))

The search field was limited to the topics category, meaning the search terms could only appear within the title, abstract, authors' keywords, and the databases' "keywords plus" category. Furthermore, only papers published in scientific journals and written in English were considered relevant. The publication period was defined to begin January 1, 2002, one year before SM hit the mainstream (Boyd & Ellison, 2008), and to end on October 5, 2021, to encompass a wide range of applications. The resulting records (N=1,199) were imported into the Citavi literature management software for further data screening. Subsequently, I performed a two-stage screening procedure. The first step involved exclusion based on the information contained in the abstracts. The following exclusion criteria were applied: (1) the abstract did not mention a reference to social media recruitment at all, (2) the abstract did not mention survey recruitment, (3) the abstract mentioned an overall sample size n≤100, and (4) the abstract mentioned that the authors of the paper did not do their own data collection. Overall, 624 articles were excluded during the abstract screening, leaving 575 full texts for review.

In a second step, the full texts of the remaining articles were screened based on the same exclusion criteria as in the abstract screening, but here on a full-text level as well as based on three additional criteria: (5) the article did not specify the SM platform, (6) the article either did not distinguish participants recruited via SM from participants recruited via other strategies, or multiple SM platforms were grouped together into the same category, and (7) the article did not include enough relevant information to be included in at least one of the analyses in the literature

review. In the second step, a further 481 articles were excluded. Additionally, 11 articles were excluded because of duplication of study results. Further, 10 articles were excluded due to a lack of data access.

A total of 73 journal articles covering a total of 83 separate studies remained for inclusion in the literature review (Online Appendix 1).[3] Finally, the articles were systematically searched for data such as the number of individuals recruited, recruitment performance metrics, and cost. Online Appendix 2 provides a flow chart showing the exclusion process (Online Appendix 2, Figure 1), an extensive summary of the studies included (Online Appendix 2, Table 1), as well as the URL to replicate the search.

Recruitment Effectiveness

The effective recruitment of participants and, consequently, a large analysis sample is essential for quantitative research. At the same time, the overall effectiveness of the recruitment strategy must be considered in the context of the target population and the study objective. Therefore, to assess the effectiveness of SM recruitment strategies, I reviewed the evaluations of effectiveness by the articles' authors and recorded the size of the samples recruited. Additionally, where feasible, I compared the effectiveness of the strategies used with other recruitment strategies. I considered a recruitment approach to be effective if the authors had found it to be sufficient for the purpose of their study. In addition, I considered a method to be more effective if it reached a larger percentage of respondents than another method.

Recruitment Costs

The effectiveness of a recruitment strategy is always influenced by its cost. In survey practice, many designs must be modified within cost constraints. There are usually limited resources available to conduct a survey, which inevitably affects the choice of recruitment method. By formally evaluating and comparing the costs of different recruitment methods, one can determine their overall effectiveness (Groves, 2004). I therefore assessed cost-effectiveness in terms of cost per participant, and compared this, where possible, to the costs of other recruitment methods.

---

3   Please note that in the remaining sections of this paper, the articles by Batterham (2014), Brodovsky et al. (2018), Ford et al. (2019), Lee et al. (2020), and Sunderland et al. (2017) are each counted as a single article or as multiple studies, according to the conclusions drawn, as they present results from multiple studies. This brings the number of studies included in this literature review to 83 studies in 73 journal articles.

Representativeness

The effectiveness and costs of sample recruitment must be balanced against the ability of samples to represent the intended target population. In line with the concept of total survey error (Groves & Lyberg, 2010), various sources of representation error such as coverage error, (self-)selection error, and non-response error are to be expected in surveys. The same applies to surveys recruited through SM platforms. Due to the reduction of the sampling frame to SM users only and the selective nature of convenience sampling approaches, severe limitations on representativeness are to be expected with SM recruitment. Nonetheless, SM recruitment is used frequently with the aim of producing a representative sample. To clarify whether the SM samples matched population estimations, I compared demographic characteristics of the recruited participants to national data included in the articles.

Findings

The articles included in this literature review were published between 2011 and 2021, with the number of publications increasing steadily over the period. This trend highlights the growing scientific relevance of the topic and the urgent need to systematically investigate its potential for survey research.

The majority (n=52) of the included articles used the social networking site Facebook as their only recruitment tool. Fifteen articles used a combination of Facebook and other SM platforms, for example, Reddit (e.g., Cahill et al., 2019; Côté-Léger & Rowland, 2020), Instagram (e.g., Garey et al., 2020; Guillory et al., 2018), and Twitter (e.g., Cavallo et al., 2020; Yuan et al., 2014). Other articles relied solely on other platforms or used a combination of them. The large number of articles that used Facebook for recruitment indicates that this was the most popular SM site for recruiting participants, certainly due to the high prevalence of usage among the world population.

Most studies used at least one paid recruiting approach (n=65). Targeted ads were used in 60 cases, and three studies used untargeted ad space on SM platforms (Dean et al., 2012; Sullivan et al., 2011; Wagenaar et al., 2012a). One study each used the option of promoting a Facebook page (Ellis et al., 2018) and a Facebook post (Barnes et al., 2021), both of which were created specifically for the study purpose.

The remaining articles used unpaid strategies, such as posting in specific groups or communities (e.g., Arentz et al., 2021; Avery-Desmarais et al., 2021), publishing multiple posts or tweets on private or institutional profile pages (McRobert et al., 2018), and sending private messages to specific users (Barratt et al., 2015; McRobert et al., 2018).

Nineteen of the 73 articles combined SM recruitment with other recruitment approaches. Overall, 11 combined SM recruitment exclusively with other online recruitment methods, for example, the use of e-mail lists (e.g., Arentz et al., 2021; Harfield et al., 2021), online panels (Zhang et al., 2020; Guillory et al., 2016), or the crowdsourcing data acquisition platform Amazon Mechanical Turk (Reuter et al., 2019; Côté-Léger & Rowland, 2020). Three studies used a combination of online and offline approaches (Baxter et al., 2017; Barrat et al., 2015; McRobert et al., 2018). Another two used venue-based approaches (Admon et al., 2016; Guillory et al., 2018). Finally, one study used newspaper ads (Carter-Harris et al., 2016).

Most studies were conducted in the United States (n=37), followed by Australia (n=17). Three studies were conducted in Canada (Chu & Snider, 2013; Shaver et al., 2019; Archer-Kuhn et al., 2021), and one study each was conducted in Brazil (Samuels & Zucco, 2014), Egypt (Wiliamson et al., 2021), Jordan (Suliman et al., 2018), Malaysia (Shakir et al., 2019), Norway (Robstad et al., 2019), and Thailand (Khumsaen & Stephenson, 2017). A total of seven studies took a cross-national approach (e.g., Barratt et al., 2015; Chard et al., 2018), while another three recruited respondents across national boundaries (e.g., Ellis et al., 2018; Dean et al., 2012). Overall, 57 of the 73 selected articles focused on cross-regional populations within countries, and 16 on specific regions (e.g., Russomanno & Tree, 2020; Wilson et al., 2019).

The majority of studies focused on adult-aged participants (n=48). The rest targeted very specific age groups (e.g., 13-20 years, Ford et al., 2019; 55-77 years, Carter-Harris et al., 2016). In addition, most of the studies covered all genders (n=66). Seven targeted female participants only (e.g., Archer-Kuhn et al., 2021; Arentz et al., 2021), and eight focused on male respondents only (e.g., Seidler et al., 2021; Wagenaar et al., 2012a). A single study targeted transgender and gender non-conforming people (Russomanno & Tree, 2020).

Apart from basic demographic characteristics, most studies focused on specific target groups, for example, (ex-)smokers (e.g., Carter-Harris et al., 2016; Guillory et al., 2016), users of (illegal) drugs (e.g., Borodovsky et al., 2018; Daniulaityte et al., 2018), parents (e.g., Akard et al., 2015; Arcia, 2014), or certain ethnic groups (e.g., Admon et al., 2016; Harfield et al., 2021). A total of 24 studies focused on specific rare populations. Eleven of these studies focused on members of the LGBTQI* community (e.g., Mitchell & Petroll, 2012; Sharma et al., 2018), eight on patients with rare diseases (e.g., Chung et al., 2019; Woodward et al., 2016), two on specific professional groups (Robstad et al., 2019; Suliman et al., 2018), and one study each on indigenous populations (Harfield et al., 2021), victims of sextortion (Wolak et al., 2018), and parents of children with cancer (Akard et al., 2015). A further nine studies addressed hard-to-reach populations. Four of these studies targeted young smokers (e.g., Garey et al., 2020; Pepper et al., 2019), and one each focused on cannabis cultivators (Barratt et al., 2015), heavy-drinking smokers (Bold et al.,

2016), mothers who had experienced domestic violence (Archer-Kuhn et al., 2021), men who seek help from mental health services (Seidler et al., 2021), and Polish migrants (Pötzschke & Braun, 2017).

Recruitment Effectiveness

The total number of participants recruited via SM ranged from one participant recruited using a single post on a LinkedIn profile (McRobert et al., 2018) to 71,612 participants recruited using Facebook ads for a cross-national survey (Perrotta et al., 2021). The wide variation can be attributed to the recruitment strategies used as well as the different target groups.

Overall, the majority of unpaid SM strategies resulted in sample sizes n≤100. This includes all strategies that involved posting the survey invitation on a (profile) page. This was the case for posts on personal pages (e.g., Facebook profile page: n=21, Côté-Léger & Rowland, 2020; LinkedIn: n=1, Google +: n=41, McRobert et al., 2018), as well as on pages created specifically for the study (Facebook page: n=100, McRobert et al., 2018). Other unpaid strategies, such as posting a home-made video on YouTube (n=7; Barratt et al., 2015) and direct messaging on Twitter (n=67; Barratt et al., 2015), also resulted in a comparatively small number of cases. In contrast, unpaid strategies that relied on the group structure of SM platforms performed better. Of a total of twelve articles reporting results for group strategies, eight achieved a case count above 100 participants.

