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Recruiting for health, medical or psychosocial research using Facebook: Systematic review

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ABSTRACT

Recruiting participants is a challenge for many health, medical and psychosocial research projects. One tool more frequently being used to improve recruitment is the social networking website Facebook. A systematic review was conducted to identify studies that have used Facebook to recruit participants of all ages, to any psychosocial, health or medical research. 110 unique studies that used Facebook as a recruitment source were included in the review. The majority of studies used a cross-sectional design (80%) and addressed a physical health or disease issue (57%). Half (49%) of the included studies reported specific details of the Facebook recruitment process. Researchers paid between $1.36 and $110 per completing participants (Mean = $17.48, SD = $23.06). Among studies that examined the representativeness of their sample, the majority concluded (86%) their Facebook-recruited samples were similarly representative of samples recruited via traditional methods. These results indicate that Facebook is an effective and cost-efficient recruitment method. Researchers should consider their target group, advertisement wording, offering incentives and no-cost methods of recruitment when considering Facebook as a recruitment source. It is hoped this review will assist researchers to make decisions regarding the use of Facebook as a recruitment tool in future research.

1. Introduction

Recruiting participants is a challenge for many health, medical and psychosocial research projects. Participant recruitment can often be an expensive and time consuming process, complicated by the fact that some traditional methods of recruitment, such as mail and phone recruitment have become more difficult and expensive in recent decades (Fenner et al., 2012; Balfe et al., 2012). In research environments where resources are scarce and project timelines are tight it is important for researchers to identify ethical, effective, efficient and representative methods of recruitment.

Online recruitment is more frequently being used to improve recruitment outcomes, by overcoming some of the limitations of traditional methods. In particular, Facebook has attracted researchers as a recruitment source, due to its widespread use and ability to target advertising to user characteristics. Facebook is a free social networking website that allows users to create a profile, connect with other users and view and share content (Facebook.com, 2013). Globally, Facebook is the most popular social media site with 1.49 billion active users (users who have logged into Facebook during the last 30 days: Statista, 2015) and the 2nd most popular website, following Google.com (Alexa.com, 2015). The Pew Research Institute recently reported that 71% of US adults who use the Internet also use Facebook, which represents 58% of all US adults. Seventy percent of Facebook users also report that they use the site on a daily basis (Duggan et al., 2015).

Recruiting via Facebook is a potentially cost-effective way to contact a large number of individuals, in a short period of time. It has also been suggested as a particularly useful resource for recruiting younger people, (Christofides et al., 2009; Raacke and Bonds-Raacke, 2008), and low incidence and stigmatized groups, due to the anonymity and confidentiality that sites such as Facebook can afford (Balfe et al., 2012; Fenner et al., 2012; Ramo and Prochaska, 2012; Temple and Brown, 2011).

Adding to Facebook's appeal for research is the increasing diversity of users. While Facebook continues to be used at high levels by young adults, the Pew Institute found that more than half of all online older adults surveyed (56%) used Facebook, representing 31% of all adults aged 65 years and over (Duggan et al., 2015). Their study also found

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high rates of Facebook use (77%) were reported by people with a household income of less than US$30,000 per year, indicating its reach into economically disadvantaged populations. Similarly, growth in Facebook usage is largest in developing countries (Duggan et al., 2015; Internet World Stats, 2012).

In order to legitimise the use of Facebook as a recruitment source, we need to better understand who is likely to participate in research recruiting via Facebook, how researchers are using it, how to economize the process and what the limitations surrounding this recruitment source are. However, only one group has previously examined the utility of Facebook recruitment for research-related purposes across a number of research trials. Focussed exclusively on recruiting adolescents, Amon et al. (2014) identified six studies that used Facebook as a recruitment tool of children aged 10 to 18 years. Amon et al. (2014) identified three ways in which Facebook was used for recruitment: (1) via paid advertising on Facebook (4/6 studies, at an average cost per participant of USD $0.60 to $20.14); (2) via a project-specific Facebook page (1/6 studies); and (3) to locate participants for follow-up (1/6 studies). The authors concluded that paid advertising on Facebook was an effective and cost efficient recruitment method, however many studies did not provide sufficient data to establish the efficacy of Facebook as a recruitment tool. It remains unclear as to how researchers might best optimize Facebook to recruit participants, particularly in research targeting populations other than adolescents (Amon et al., 2014).