Table 3 Efficiency of the Studies Identified

Publication	N recruited via SM		% via SM	Other recruitment methods
Paid strategies				
Admon et al., 2016	Facebook	1,178	84.32	*Venue-based* – clinic-based recruitment
Carter-Harris et al., 2016	Facebook	331[a]	91.69[a]	*Newspaper ads*
Guillory et al., 2016	Twitter	568	26.36	*Online-Panel* – Qualtrics' panel aggregator
Guillory et al., 2018	Facebook & Instagram	6,611	47.27	*Venue-based* – LGBT social venues via in-person intercept interviews
Harfield et al., 2021	Facebook & Instagram	2,003	73.53	*E-mail*
Reuter et al., 2019	Twitter	704	48.82	*Internet-mediated recruitment method* – Amazon Mechanical Turk
Samuels & Zucco, 2014	Facebook	3,212[b]	72.46[b]	*Not specified* – National Probability Sample / face-to-face survey
Thornton et al., 2016	Facebook	553	56.03	*Internet-mediated recruitment methods* – community research database, first-year psychology courses at the University of Newcastle, New South Wales, Australia
Wolak et al., 2018	Facebook	2,148[a]	91.90[a]	*Internet-mediated recruitment methods* – website, shared by members of an advisory panel, ads on Google searches
Zhang et al., 2020	Facebook	2,432[a]	64.37[a]	*Online-Panel* – GfK Panel Provider
Paid and unpaid strategies				
Bennetts et al, 2019 paid	Facebook	3,440[a]	73.74[a]	*Internet-mediated recruitment methods* – ads in a popular online single-parent community, via e-mail
unpaid		1,146[a]	24.57[a]	

Publication			N recruited via SM	% via SM	Other recruitment methods
Côté-Léger & Rowland, 2020	unpaid	Facebook	21[a]	1.95[a]	*Internet-mediated recruitment methods* – giveaway websites, Amazon Mechanical
		Reddit	98[a]	9.09[a]	Turk, other not specified
	paid	Facebook	626[a]	58.07[a]	
		Reddit	80[a]	7.42[a]	
Unpaid strategies					
Arentz et al., 2021		Facebook	311[a]	63.08[a]	*E-mail* – Polycystic Ovary Association of Australia (organization) – e-mail
Barratt et al., 2015		Facebook	1,087[b]	12.91[b]	*Internet-mediated recruitment methods* – e-mail/e-newsletter, user website/forum,
		Twitter	67[b]	0.80[b]	online chat
		YouTube	7[b]	0.08[b]	*Offline methods* – news article, referrals by friends, family & associates, flyers/ posts, grower magazine, radio
Baxter et al., 2017		Facebook	17	5.31	*Internet-mediated recruitment methods* – direct mailing, e-mail, website, *Offline methods* – family, friends, clinic-based
McRobert et al., 2018		Twitter	552	28.83	*Internet-mediated recruitment methods* – e-mail, website placement, newsletter
		Facebook	100	5.22	*Offline methods* – flyer ads, in-person survey invitations, postal research flyers
		Google+	41	2.14	
		LinkedIn	1	0.05	
Robstad et al., 2019		Facebook	21	15.22	*E-mail* – *e-mail* list of nurses
Welton et al., 2020		Facebook	339	26.76	*Internet-mediated recruitment methods* – post on MedAdvisor

Note: a = completed interviews, b = eligible interviews.

Table 3 shows the eighteen studies that evaluated the effectiveness of SM recruitment using an additional method. Overall, the percentage of participants recruited via SM ranged from 5.31% (Baxter et al., 2017) to 91.90% (Wolak et al., 2018). The median percentage was 59.56%. Eleven of the 18 articles reported more than 50% recruitment via SM.

The comparison with other strategies highlights that most unpaid SM approaches were less effective. Only Arentz et al. (2021), comparing an invitation to participate in a pre-existing Facebook group to direct e-mail to members of an association, achieved a larger sample with SM (n=91; 90.10%). The other articles suggested that alternative recruitment approaches, such as ads on collaborating websites (Baxter et al., 2019), ads on mobile apps (Welton et al., 2020), or venue-based approaches (Robstad et al., 2019), were more effective in achieving a sufficient analytic sample for their study purpose.

Nevertheless, none of the articles concluded that recruitment via SM was not advisable overall. Some studies with small sample sizes using unpaid SM approaches combined these with more effective paid SM approaches (Bennetts et al., 2019; Côté-Léger & Rowland, 2020). Here, it is important to keep in mind that whereas unpaid recruitment strategies rely on sporadic releases of content on SM, paid recruitment strategies usually entail continuous promotion of content over a period of several days. It is therefore inevitable that the paid strategies perform better in terms of recruitment rates, as more people are exposed to the content overall. Other articles argue that the small SM samples nonetheless provide greater diversity to their study population (e.g., Baxter et al., 2017; Robstadt et al., 2019). Based on these findings, it can be concluded that unpaid SM approaches are less effective than paid approaches and other recruitment strategies overall. Still, they can serve as a complementary sampling method to expand the sample population in a cost-effective way.

The paid SM strategies reached a higher number of recruited individuals than the unpaid approaches. The median number of individuals reached through paid approaches was 2,003, with absolute numbers ranging from 154 to 144,034. The large difference in performance was due primarily to the duration of each recruitment strategy. Taking recruitment duration into account, the median number of individuals recruited per day was 35.51, again with wide variation in the number per day (range: 1.26 – 685.90).

The comparison with other strategies provides evidence that paid SM strategies may be advantageous over offline approaches. Three studies used targeted ads in combination with offline recruitment methods (Admon et al., 2016; Guillory et al., 2018; Carter-Harris et al., 2016). In all cases, the authors concluded that

recruitment via SM was more effective than the offline approach.[4] Compared with other Internet-mediated approaches, results for paid strategies were more diverse but generally showed a positive trend toward SM recruitment. Out of eight studies, six reported higher rates of recruitment via social media. Of these, one study combined Facebook ads with an online panel (Zhang et al., 2020), and one combined Facebook and Instagram ads with recruitment via an e-mail list (Harfield et al., 2021). Four studies used a combination of various other Internet-mediated recruitment methods (Bennetts et al., 2019; Côté-Léger & Rowland, 2020; Thornton et al., 2016; Wolak et al., 2018). The two studies that showed lower recruitment rates for paid SM strategies combined Twitter ads with an online panel (Guillory et al., 2016) and Twitter ads with Amazon Mechanical Turk (Reuter et al., 2019). Guillory et al. (2016) aimed to recruit 190 participants using each of the applied recruitment approaches and therefore concluded that the SM sample was effective for their study purpose.

Only two of the 24 studies focusing on rare populations combined an SM strategy with another approach. Welton et al. (2020) used a mix of unpaid posts in three Facebook groups and posts in a health app to reach individuals with seizure disorders and epilepsy. Overall, 26.76% (n=339) of participants enrolled via Facebook. The authors concluded that the combination of the two strategies was effective in obtaining a more diverse sample of the target population. Guillory et al. (2018) compared targeted ads on Facebook and Instagram with in-person intercept recruitment in LGBT bars and nightclubs to reach 18-24-year-old LGBT individuals. They concluded that both virtual (n=6,611; 47.27%) and local venues (n=7,375; 52.73%) were highly effective in recruiting a sufficient number of participants. Although more respondents were recruited through social venues, the researchers argued that SM was more efficient. Time spent recruiting in venues was much higher, as it included training, travel time to and from recruitment venues, and time to recruit at locations. In contrast, SM recruitment only required ad placement before the self-selection of participants into the survey could begin. Thus, much less time was needed to generate a large sample. Finally, the outstanding success in reaching LGBT* individuals might be because these rare population groups are particularly active in social venues and on SM in connecting with other community members. In conclusion, it is reasonable to assume that highly connected and active subgroups can be reached effectively via SM.

---

4   Although Guillory et al. (2018) recorded more participants with the venue-based approach, they concluded that ads on Facebook and Instagram were more effective because of the time savings.

Recruitment Costs

Of all studies that used at least partially paid strategies, 73 reported at least some information about recruitment costs. Table 4 contains an extensive overview of all reported financial and performance metrics. Given the variation in sample sizes, recruitment length, and SM strategies, it is not surprising that the overall cost varied widely. Total SM recruitment expenditures were given in 43 studies and ranged from $50.20 (n=404; Dean et al., 2012) to $10,388.17 (n=4,010; Lee et al., 2020 – Study 1).[5] The median total spent on recruitment via SM was $812.03. The cost per click (CPC), which applies to any paid advertising or promotion, was determined by daily fluctuating bid prices, as SM platforms offer advertising slots based on a competitive bidding system. Advertisers can bid on limited slots, and thus, demand determines the performance of the ads. Thus, while researchers can set a budget for ad campaigns, they have no control over the number of clicks generated by an ad. The information on the average CPC, available in 25 studies, varied between $0.02 (n=1,562; Shakir et al., 2019) to $2.16 (n=2,432; Zhang et al., 2020), with a median CPC of $0.36. Additionally, 39 studies reported the average cost per participant (CPP). The amount ranged from $0.18 (n=6,602; Ali et al., 2020) to $43.41 (n=661; Cavallo et al., 2020 – Twitter), and the median of CPP was $4.33.

Moreover, four studies compared the costs of different recruitment methods. Batterham (2014) found the cost of recruiting by postal and telephone recruitment (CPP: $13.56) to be significantly higher than for targeted ads on Facebook (CPP: $1.07 in Study 1; $7.09 in Study 2). Two studies came to a similar conclusion when comparing targeted ads on Facebook with venue-based recruitment (Admon et al., 2016: CPP: $14.63 vs. $23.51) and newspaper advertising (Carter-Harris et al., 2016: CPP: $1.51 vs. $40.8). The reasons were very high personnel and processing costs when recruiting offline. Here, SM approaches provide a clear advantage. Reuter et al. (2019) compared paid Tweet ads on Twitter with recruitment via Amazon Mechanical Turk to reach 500 participants with each approach. Again, the SM-based approach was more cost-effective (Overall cost: $980 vs. $3,500).

---

5   In the figures reported in the following, the dollar sign refers to U.S. dollars.

Table 4   Recruitment Costs of the Identified Studies

Publication		Cost of SM recruitment in USD			Cost of other recruitment in USD		Platform performance				Recruit. length in days
		Overall	CPC	CPP	Overall	CPP	Impressions	Users reached	Clicks	Unique clicks	
Paid strategies											
Admon et al., 2016	Facebook	11,103.25*	NR	14.63*	4,466.68*	23.51*	NR	364,035	9,972	NR	27
Ahmed et al., 2013	Facebook	NR	0.67	20.14	NA	NA	36,154,610	469,678	8,339	7,940	134
Akard et al., 2015	Facebook	1,129.88	1.08	<17.00	NA	NA	3,897,981	NR	1,050	NR	74
Ali et al., 2020	Facebook	906.00	0.09	0.18	NA	NA	NR	236,017	9,609	NR	10
Altshuler et al., 2015	Facebook	3,970.00	NR	3.00	NA	NA	NR	NR	8,673	NR	109
Arcia, 2014	Facebook	3,821.81	0.63	16.52	NA	NA	10,577,381	7,248,985	6,094	5,963	129
Batterham & Calear, 2021	Facebook	NR	NR	NR	NA	NA	NR	NR	7,174	NR	NC
Batterham, 2014	study 1 – Facebook	8,946.00[a]	NR	7.09[a]	215,982.00[a]	13,56[a]	NR	NR	12,773	NR	NC
	study 2 – Facebook	653.20[a]	NR	1.07[a]	215,982.00[a]	13,56[a]	NR	NR	NR	NR	NC
Bold et al., 2016	Facebook	480.89	0.27	4.37	NA	NA	102,697	NR	1,781	NR	14
Borodovsky et al., 2018	study 1 – Facebook	800.00	NR	NR	NA	NA	NR	168,894	3,708	NR	43
	study 2 – Facebook	809.00	NR	NR	NA	NA	NR	231,400	3,932	NR	28
	study 3 – Facebook	350.00	NR	NR	NA	NA	NR	126,945	5,480	NR	20
	study 4 – Facebook	293.00	NR	NR	NA	NA	NR	78,974	3,135	NR	6

Publication	Cost of SM recruitment in USD			Cost of other recruitment in USD		Platform performance				Recruit. length in days
	Overall	CPC	CPP	Overall	CPP	Impressions	Users reached	Clicks	Unique clicks	
study 5 – Facebook	402.00	NR	NR	NA	NA	NR	68,525	2,599	NR	9
study 6 – Facebook	377.00	NR	NR	NA	NA	NR	96,096	5,612	NR	7
Calear & Batterham, 2019 / Facebook	NR	NR	NR	NA	NA	NR	NR	NR	7,174	NC
Carter-Harris et al., 2016 / Facebook	500.00	NR	1.51	1,224.00	40.80	56,621	NR	NR	1,121	18
Cavallo et al, 2020 / Facebook & Instagram	NR	0.81/1.32	33.82	NR	NR	1,027,738	NR	8,507	NR	273[‡]
Twitter	NR	NR	43.41	NR	NR	2,998,715	NR	1,198	NR	273[‡]
Chard et al., 2018 / Facebook	NR	NR	NR	NA	NA	NR	NR	NR	11,850	5-16
Chu & Snider., 2013 / Facebook	1,053.91c	0.30c	11.97c	NA	NA	17,527,703	NR	3,440	NR	NC
Crosier et al., 2016 / Facebook	2,150.00	0.17-0.36	8.14	NA	NA	186,430	199,928	NR	NR	39
Daniulaityte et al., 2018 / Twitter	2,100.00	NR	NR	NA	NA	NR	NR	NR	NR	18
Ellis et al., 2018 / Facebook	NR	NR	NR	NA	NA	NR	NR	243	NR	NC
Folk et al., 2020 / Facebook	1,802.72	0.53	10.73	NA	NA	NR	500,208	NR	3,394	23
Ford et al., 2019 / study 1 – Facebook	274.56	0.30	4.76[+]	NA	NA	38,108	NR	915	NR	21
study 1 – Instagram	267.26	0.33	4.76[+]	NA	NA	2,222	NR	803	NR	20
study 1 – Snapchat	400.00	0.25	4.76[+]	NA	NA	114,200	NR	1,600	NR	10

Publication	Cost of SM recruitment in USD			Cost of other recruitment in USD		Platform performance				Recruit. length in days
	Overall	CPC	CPP	Overall	CPP	Impressions	Users reached	Clicks	Unique clicks	
study 2 – Facebook	25.44	0.28	4.76[+]	NA	NA	5,401	NR	89	NR	26
study 2 – Instagram	300.00	0.34	4.76[+]	NA	NA	98,982	NR	864	NR	26
study 2 – Snapchat	674.00	0.37	4.76[+]	NA	NA	504,700	NR	1,818	NR	NC
Garey et al., 2020 Facebook	522.39	0.50	NR	NA	NA	345,223	56,459	1,054	4,902	64
Instagram	2,084.82	0.33	NR	NA	NA	1,507,887	388,813	6,234	4,902	64
Guillory et al., 2016 Twitter	6,848.25	NR	NR	NR	NR	NR	590,954	2,691	NR	NR
Guillory et al., 2018 Facebook	NR	NR	NR	NR	NR	NR	324,959	7,249	NR	12
Harfield et al., 2021 Facebook & Instagram	631.90[a]	0.20[a]	NR	NA	NA	173,452	98,445	3,190	NR	‡
Khumsaen & Stephenson, 2017 Facebook	NR	NR	NR	NA	NA	154,210	NR	16,391	NR	14
Knapp et al., 2019 Facebook & Instagram	NR	NR	NR	NA	NA	NR	126,945	5,480	NR	20
Leach et al., 2019 Facebook	5,170.00	NR	0.68-4.86	NA	NA	NR	NR	NR	NR	NC
Lee et al., 2020 study 1 – Facebook	10,388.17[a]	NR	3.23	NA	NA	NR	413,742	15,291	NR	NC
study 2 – Facebook	4,600.63	NR	1.10	NA	NA	NR	261,457	10,702	NR	NC
Manski & Kottke, 2015 Facebook	NR	0.52	5.98	NA	NA	NR	NR	3,720	NR	NC
Mitchell & Petroll, 2012 Facebook	NR	NR	NR	NA	NA	8,500,000	NR	NR	7,994	70[‡]

Publication		Cost of SM recruitment in USD			Cost of other recruitment in USD		Platform performance				Recruit. length in days
		Overall	CPC	CPP	Overall	CPP	Impressions	Users reached	Clicks	Unique clicks	
Nelson et al., 2014	Facebook	NR	NR	1.36	NA	NA	3,254,666	NR	2,440	NR	72
Obamiro et al., 2020	Facebook	NR	0.04°	1.40	NA	NA	590,757	136,640	9,627	NR	91.25‡
Pepper et al., 2019	Facebook	NR	NR	NR	NA	NA	NR	NR	25,730	NR	NC
	Instagram	NR	NR	NR	NA	NA	NR	NR	16,300	NR	NC
Perrotta et al., 2021	Facebook	NR	0.17	1.25	NA	NA	19,300+	NR	NR	NR	15-37
Pötzschke & Braun, 2017	Facebook & Instagram	557	0.13/ 0.25	0.52	NA	NR	173,084	90,436	5,080	3,721	30
Ramo & Prochaska, 2012	Facebook	6,628.24	0.45	4.28	NA	NA	28,683,151	NR	14,808	NR	395‡
Reuter et al., 2019	Twitter	980.00	NR	NR	3,500.00	NR	NR	NR	NR	NR	17
Rosenzweig & Zhou, 2021	Facebook	1,959.84	NR	NR	NA	NA	2,730,047	1,337,866	31,263	NR	15
Rosso & Sharma, 2020	Facebook & Instagram	NR	NR	NR	NA	NA	680,290	NR	NR	3,849	NC
Russomanno & Tree, 2020	Facebook	NR	NR	NR	NA	NA	NR	NR	NR	742	NC
Salk et al., 2020	Facebook & Instagram	1,536.00	NR	NR	NA	NA	377,469	NR	8,747	NR	NC
Samuels & Zucco, 2014	Facebook	4,972.79	0.22	1.74*	NR	NR	47,100,000	4,600,000	NR	22,181	29
Shakir et al., 2019	Facebook	NR	0.02b	NR	NA	NA	5,282,661	1,652,361	114,054	NR	70
Sharma et al., 2018	Facebook	NR	NR	NR	NA	NA	352,997	NR	14,968	NR	NC
Shaver et al., 2019	Facebook	1,365.00c	NR	1.30c	NA	NA	132,021	34,012	2,316	2,067	40
Sullivan et al., 2011	MySpace	NR	NR	NR	NA	NA	8,257,271	NR	30,559	NR	29