The aim of the current review was to examine the methodology and effectiveness of recruiting participants of all ages, to any psychosocial, health or medical research, via Facebook. Specifically, the review aimed to determine: who is likely to participate in research recruiting via Facebook; how has this recruitment source been used by researchers; the most cost-effective recruitment strategies; and limitations associated with this approach.

2. Method

2.1. Eligibility criteria

To be included in the current review studies were required to recruit participants via Facebook, report primary data (as opposed to a review, commentary or editorial), be peer-reviewed and published in English.

2.2. Information sources and search

PubMed, PsycInfo, and Cochrane databases were searched in March 2015 using the following search terms in title, abstract or key words: (social media OR online social network OR Facebook OR social networking site) AND (advert* OR recruit*). Limitations were also placed on the year of the study, with studies from 2004 (when Facebook was launched) up to the time of the search included.

2.3. Study selection

A flowchart of the selection of included studies is presented in Fig. 1. In total, 590 abstracts were identified through the three database searches, of which 104 were removed as duplicates. The remaining 486 abstracts were screened for inclusion in the review.

No additional limitations were placed on study design. This initial screening of abstracts resulted in 151 relevant papers being retained, for which full text articles were collected. Screening of the full-text articles resulted in a further 31 studies being excluded, as they did not use Facebook as a means of recruitment ($n = 28$) or did not report primary data ($n = 3$).

2.4. Data collection

After screening, the 120 remaining papers were each coded by two independent raters using a pre-formulated coding sheet. All papers were coded for (1) study characteristics including year of publication, location based on participant nationality or (if nationality not reported or diverse) author's location, topic of study and design of study, and, (2) whether the paper reported specifically on the recruitment processes using Facebook. Only papers that reported specific details on the Facebook recruitment process were further coded for: (3) sample characteristics (sample size, gender and age distribution), and (4) recruitment strategies including wording/image used in ad(s), time period taken to recruit, target group, and cost and method of Facebook advertising. The findings regarding Facebook recruitment for these studies were also summarised in terms of recruitment success, limitations and sample representativeness.

Finally, a search of coded papers was undertaken to identify studies that had been reported in more than one paper. This search was based on matching author names and study characteristics. Where the same study was described in more than one paper, the paper with the greatest detail regarding the Facebook recruitment process was retained, unless no distinction could be made, in which case the earliest paper was retained.

Bias in reporting of the recruitment process was assessed by recording summary details of all studies that recruited using Facebook, whether or not they detailed the recruitment process. Characteristics of studies that detailed the recruitment process were compared to those that did not.

2.5. Synthesis of results

The primary outcomes of interest in the current review were: cost of recruitment per completed participant and the gender distribution recruited to the study (only for studies where gender was not the basis of recruitment). These outcomes were compared on the basis of study characteristics. Costs were converted to US dollars (using the exchange rates on 5th August 2015) for comparability. When aggregating findings across groups of studies, cost per participant was assessed both in terms of the total cost for all studies in the group divided by the combined sample size, and in terms of the average cost per study. The average cost per study was compared across different types of studies using *t*-tests. Gender distributions were compared using Fisher's exact test. Other outcomes of interest included speed of recruitment, comparison of recruitment methods, characteristics of advertising strategies that were most effective, and limitations of recruiting on Facebook. These factors were summarised for each study and are synthesized in the results.

3. Results

Of the 120 papers coded, 11 papers describing the same study sample as another included paper were identified and removed. This resulted in 109 papers that were included in the review, and were found to describe 110 unique studies.

Table 1 describes the characteristics of included studies. The majority of included studies (57.3%, $n = 63$) addressed a physical health or disease issue. Seventeen studies (15.5%) recruited participants to research addressing mental health issues and 16 (14.5%) recruited to studies examining substance use. Twenty-three studies (20.9%) addressed other issues (e.g., workplace or intimate partner violence, childbirth expectations, rating facial portraits for attractiveness). Facebook was mainly used to recruit eligible participants to cross-sectional surveys (80%, $n = 88$), followed by trials (15.5%, $n = 17$) or longitudinal surveys (6.4%, $n = 7$). Four studies (3.6%) recruited participants to research employing qualitative methodologies. Included studies took an average of five and a half months to recruit their participants via Facebook. The range included 72 h (Child et al., 2014) through to almost 2 years (Hernandez-Romieu et al., 2014; Osborne et al., 2015).