Publication		Cost of SM recruitment in USD			Cost of other recruitment in USD		Platform performance				Recruit. length in days
		Overall	CPC	CPP	Overall	CPP	Impressions	Users reached	Clicks	Unique clicks	
Sunderland et al., 2017	study 1 – Facebook	NR	NR	NR	NA	NA	NR	NR	39,945	NR	NC
	study 2 – Facebook	NR	NR	NR	NA	NA	NR	NR	7,174	NR	NC
Thornton et al., 2016	Facebook	975.83	0.44	1.86	NA	NA	4,106,729	NR	2,220	NR	34
Wagenaar et al., 2012[a]	MySpace	NR	NR	NR	NA	NA	8,257,271	NR	30,559	NR	29
Webler et al., 2020	Facebook	200.00	NR	0.53	NA	NA	NR	NR	NR	NR	7[‡]
Williamson & Malik, 2021	Facebook	NR	NR	NR	NA	NA	NR	4,057,249	NR	10,237	NC
Wilson et al., 2019	Facebook	NR	NR	0.41[a]	NA	NA	NR	NR	NR	NR	NC
Wolak et al., 2018	Facebook	NR	NR	NR	NR	NR	NR	1,370,802	NR	NR	NC
Woodward et al., 2016	Facebook	NR	NR	4.44[a]	NR	NR	NR	NR	NR	1,668	96
Zhang et al., 2020	Facebook	NR	2.16	4.05	NR	NR	NR	NR	NR	7,642	14[‡]
Paid and unpaid strategies											
Archer-Kuhn et al., 2021	Facebook – targeted ads	432.98	0.31	4.76	NA	NA	NR	42,488	1,375	521	122
Barnes et al, 2021	Facebook – boosted post	815.06[a]	NR	1.02[a]	NA	NA	71,787	88,650	1,739	NR	74
	Facebook – post & direct message	NA	NA	NA	NA	NA	22,482	14,542	156	NR	74

Publication		Cost of SM recruitment in USD			Cost of other recruitment in USD		Platform performance				Recruit. length in days
		Overall	CPC	CPP	Overall	CPP	Impressions	Users reached	Clicks	Unique clicks	
Bennetts et al, 2019	Facebook	5,658.17[a]	1.07[a]	1.65[a]	142.00[a]	NR	NR	446,787	8,364	NR	135
Cahill et al., 2019	Facebook	500.00	1.91[†]	3.16/3.13	NA	NA	NR	NR	NR	NR	14
	Twitter	500.00	9.90[†]	10.00/1.76	NA	NA	NR	NR	NR	NR	10
Chung et al., 2019	Facebook – promoted page	206.00	NR	2.92	NA	NA	NR	1,933	15	NR	35[‡]
	Facebook – targeted ads	176.00	NR	2.19	NA	NA	NR	NR	NR	699	35[‡]
Dean et al., 2012	Second Life	50.20	NR	NR	NA	NA	NA	NA	NA	NA	
Yuan et al., 2014	Facebook, Twitter, LinkedIn, Tumblr	5,021.00	0.64	3.56	NA	NA	NR	NR	10,006	NR	NC

Note. Results from Samules & Zucco (2014) were supplemented with data from Samules & Zucco (2013); results from Perrotta et al. (2021) were supplemented with data from Grow et al. (2020), and results from Ahmed et al. (2013) were supplemented with data from Fenner et al. (2012). CPC = cost per click; CPP = cost per completed; NR = not reported; NA = not applicable; NC = not computable; * = incl. other costs (e.g., incentives, salaries, pilot study costs, etc.); ° = cost per impression; † = cost per 1,000 impressions; + = own calculations (1 week = 7 days; 1 month = 30.42 days); a = AUD converted to USD at a rate of 0.71; b = MYR converted to USD at a rate of 0.24; c = CD converted to USD at a rate of 0.78; AUD converted to USD at a rate of 0.71.

Overall, few of the studies on rare or hard-to-reach populations provided information on costs. Of the 33 total studies, 25 used at least one paid SM strategy. However, only nine of the 25 studies included information on the exact cost of completed interviews (Akard et al., 2015; Archer-Kuhn et al., 2021; Bold et al., 2016; Chung et al., 2019; Crosier et al., 2016; Pötzschke & Braun, 2017; Ramo & Prochaska, 2012; Woodward et al., 2016; Yuan et al., 2014). All studies used targeted ads on Facebook as a paid recruitment strategy. The most cost-effective completed interviews were reported by Pötzschke and Braun (2017), who used a combination of Facebook and Instagram ads to recruit Polish migrants in four European countries ($0.52 per interview). The most expensive completed interviews were recorded by Akard et al. (2015), who used targeted advertising on Facebook to reach parents of children with cancer (just under $17.00 per interview). All nine studies concluded that the SM approaches were highly cost-effective. These findings suggest great potential for the cost-effective recruitment of rare or hard-to-reach population groups via SM. This is especially relevant in terms of cost planning for data collection, particularly since probabilistic sampling strategies require a very high number of attempts to contact these populations, which in turn greatly increases costs. On SM platforms, on the other hand, group structures and targeting options can be used to reach specific individuals in a targeted manner, making recruitment more cost-effective.

Social Media's Representation of the Population

Recruitment effectiveness and cost-effectiveness must be balanced against a sample's ability to represent an intended target population. Since samples recruited via SM are non-probability-based, target group members have unequal chances of being included. One of the biggest challenges in correcting this selectivity is the lack of available information about who actively decides not to participate in the survey. In most cases, data about the total population active on each SM platform is unavailable. Without this information, there is almost no way to make probabilistic inferences about the population. As a result, the conclusions of most SM samples cannot be readily extrapolated (Lehdonvirta et al., 2020).

However, the goal of such survey designs is not always to obtain a representative sample of respondents. All reviewed articles discussed the issue of the scope of the recruited sample, at least in terms of study limitations. Most concluded that their studies could not be generalized to the entire target population. None of the eight articles that used exclusively unpaid strategies included a comparison of the SM sample with known distributions of the target population. However, some of these studies aimed not to create a representative sample but rather to gain insight into an area of research (e.g., Avery-Desmarais et al., 2021).

More than two-thirds of the articles that used at least one paid strategy (n=44; 67.69%) concluded that the sample was not representative due to the SM population's unknown composition or the "black box" of advertising algorithms. The remaining 21 articles evaluated the representativeness of characteristics of the population of interest. Their findings were mixed overall. Most comparisons concluded that the samples were only partially representative. The characteristics most often described as imbalanced included age, gender, education level, and ethnicity/race. Table 5 provides a detailed listing of biased and unbiased demographics.

Age bias was reported in twelve articles. A total of seven articles reported the overrepresentation of young people or adolescents. Additionally, Batterham and Calear (2021) reported an underrepresentation of elderly populations. The biased estimates may be due to the comparatively younger SM population on most platforms. Furthermore, younger people generally spend more time on SM, which increases the chances of reaching this group. However, the findings of Ali et al. (2020) and Perrotta et al. (2021) differ. Both had a comparatively high proportion of older individuals in their samples. This could be due to the specific topic of the surveys: Ali et al. (2020) and Perrotta et al. (2021) surveyed beliefs and behaviors in the context of the COVID-19 pandemic. Because an infection poses a higher risk of severe complications, particularly for older adults, it is reasonable to assume that this group would have a higher interest in study participation.

Regarding the distribution of gender and education level, there were further limitations on representativeness. Five studies using Facebook for recruitment found an overrepresentation of female participants (Batterham & Calear, 2021; Batterham, 2014; Carter-Harris et al., 2016; Chung et al., 2019; Harfield et al., 2021). This may be because females tend to be more active on SM (Pew Research Center, 2015). Dean et al. (2012) found the opposite gender effect, that is, a higher number of males, in a sample recruited via Second Life. In addition, eight studies found a trend toward participants with higher levels of education (Ahmed et al., 2013; Ali et al., 2020; Bennetts et al., 2019; Carter-Harris et al., 2016; Nelson et al., 2014; Perrotta et al., 2021; Rosenzweig & Zhou, 2021; Zhang et al., 2020). All these studies used targeted ads on Facebook to recruit their participants.

Table 5   Check for Representativeness

Publication	Comparison	Sociodemographics	SM
Paid strategies			
Ahmed et al., 2013	Australian Census Data 2006	• age: younger age group (16-17 years) underrepresented • education: higher educational level overrepresented • geographic area: representative to comparison • socioeconomic status: representative to comparison	Facebook
Ali et al., 2020	U.S. Census 2018-2019	• gender: representative to comparison • age: younger adults underrepresented • education: higher education overrepresented • ethnicity/race: Non-Hispanic whites overrepresented	Facebook
Altshuler et al., 2015	U.S. Census	• gender: representative to comparison • age: younger age group (13-18 years) overrepresented • ethnicity/race: Hispanics/Latinos underrepresented; Blacks/African Americans overrepresented; individuals with two or more races overrepresented • geographic area: Southerners underrepresented; Westerners overrepresented	Facebook
Arcia, 2014	National Vital Statistics Reports 2010	• age: younger mothers overrepresented • ethnicity/race: Hispanics underrepresented	Facebook
Batterham & Calear, 2021	Australian population (not defined further)	• gender: females overrepresented • age: older age-group (65+ years) underrepresented	Facebook
Batterham, 2014	Australian Census Data & National Survey Data	• gender: females overrepresented • age: younger adults overrepresented; older adults underrepresented	Facebook
Borodovsky et al., 2018	U.S. Census 2015	• geographic area: representative to comparison	Facebook

Publication	Comparison	Sociodemographics	SM
Carter-Harris et al., 2016	parallel Newspaper recruitment (not representative for the U.S. population)	• gender: females overrepresented • education: high school graduates or higher overrepresented • ethnicity/race: non-Hispanic Caucasians overrepresented • geographic area: representative to zip code areas	Facebook
Daniulaityte et al., 2018	U.S. Census 2017	• ethnicity/race: representative to comparison	Twitter
Harfield et al., 2021	Australian Bureau of Statistics information 2016	• gender: females overrepresented • age: younger age group (16-19) overrepresented • ethnicity/race: Aboriginal and Torres Strait Islanders overrepresented • geographic area: urban young people overrepresented	Facebook & Instagram
Nelson et al., 2014	Census data Minneapolis/St. Paul	• education: higher education overrepresented	Facebook
Perrotta et al., 2021	Eurostat 2019, U.S. census 2018	• age: older people overrepresented in Italy and the United Kingdom • education: higher education overrepresented in Belgium, France, Spain, the United Kingdom, and the United States	Facebook
Rosenzweig & Zhou, 2021	Afrobarometer	• age: younger people overrepresented • education: higher educational level overrepresented • geographic area: urban areas overrepresented • socioeconomic status: wealthy adults overrepresented	Facebook
Seidler et al., 2021	Ten to men study cohort	• age: representative to comparison • ethnicity/race: Aboriginal or Torres Strait Islander men underrepresented	Facebook
Shaver et al., 2019	Census Data for Newfoundland and Labrador 2016	• age: older age group (60-64 years) overrepresented • geographic area: representative to comparison • socioeconomic status: lower income groups underrepresented	Facebook
Wagenaar et al., 2012b	U.S. Bureau & CIA information	• ethnicity/race: whites overrepresented in South Africa; Blacks overrepresented in the United States	Facebook

Publication	Comparison	Sociodemographics	SM
Zhang et al., 2020	American Community Survey 2016	▪ age: younger age-group (18-24 years) overrepresented ▪ education: higher education levels overrepresented ▪ ethnicity/race: whites underrepresented	Facebook
Paid and unpaid strategies			
Bennetts et al, 2019	Longitudinal Study of Australian Children (LSAC)	▪ education: higher educational level overrepresented ▪ migration background: migration background underrepresented	Facebook
Chung et al., 2019	National Data of Kidney transplant recipients 2016	▪ gender: females overrepresented ▪ ethnicity/race: African Americans underrepresented	Facebook
Dean et al., 2012	American Community Survey	▪ age: younger people overrepresented ▪ gender: males overrepresented ▪ ethnicity/race: Blacks underrepresented; Asians overrepresented	Second Life
Yuan et al., 2014	HIV Population in the U.S. (Centers for Disease Control and Prevention information)	▪ ethnicity/race: African Americans / Latinos underrepresented	Facebook, Twitter, LinkedIn, Tumblr

Studies reported mixed findings regarding the representation of ethnic groups. Ali et al. (2020), Arcia (2014), and Altshuler et al. (2015) found an underrepresentation of Hispanics and overrepresentation of non-Hispanics, respectively. Chung et al. (2019) and Yuan et al. (2014) found an underrepresentation of African Americans. Since all these studies used Facebook as their primary sampling frame, the results indicate a distinct limitation of this platform as a recruitment tool.

To increase the national representativeness of their surveys, Perrotta et al. (2021) and Zhang et al. (2020) applied weights to compare their samples to population data. Perrotta et al. (2021) used a post-stratification weighting approach, and Zhang et al. (2020) used an inverse probability weighting approach. These procedures led, at least partially, to corrected results comparable to population data. Appropriate weighting strategies might thus increase the quality of SM samples. Nevertheless, these two examples should not be taken as irrefutable proof of the effectiveness of weighting methods in obtaining representative results. Despite weighting strategies, bias was still found in both studies.

Discussion

This literature review synthesized the available evidence on the strengths and weaknesses of SM as a recruitment tool for online surveys. The majority of studies included in this review concluded that recruitment via SM was an effective method for their study purposes. In particular, studies comparing SM and offline strategies showed SM to have the advantages of a wide reach and the ability to reach audiences. In addition, studies comparing SM and other online strategies showed that the options of targeting and promoting ads in SM were beneficial. Unpaid SM strategies, on the other hand, tended to be less effective than other approaches. Nevertheless, unpaid strategies should not be considered generally ineffective. Indeed, the review showed that these approaches could be used effectively to complement other recruitment strategies to reach specific subgroups of a target population.

Beyond that, studies showed that SM recruitment was effective for reaching rare populations. This is one of the most significant advantages of these recruitment strategies. Due to the many SM platforms and numerous daily online user interactions, researchers can reach even very rare populations at a scale sufficient for their study purposes. The group structures, as well as the extensive targeting options, enable targeting of even very precisely defined populations. Thus, SM strategies offer a recruitment option for cases in which probabilistic sampling methods meet their limits due to financial, personnel, or time constraints, as well as a lack of sampling frames. The benefits were particularly evident for the recruitment of LGBT people, who tend to be highly connected through SM.

The costs of SM approaches varied widely across studies. Most studies reported SM strategies to be very cost-effective, but the costs depended heavily on the target audience. Comparisons of SM recruitment with other recruitment approaches highlighted the advantages of SM in terms of recruitment costs. Likewise, studies focusing on rare or hard-to-reach populations illustrated the argument for high cost-effectiveness of SM recruitment, as probabilistic recruitment strategies to reach these groups would involve a high number of contact attempts and would thus inevitably increase costs.

Finally, most studies that aimed for representative results showed bias in some sociodemographic variables. Study results showed, for example, disproportionate percentages of women and highly educated individuals in samples recruited via Facebook. A remaining problem is the lack of control when relying on paid SM strategies and allocation algorithms. The SM platforms covered in this review are not transparent as to the sum of all underlying decision-making mechanisms that influence the placement of ads or promoted content. Potential selectivity bias cannot be ruled out without further insight into the allocation mechanism. However, many of the studies reviewed did not aspire to generalize their results, arguing that the results were not transferable or valid outside a narrow framework.

Unpaid strategies such as posts in groups or communities can be used in the form of an online venues-based approach to reach certain subgroups. Direct messages offer a digital version of an outreach event. Finally, paid SM recruitment strategies allow monitoring of participant demographic characteristics and can be used to target population members accordingly.

Additionally, this literature review produced some more general findings. Several scientific papers lacked sufficient documentation. Only if the recruitment process is transparent can results be interpreted in a real context, making follow-up research or reproducible studies possible. Furthermore, many studies lacked reflection on the quality of the data obtained. While most studies described the lack of representativeness, few commented on the impacts of, for example, the devices used or the risk of falsified or faked responses.

The Internet and SM have a significant influence on survey research. The ongoing growth of the Internet and the increasing number of SM users offer great potential for future participant recruitment. It is essential to continue research in this area and (critically) reflect on new developments to ensure and update scientific standards accordingly.

Directions for Future Research

The literature review highlighted several areas for future research. Only a fraction of the studies included using paid strategies explicitly reported performance met-

rics for the individual advertisements. Therefore, the question of what types of ad design were more appealing to potential participants could not be answered in most cases. Future studies should explicitly address the performance of individual ads and the effect of design differences between ads.

The results of many of the articles included in this review cannot be generalized beyond specific populations. Only in a few cases, when controlling for several indicators and using probability-based survey data and a known population base, can the results be reasonably generalized. All of the studies considered reported at least a low level of bias. Further research is needed to systematically address whether SM can be used at all to recruit representative samples and, if so, which SM platforms and strategies are the most suitable for this purpose. Furthermore, to comprehensively describe the representativeness of samples recruited via SM, future studies should explicitly include parameters matching census data or national surveys in the questionnaire to allow for comparability.

When using SM for survey recruitment, users need to see and read the invitation to join the online survey. Without information on the group that has been exposed to the invitation, it is impossible to determine whether representativeness problems were due to algorithm allocation processes that caused underrepresented groups not to see the ads, or whether underrepresented groups simply did not want to participate. To date, little research exists on the perception of ads and promoted content on SM platforms. A future approach could be to study attention to ads on SM through, for example, eye-tracking tests.

In general, only a few articles covered in this review addressed the possibility of fraudulent enrolment when recruiting survey participants via SM. Since many of the SM platforms use limited account validation measures, there is always a risk of multiple participation and intentional falsification of survey data. Furthermore, it cannot be ensured that participants originated from the platforms. Since recruitment is uncontrolled, survey links can be shared and distributed outside the platforms. Further work is needed to evaluate methods to ensure data authenticity, such as tracking IP addresses or referral URLs, to investigate participant conversion patterns further.

Few studies mentioned the use of incentives to recruit respondents via SM. There is a tension between the use of incentives and the simultaneous risk of generating a high proportion of fraudulent interviews. Future research should test incentivization methods for SM surveys, taking the resulting data quality into consideration. In addition, only one study incorporated incentive costs into expenditures. However, the use of incentives could have an impact on the evaluation of cost-effectiveness. This is where further research could come in and examine whether the argument for cost-effective recruitment remains valid when incentive costs are considered.