The majority of included studies were conducted in the US ($n = 59$, 53.6%), Australia ($n = 24$, 21.8%) or the UK ($n = 11$, 10%). Eight studies

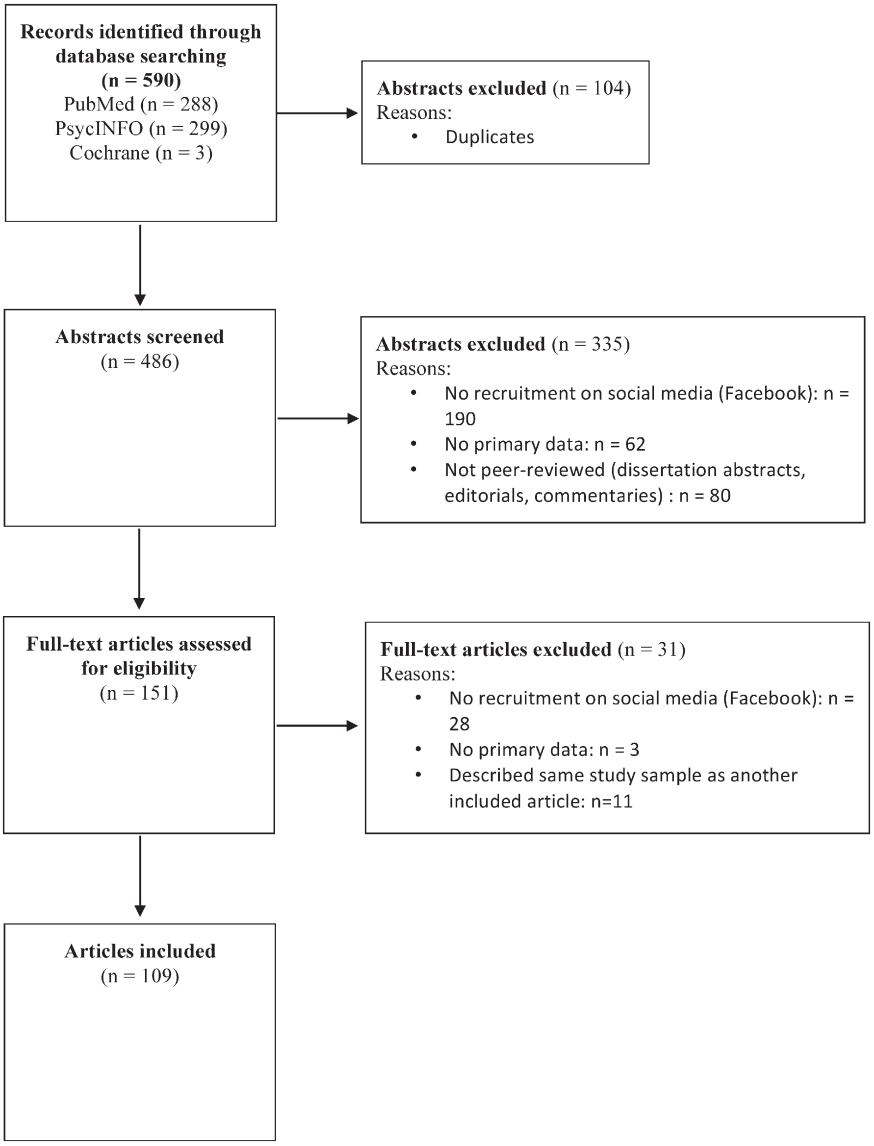

Fig. 1. Study selection.

(7.3%) published between January–March 2015 were included in this review, along with 51 (46.4%) published in 2014, 34 (30.9%) in 2013, 14 (12.7%) in 2012 and 1 each from 2009, 2010 and 2011.

Around half ($n = 54$, 49.1%) of the included studies reported specific details on the process involved in recruiting participants via Facebook (see Table 2 in the Supplementary material). These 54 studies reported receiving an average of 4876 clicks or likes of their advertisements or pages (median = 3462, range: 259 to 14,808), recruited an average of 900 participants (median = 416, range: 2 to 11,799), and an average of 736 participants who went on to complete all aspects of their study (median = 230, range: 0 to 11,799). Findings from these studies are examined in further detail below.