References

Admon, L., Haefner, J. K., Kolenic, G. E., Chang, T., Davis, M. M., & Moniz, M. H. (2016). Recruiting Pregnant Patients for Survey Research: A Head to Head Comparison of Social Media-Based Versus Clinic-Based Approaches. *Journal of Medical Internet Research*, *18(12)*. doi:10.2196/jmir.6593

Ahmed, N., Jayasinghe, Y., Wark, J. D., Fenner, Y., Moore, E. E., Tabrizi, S. N., Fletcher, A., & Garland, S. M. (2013). Attitudes to chlamydia screening elicited using the social networking site Facebook for subject recruitment. *Sexual Health*, *10*(3), 224–228. doi:10.1071/SH12198

Akard, T. F., Wray, S., & Gilmer, M. J. (2015). Facebook Advertisements Recruit Parents of Children With Cancer for an Online Survey of Web-Based Research Preferences. *Cancer Nursing*, *38*(2), 155–161. doi:10.1097/NCC.0000000000000146

Ali, S. H., Foreman, J., Capasso, A., Jones, A. M., Tozan, Y. & DiClemente, R. J. (2020). Social media as a recruitment platform for a nationwide online survey on COVID-19 knowledge, beliefs, and practices in the United States: methodology and feasibility analysis. *BMC Medical Research Methodology, 116*. doi: 10.1186/s12874-020-01011-0

Al-Shaqsi, S. Z., Rai, A., Forrest, C., & Phillips, J. (2020). Public Perception of a Normal Head Shape in Children With Sagittal Craniosynostosis. *Journal of Craniofacial Surgery*, *31*(4), 940–944. doi:10.1097/SCS.0000000000006260

Altshuler, A. L., Storey, H. L., & Prager, S. W. (2015). Exploring abortion attitudes of US adolescents and young adults using social media. *Contraception*, *91*(3), 226–233. doi:10.1016/j.contraception.2014.11.009

Archer-Kuhn, B., Beltrano, N. R., Hughes, J., Saini, M., & Tam, D. (2021). Recruitment in response to a pandemic: pivoting a community-based recruitment strategy to facebook for hard-to-reach populations during COVID-19. *International Journal of Social Research Methodology*, pp. 1–12. doi:10.1080/13645579.2021.1941647

Arcia, A. (2014). Facebook Advertisements for Inexpensive Participant Recruitment Among Women in Early Pregnancy. *Health Education & Behavior*, *41*(3), 237–241. doi:10.1177/1090198113504414

Arentz, S., Smith, C. A., Abbott, J., & Bensoussan, A. (2021). Perceptions and experiences of lifestyle interventions in women with polycystic ovary syndrome (PCOS), as a management strategy for symptoms of PCOS. *BMC Women's Health*, *21*(1). doi:10.1186/s12905-021-01252-1

Avery-Desmarais, S. L., McCurry, M. K., Sethares, K. A., Batchelder, A., & Stover, C. (2021). Internet Recruitment of a Diverse Population of Lesbian, Gay, and Bisexual Nurses in a Study of Substance Use and Minority Stress. *Journal of Transcultural Nursing*, 10436596211042071. doi:10.1177/10436596211042071

Bach, R. L., Kern, C., Amaya, A., Keusch, F., Kreuter, F., Hecht, J., & Heinemann, J. (2021). Predicting Voting Behavior Using Digital Trace Data. *Social Science Computer Review*, *39*(5), 862–883. doi:10.1177/0894439319882896

Barnes, L. A., Barclay, L., McCaffery, K., Rolfe, M. I., & Aslani, P. (2021). Using Facebook to recruit to a national online survey investigating complementary medicine product use in pregnancy and lactation: A case study of method. *Research in Social & Administrative Pharmacy*, *17*(5), 864–874. doi:10.1016/j.sapharm.2020.07.011

Barratt, M. J., Potter, G. R., Wouters, M., Wilkins, C., Werse, B., Perala, J., Pedersen, M. M., Nguyen, H., Malm, A., Lenton, S., Korf, D., Klein, A., Heyde, J., Hakkarainen, P., Frank, V. A., Decorte, T., Bouchard, M., & Blok, T. (2015). Lessons from conduct-

ing trans-national Internet-mediated participatory research with hidden populations of cannabis cultivators. *International Journal of Drug Policy*, *26*(3), 238–249. doi:10.1016/j.drugpo.2014.12.004

Batterham, P. J. (2014). Recruitment of mental health survey participants using Internet advertising: content, characteristics and cost effectiveness. *International Journal of Methods in Psychiatric Research*, *23*(2), 184–191. doi:10.1002/mpr.1421

Batterham, P. J., & Calear, A. L. (2021). Incorporating psychopathology into the interpersonal-psychological theory of suicidal behavior (IPTS). *Suicide and Life-Threatening Behavior*, *51*(3), 482–491. doi:10.1111/sltb.12727

Baxter, M., Erby, L., Roter, D., Bernhardt, B. A., Terry, P., & Guttmacher, A. (2017). Health screening behaviors among adults with hereditary hemorrhagic telangiectasia in North America. *Genetics in Medicine*, *19*(6), 659–666. doi:10.1038/gim.2016.161

Bennetts, S. K., Hokke, S., Crawford, S., Hackworth, N. J., Leach, L. S., Nguyen, C., Nicholson, J. M., & Cooklin, A. R. (2019). Using Paid and Free Facebook Methods to Recruit Australian Parents to an Online Survey: An Evaluation. *Journal of Medical Internet Research*, *21*(3), e11206. doi:10.2196/11206

Bolanos, F., Herbeck, D., Christou, D., Lovinger, K., Pham, A., Raihan, A., Rodriguez, L., Sheaff, P., & Brecht, M. L. (2012). Using facebook to maximize follow-up response rates in a longitudinal study of adults who use methamphetamine. *Substance abuse: research and treatment*, *6*, pp. 1–11. doi:10.4137/SART.S8485

Bold, K. W., Hanrahan, T. H., O'Malley, S. S., & Fucito, L. M. (2016). Exploring the Utility of Web-Based Social Media Advertising to Recruit Adult Heavy-Drinking Smokers for Treatment. *Journal of Medical Internet Research*, *18*(5). doi:10.2196/jmir.5360

Borodovsky, J. T., La Marsch, & Budney, A. J. (2018). Studying Cannabis Use Behaviors With Facebook and Web Surveys: Methods and Insights. *JMIR Public Health and Surveillance*, *4*(2), 370–383. doi:10.2196/publichealth.9408

Boyd, D. M., & Ellison, N. B. (2008). Social Network Sites: Definition, History, and Scholarship. *Journal of Computer-Mediated Communication*, *13*, pp. 210–230. doi:10.1111/j.1083-6101.2007.00393.x

Brickman Bhutta, C. (2012). Not by the Book: Facebook as a Sampling Frame. *Sociological Methods & Research*, *41*(1), 57–88. doi:10.1177/0049124112440795

Cahill, T., Wertz, B., Zhong, Q. K., Parlato, A., Donegan, J., Forman, R., Manot, S., Wu, T. Y., Xu, Y. Z., Cummings, J. J., Cunningham, T. N., & Wang, C. (2019). The Search for Consumers of Web-Based Raw DNA Interpretation Services: Using Social Media to Target Hard-to-Reach Populations. *Journal of Medical Internet Research*, *21*(7). doi:10.2196/12980

Calear, A. L., & Batterham, P. J. (2019). Suicidal ideation disclosure: Patterns, correlates and outcome. *Psychiatry Research*, *278*, 1–6. doi:10.1016/j.psychres.2019.05.024

Canan, S. N., Kaplan, A. M. & Jozkowski, K. N. (2021). Comparing Rates of Sexual Assault Between Panel Quota and Social Media Samples: Findings Across Sexual Orientation Categories. *Journal of Interpersonal Violence*. doi:10.1177/0886260521105627

Carter-Harris, L., Ellis, R. B., Warrick, A., & Rawl, S. (2016). Beyond Traditional Newspaper Advertisement: Leveraging Facebook-Targeted Advertisement to Recruit Long-Term Smokers for Research. *Journal of Medical Internet Research*, *18*(6). doi:10.2196/jmir.5502

Cavallo, D., Lim, R., Ishler, K., Pagano, M., Perovsek, R., Albert, E., Gonzalez, S. K., Trapl, E., & Flocke, S. (2020). Effectiveness of Social Media Approaches to Recruiting

Young Adult Cigarillo Smokers: Cross-Sectional Study. *Journal of Medical Internet Research*, *22*(7). doi:10.2196/12619

Chard, A., Metheny, N. S., Sullivan, P. S., & Stephenson, R. (2018). Social Stressors and Intoxicated Sex Among an Online Sample of Men who have Sex with Men (MSM) Drawn from Seven Countries. *Substance Use & Misuse*, *53*(1), 42–50. doi:10.1080/10826084.2017.1322985

Chu, J. L., & Snider, C. E. (2013). Use of a Social Networking Web Site for Recruiting Canadian Youth for Medical Research. *Journal of Adolescent Health*, *52*(6), 792–794. doi:10.1016/j.jadohealth.2012.12.002

Chung, S. Y., Hacker, E. D., Rawl, S., Ellis, R., Bakas, T., Jones, J., & Welch, J. (2019). Using Facebook in Recruiting Kidney Transplant Recipients for a REDCap Study. *Western Journal of Nursing Research*, *41*(12), 1790–1812. doi:10.1177/0193945919832600

Côté-Léger, P., & Rowland, D. L. (2020). Estimations of Typical, Ideal, Premature Ejaculation, and Actual Latencies by Men and Female Sexual Partners of Men During Partnered Sex. *Journal of Sexual Medicine*, *17*(8), 1448–1456. doi:10.1016/j.jsxm.2020.04.317

Crosier, B. S., Brian, R. M., & Ben-Zeev, D. (2016). Using Facebook to Reach People Who Experience Auditory Hallucinations. *Journal of Medical Internet Research*, *18*(6). doi:10.2196/jmir.5420

Daniulaityte, R., Zatreh, M. Y., Lamy, F. R., Nahhas, R. W., Martins, S. S., Sheth, A., & Carlson, R. G. (2018). A Twitter-based survey on marijuana concentrate use. *Drug and Alcohol Dependence*, *187*, pp. 155–159. doi:10.1016/j.drugalcdep.2018.02.033

Dean, E., Cook, S., Murphy, J., & Keating, M. (2012). The Effectiveness of Survey Recruitment Methods in Second Life. *Social Science Computer Review*, *30*(3), 324–338. doi:10.1177/0894439311410024

Dijck, J. (2013). The Culture of Connectivity: A Critical History of Social Media. Oxford: Oxford University Press.

Ellis, R. J., Ganci, A., Head, K. J., & Ofner, S. (2018). Characteristics of Adults Managing Vitamins/Supplements and Prescribed Medications – Who Is Using, Not Using, and Abandoning Use of Pillboxes? A Descriptive Study. *Clinical Nurse Specialist*, *32*(5), 231–239. doi:10.1097/NUR.0000000000000395

Erhardt, J., & Freitag, M. (2021). The Janus-Face of Digitalization: The Relation Between Internet Use and Civic Engagement Reconsidered. *Social Science Computer Review*, *39*(3), 315–334. doi:10.1177/0894439319861966

Ersanilli, E. & van der Gaag, M. (2022). Data report: online surveys, Wave 2 & Polish 2021 online survey. *MOBILISE working papers*. doi: 10.31235/osf.io/twrzq

Facebook (October 25, 2021). Facebook Q3 2021 Earnings. Facebook Reports Third Quarter 2021 Results. Retrieved February 18, 2022, from: www.s21.q4cdn.com/399680738/files/doc_financials/2021/q3/FB-09.30.2021-Exhibit-99.1.pdf

Fenner, Y., Garland, S. M., Moore, E. E., Jayasinghe, Y., Fletcher, A., Tabrizi, S. N., Gunasekaran, B., & Wark, J. D. (2012). Web-Based Recruiting for Health Research Using a Social Networking Site: An Exploratory Study. *Journal of Medical Internet Research*, *14*(1). doi:10.2196/jmir.1978

Ferg, R., Conrad, F., & Gagnon-Bartsch, J. (2021). A Critical Evaluation of Tracking Public Opinion with Social Media: A Case Study in Presidential Approval. *methods, data, analyses, 15(2)*, 26. doi:10.12758/mda.2021.04

Folk, J. B., Harrison, A., Rodriguez, C., Wallace, A., & Tolou-Shams, M. (2020). Feasibility of Social Media-Based Recruitment and Perceived Acceptability of Digital Health

Interventions for Caregivers of Justice-Involved Youth: Mixed Methods Study. *Journal of Medical Internet Research*, *22*(4). doi:10.2196/16370

Ford, K. L., Albritton, T., Dunn, T. A., Crawford, K., Neuwirth, J., & Bull, S. (2019). Youth Study Recruitment Using Paid Advertising on Instagram, Snapchat, and Facebook: Cross-Sectional Survey Study. *JMIR Public Health and Surveillance*, *5*(4), 111–119. doi:10.2196/14080

Garey, L., Japuntich, S. J., Nelson, K. M., & Scott-Sheldon, L. A. (2020). Using Social Media to Recruit Youth Who Use Electronic Cigarettes. *American Journal of Health Behavior*, *44*(4), 488–498. doi:10.5993/AJHB.44.4.10

Groves, R. M. (2004). *Survey errors and survey costs* (Repr). *Wiley-Interscience paperback series*. Hoboken, New Jersey: Wiley-Interscience.

Groves, R. M., & Lyberg, L. (2010). Total Survey Error: Past, Present, and Future. *Public Opinion Quarterly*, *74*(5), 849–879. doi:10.1093/poq/nfq065

Grow, A., Perrotta, D., Del Fava, E., Cimentada, J., Rampazzo, F., Gil-Clavel, S., & Zagheni, E. (2020). Addressing Public Health Emergencies via Facebook Surveys: Advantages, Challenges, and Practical Considerations. *Journal of Medical Internet Research*, *22*(12), e20653. doi:10.2196/20653

Guillory, J., Kim, A., Murphy, J., Bradfield, B., Nonnemaker, J., & Hsieh, Y. (2016). Comparing Twitter and Online Panels for Survey Recruitment of E-Cigarette Users and Smokers. *Journal of Medical Internet Research*, *18*(11). doi:10.2196/jmir.6326

Guillory, J., Wiant, K. F., Farrelly, M., Fiacco, L., Alam, I., Hoffman, L., Crankshaw, E., Delahanty, J., & Alexander, T. N. (2018). Recruiting Hard-to-Reach Populations for Survey Research: Using Facebook and Instagram Advertisements and In-Person Intercept in LGBT Bars and Nightclubs to Recruit LGBT Young Adults. *Journal of Medical Internet Research*, *20*(6). doi:10.2196/jmir.9461

Harfield, S., Elliott, S., Ramsey, L., Housen, T., & Ward, J. (2021). Using social networking sites to recruit participants: methods of an online survey of sexual health, knowledge and behaviour of young South Australians. *Australian and New Zealand Journal of Public Health*, *45*(4), 348–354. doi:10.1111/1753-6405.13117

Hargittai, E. (2020). Potential Biases in Big Data: Omitted Voices on Social Media. *Social Science Computer Review*, *38*(1), 10-24. doi:10.1177/0894439318788322

Hellemans, J., Willems, K., & Brengman, M. (2020). Daily Active Users of Social Network Sites: Facebook, Twitter, and Instagram-Use Compared to General Social Network Site Use. In F. J. Martínez-López & S. D'Alessandro (Eds.), *Springer Proceedings in Business and Economics. Advances in Digital Marketing and eCommerce* (pp. 194–202). Springer International Publishing. doi: 10.1007/978-3-030-47595-6_24

Kepios Pte. Ltd., We Are Social Ltd., Hootsuite Inc. (October 21, 2021). Digital 2021. October Global Statshot Report. Retrieved February 18, 2022, from: www.datareportal.com/reports/digital-2021-october-global-statshot

Khumsaen, N., & Stephenson, R. (2017). Beliefs and Perception about HIV/AIDS, Self-Efficacy, and HIV Sexual Risk Behaviors Among Youth Thai Men Who Have Sex With Men. *AIDS Education and Prevention*, *29*(2), 175–190. doi:10.1521/aeap.2017.29.2.175

Knapp, A. A., Lee, D. C., Borodovsky, J. T., Auty, S. G., Gabrielli, J., & Budney, A. J. (2019). Emerging Trends in Cannabis Administration Among Adolescent Cannabis Users. *Journal of Adolescent Health*, *64*(4), 487–493. doi:10.1016/j.jadohealth.2018.07.012

Kühne, S., & Zindel, Z. (2020). *Using Facebook and Instagram to Recruit Web Survey Participants: A Step-by-Step Guide and Application.* doi:10.13094/SMIF-2020-00017

Leach, L. S., Bennetts, S. K., Giallo, R., & Cooklin, A. R. (2019). Recruiting fathers for parenting research using online advertising campaigns: Evidence from an Australian study. *Child Care Health and Development*, *45*(6), 871–876. doi:10.1111/cch.12698

Lee, S., Torok, M., Shand, F., Chen, N., McGillivray, L., Burnett, A., Larsen, M. E., & Mok, K. (2020). Performance, Cost-Effectiveness, and Representativeness of Facebook Recruitment to Suicide Prevention Research: Online Survey Study. *JMIR Mental Health*, *7*(10). doi:10.2196/18762

Lehdonvirta, V., Oksanen, A., Räsänen, P., & Blank, G. (2021). Social Media, Web, and Panel Surveys: Using Non-Probability Samples in Social and Policy Research. *Policy & Internet*, *13*(1), 134–155. doi:10.1002/poi3.238

Lu, J., & Yu, X. (2019). The Internet as a Context: Exploring Its Impacts on National Identity in 36 Countries. *Social Science Computer Review*, *37*(6), 705–722. doi:10.1177/0894439318797058

Manski, R., & Kottke, M. (2015). A Survey of Teenagers' Attitudes Toward Moving Oral Contraceptives Over the Counter. *Perspectives on Sexual and Reproductive Health*, *47*(3), 122–128. doi:10.1363/47e3215

McRobert, C. J., Hill, J. C., Smale, T., Hay, E. M., & van der Windt (2018). A multi-modal recruitment strategy using social media and internet-mediated methods to recruit a multidisciplinary, international sample of clinicians to an online research study. *PLOS ONE*, *13*(7). doi:10.1371/journal.pone.0200184

Meta Inc. *Reach everyone, or just a few.* Facebook. Retrieved February 18, 2022, from: www.facebook.com/business/ads/ad-targeting

Mitchell, J. W., & Petroll, A. E. (2012). Patterns of HIV and Sexually Transmitted Infection Testing Among Men Who Have Sex With Men Couples in the United States. *Sexually Transmitted Diseases*, *39*(11), 871–876. doi:10.1097/OLQ.0b013e3182649135

Nelson, E. J., Hughes, J., Oakes, J. M., Pankow, J. S., & Kulasingam, S. L. (2014). Estimation of Geographic Variation in Human Papillomavirus Vaccine Uptake in Men and Women: An Online Survey Using Facebook Recruitment. *Journal of Medical Internet Research*, *16*(9). doi:10.2196/jmir.3506

Obamiro, K., West, S., & Lee, S. (2020). Like, comment, tag, share: Facebook interactions in health research. *International Journal of Medical Informatics*, *137*. doi:10.1016/j.ijmedinf.2020.104097

Orehek, E., & Human, L. J. (2017). Self-Expression on Social Media: Do Tweets Present Accurate and Positive Portraits of Impulsivity, Self-Esteem, and Attachment Style? *Personality & Social Psychology Bulletin*, *43*(1), 60–70. doi:10.1177/0146167216675332

Pagoto, S. L., Schneider, K. L., Oleski, J., Smith, B., & Bauman, M. (2014). The Adoption and Spread of a Core-Strengthening Exercise Through an Online Social Network. *Journal of Physical Activity & Health 11*(3), 648–653. doi:10.1123/jpah.2012-0040

Pepper, J. K., Coats, E. M., Nonnemaker, J. M., & Loomis, B. R. (2019). How Do Adolescents Get Their E-Cigarettes and Other Electronic Vaping Devices? *American Journal of Health Promotion*, *33*(3), 420–429. doi:10.1177/0890117118790366

Perrotta, D., Grow, A., Rampazzo, F., Cimentada, J., Del Fava, E., Gil-Clavel, S., & Zagheni, E. (2021). Behaviours and attitudes in response to the COVID-19 pandemic: insights from a cross-national Facebook survey. *EPJ Data Science*, *10*(1). doi:10.1140/epjds/s13688-021-00270-1

Pew Research Center. (2015, August 28). Men catch up with women on overall social media use. *Pew Research Center*. Retrieved September 25, 2022, from https://www.pewresearch.org/fact-tank/2015/08/28/men-catch-up-with-women-on-overall-social-media-use/

Pötzschke, S., & Braun, M. (2017). Migrant Sampling Using Facebook Advertisements: A Case Study of Polish Migrants in Four European Countries. *Social Science Computer Review*, *35*(5), 633–653. doi:10.1177/0894439316666262

Pozzar, R., Hammer, M. J., Underhill-Blazey, M., Wright, A. A., Tulsky, J. A., Hong, F., Gundersen, D. A., & Berry, D. L. (2020). Threats of Bots and Other Bad Actors to Data Quality Following Research Participant Recruitment Through Social Media: Cross-Sectional Questionnaire. *Journal of Medical Internet Research*, *22*(10), e23021. doi:10.2196/23021

Quach, S., Pereira, J. A., Russell, M. L., Wormsbecker, A. E., Ramsay, H., Crowe, L., Quan, S. D., Kwong, J. (2013). The Good, Bad, and Ugly of Online Recruitment of Parents for Health-Related Focus Groups: Lessons Learned. *Journal of Medical Internet Research, 15*(11), e250. doi:10.2196/jmir.2829

Ramo, D. E., & Prochaska, J. J. (2012). Broad Reach and Targeted Recruitment Using Facebook for an Online Survey of Young Adult Substance Use. *Journal of Medical Internet Research*, *14*(1). doi:10.2196/jmir.1878

Reuter, K., Zhu, Y. F., Angyan, P., Le, N., Merchant, A. A., & Zimmer, M. (2019). Public Concern About Monitoring Twitter Users and Their Conversations to Recruit for Clinical Trials: Survey Study. *Journal of Medical Internet Research*, *21*(10). doi:10.2196/15455

Robstad, N., Westergren, T., Siebler, F., Soderhamn, U., & Fegran, L. (2019). Intensive care nurses' implicit and explicit attitudes and their behavioural intentions towards obese intensive care patients. *Journal of Advanced Nursing*, *75*(12), 3631–3642. doi:10.1111/jan.14205

Rosenzweig, L. R., & Zhou, Y.-Y. (2021). Team and Nation: Sports, Nationalism, and Attitudes Toward Refugees. *Comparative Political Studies*, 001041402199749. doi:10.1177/0010414021997498

Rosso, M. T., & Sharma, A. (2020). Willingness of Adults in the United States to Receive HIV Testing in Dental Care Settings: Cross-Sectional Web-Based Study. *JMIR Public Health and Surveillance*, *6*(3), 99–110. doi:10.2196/17677

Russomanno, J., & Tree, J. M. (2020). Food insecurity and food pantry use among transgender and gender non-conforming people in the Southeast United States. *BMC Public Health*, *20*(1). doi:10.1186/s12889-020-08684-8

Salk, R. H., Thoma, B. C., & Choukas-Bradley, S. (2020). The Gender Minority Youth Study: Overview of Methods and Social Media Recruitment of a Nationwide Sample of US Cisgender and Transgender Adolescents. *Archives of Sexual Behavior*, *49*(7), 2601–2610. doi:10.1007/s10508-020-01695-x

Samuels, D., & Zucco, C. (2014). The Power of Partisanship in Brazil: Evidence from Survey Experiments. *American Journal of Political Science*, *58*(1), 212–225. doi:10.1111/ajps.12050

Samuels, D. J., & Zucco, C. (2013). Using Facebook as a Subject Recruitment Tool for Survey-Experimental Research. *SSRN Electronic Journal*. Advance online publication. doi:10.2139/ssrn.2101458

Seidler, Z. E., Wilson, M. J., Walton, C. C., Fisher, K., Oliffe, J. L., Kealy, D., Ogrodniczuk, J. S., & Rice, S. M. (2021). Australian men's initial pathways into mental health servic-

es. *Health Promotion Journal of Australia: Official Journal of Australian Association of Health Promotion Professionals.* Advance online publication. doi:10.1002/hpja.524

Shakir, S. M. M., Wong, L. P., Abdullah, K. L., & Adam, P. (2019). Factors associated with online sexually transmissible infection information seeking among young people in Malaysia: an observational study. *Sexual Health*, *16*(2), 158–171. doi:10.1071/SH17198

Sharma, A., Kahle, E. M., Sullivan, S. P., & Stephenson, R. (2018). Birth Cohort Variations Across Functional Knowledge of HIV Prevention Strategies, Perceived Risk, and HIV-Associated Behaviors Among Gay, Bisexual, and Other Men Who Have Sex With Men in the United States. *American Journal of Mens Health*, *12*(6), 1824–1834. doi:10.1177/1557988318790875

Shaver, L. G., Khawer, A., Yi, Y. Q., Aubrey-Bassler, K., Etchegary, H., Roebothan, B., Asghari, S., & Wang, P. P. (2019). Using Facebook Advertising to Recruit Representative Samples: Feasibility Assessment of a Cross-Sectional Survey. *Journal of Medical Internet Research*, *21*(8). doi:10.2196/14021

Stier, S., Breuer, J., Siegers, P., & Thorson, K. (2020). Integrating Survey Data and Digital Trace Data: Key Issues in Developing an Emerging Field. *Social Science Computer Review*, *38*(5), 503–516. doi:10.1177/0894439319843669

Suliman, M., Al Qadire, M., Alazzam, M., Aloush, S., Alsaraireh, A., & Alsaraireh, F. A. (2018). Students nurses' knowledge and prevalence of Needle Stick Injury in Jordan. *Nurse Education Today*, *60*, 23–27. doi:10.1016/j.nedt.2017.09.015

Sullivan, P. S., Khosropour, C. M., Luisi, N., Amsden, M., Coggia, T., Wingood, G. M., & DiClemente, R. J. (2011). Bias in Online Recruitment and Retention of Racial and Ethnic Minority Men Who Have Sex With Men. *Journal of Medical Internet Research*, *13*(2). doi:10.2196/jmir.1797

Sunderland, M., Batterham, P. J., Calear, A. L., & Carragher, N. (2017). The development and validation of static and adaptive screeners to measure the severity of panic disorder, social anxiety disorder, and obsessive compulsive disorder. *International Journal of Methods in Psychiatric Research*, *26*(4). doi:10.1002/mpr.1561

Telegram (November 8th, 2021). *Telegram Info.* Retrieved February 18, 2022, from: www.t.me/tginfo/3147

Thornton, L. K., Harris, K., Baker, A. L., Johnson, M., & Kay-Lambkin, F. J. (2016). Recruiting for addiction research via Facebook. *Drug and Alcohol Review*, *35*(4), 494–502. doi:10.1111/dar.12305

Twitter Inc. (n.d.) *Reach the right people at the right time with Twitter's targeting tools.* Twitter. Retrieved February 18, 2022, from: www.business.twitter.com/en/advertising/targeting.html

Wagenaar, B. H., Christiansen-Lindquist, L., Khosropour, C., Salazar, L. F., Benbow, N., Prachand, N., Sineath, R. C., Stephenson, R., & Sullivan, P. S. (2012a). Willingness of US Men Who Have Sex with Men (MSM) to Participate in Couples HIV Voluntary Counseling and Testing (CVCT). *PLOS ONE*, *7*(8). doi:10.1371/journal.pone.0042953

Wagenaar, B. H., Sullivan, P. S., & Stephenson, R. (2012b). HIV Knowledge and Associated Factors among Internet-Using Men Who Have Sex with Men (MSM) in South Africa and the United States. *PLOS ONE*, *7*(3). doi:10.1371/journal.pone.0032915

Webler, T., Holewinski, M., Orrick, B., & Kaur, R. (2020). Toward a method for the rapid collection of public concerns and benefits of emerging energy technologies. *Journal of Risk Research*, *23*(1), 35–46. doi:10.1080/13669877.2018.1485174

Welton, J. M., Walker, C., Riney, K., Ng, A., Todd, L., & D'Souza, W. J. (2020). Quality of life and its association with comorbidities and adverse events from antiepileptic medi-

cations: Online survey of patients with epilepsy in Australia. *Epilepsy & Behavior*, *104*. doi:10.1016/j.yebeh.2019.106856

Williamson, S., & Malik, M. (2021). Contesting narratives of repression: Experimental evidence from Sisi's Egypt. *Journal of Peace Research*, *58*(5), 1018–1033. doi:10.1177/0022343320961835

Wilson, K. M., Beggs, S. A., Zosky, G. R., Bereznicki, L. R., & Bereznicki, B. J. (2019). Parental knowledge, beliefs and management of childhood fever in Australia: A nationwide survey. *Journal of Clinical Pharmacy and Therapeutics*, *44*(5), 768–774. doi:10.1111/jcpt.13000

Wolak, J. J. D., Finkelhor, D., Walsh, W., & Treitman, L. (2018). Sextortion of Minors: Characteristics and Dynamics. *Journal of Adolescent Health*, *62*(1), 72–79. doi:10.1016/j.jadohealth.2017.08.014

Woodward, S. C., Bereznicki, B. J., Westbury, J. L., & Bereznicki, L. R. (2016). The effect of knowledge and expectations on adherence to and persistence with antidepressants. *Patient Preference and Adherence*, *10.* doi:10.2147/PPA.S99803

Yuan, P., Bare, M. G., Johnson, M. O., & Saberi, P. (2014). Using Online Social Media for Recruitment of Human Immunodeficiency Virus-Positive Participants: A Cross-Sectional Survey. *Journal of Medical Internet Research*, *16*(5), 101–109. doi:10.2196/jmir.3229

Zhang, B. B., Mildenberger, M., Howe, P. D., Marlon, J., Rosenthal, S. A., & Leiserowitz, A. (2020). Quota sampling using Facebook advertisements. *Political Science Research and Methods*, *8*(3), 558–564. doi:10.1017/psrm.2018.49