3.1. Participants and settings

Researchers recruited a range of different populations using Facebook. The most common group of participants sought were young adults or adolescents (21 studies, 38.9%). Many studies recruited participants from a range of low incidence or hard-to-reach groups. These included two studies examining use of illicit drugs (Barratt et al., 2015; Bauermeister et al., 2012), six studies that recruited men who have sex with men, and one study that recruited women who have sex with women. Other studies recruited participants with rare diseases such as myasthenia gravis (an auto-immune disease: Richards et al., 2014), Klinefelter syndrome (Close et al., 2013), Haemophilia (DiBenedetti et al., 2014) and neurofibromatosis (Johnson et al., 2014). Other populations targeted included people living with HIV (Yuan et al., 2014), ethnic minorities (Carlini et al., 2014), parents of adolescents (Gilligan et al., 2014), low-income earners (Lohse, 2013), people with mental disorders (King et al., 2014; Morgan et al., 2010) and health professionals (Child et al., 2014; Mannix et al., 2014). In contrast, other studies successfully recruited participants from the general population (Batterham, 2014; Barratt et al., 2015; Crosswhite et al., 2014; Thornton et al., 2013).

3.2. Recruitment cost

Twenty-seven studies reported information regarding the cost of recruiting via Facebook, while 21 studies reported details of both the cost and the number of completing participants recruited, allowing for the cost-per-completer to be calculated. These studies spent an average of $2407.07 to recruit an average of 368 participants via Facebook. Two studies recruited participants using methods that incurred no cost, while the remaining studies paid $6.79 per completer. Among individual studies, between $1.36 and $110 was paid per completer (per study

Table 1
Details of identified studies that used Facebook recruiting.

Paper	Country	Topic of study					Study design	Reported details of Facebook recruitment
		Mental health	Substance use	Physical health/ disease	Other	Specify		
Ahmed et al. (2013)	Australia			X		Chlamydia	Cross-sectional	Yes
Akard et al. (2014)	USA			X		Cancer	Cross-sectional	Yes
Altshuler et al. (2014)	USA			X		Abortion	Cross-sectional	Yes
Arcia (2014)	USA			X		Pregnancy	Cross-sectional	Yes
Balfe et al. (2012)	Ireland			X		Type 1 diabetes	Qualitative	Yes
Barnard et al. (2015)	UK			X		Type 1 diabetes	Cross-sectional	No
Barratt et al. (2015)	Australia				X	Cannabis cultivation	Cross-sectional	Yes
Batterham (2014)	Australia	X				Mental health	Cross-sectional	Yes
Bauermeister et al. (2012)	USA		X			Alcohol and other drug use	Cross-sectional	Yes
Berry and Bass (2012)	USA	X	X		X	Religiosity	Longitudinal	No
Boyce et al. (2013)	USA	X					Cross-sectional	Yes
Brief et al. (2013)	USA	X	X			PTSD and Alcohol use	Trial	No
Bull et al. (2013)	USA			X		HIV	Trial	Yes
Carlini et al. (2014)	USA		X			Alcohol & tobacco	Cross-sectional	Yes
Casler et al. (2013)	USA				X	Behavioural task	Cross-sectional	No
Child et al. (2014)	USA				X	Workplace violence	Cross-sectional	Yes
Chiu and Young (2015)	USA			X		HIV	Cross-sectional	No
Chu and Snider (2013)	Canada	X				PTSD	Cross-sectional	Yes
Close et al. (2013)	USA			X		Klinefelter syndrome	Cross-sectional	Yes
Connor et al. (2013)	USA			X		Provoked vestibulodynia	Cross-sectional	No
Cragg and Lafreniere (2010)	Canada			X		Turner syndrome	Cross-sectional	No
Crosswhite et al. (2014)	USA				X	Texting	Cross-sectional	Yes
Czajka and Dicaprio (2015)	USA			X		Multiple hereditary exostoses	Cross-sectional	No
D'cruz and Lee (2014)	Australia				X	Childbirth expectations	Cross-sectional	No
Dennison et al. (2014)	UK			X		Weight management	Trial	No
Dibenedetti et al. (2014)	USA			X		Haemophilia A	Cross-sectional	Yes
Drozd et al. (2013)	Norway	X				Stress reduction	Trial	No
Dumbleton et al. (2013)	Canada			X		Contact lens discontinuation	Cross-sectional	No
Erchull et al. (2013)	USA	X				Self-objectification, depression, self-harm, and dissociation	Cross-sectional	No
Fazzino et al. (2015)	USA		X			Alcohol	Trial	Yes
Fenner et al. (2012)	Australia			X		Sexual and reproductive health	Cross-sectional	Yes
Finneran et al. (2012)	USA				X	Intimate partner violence among gay men	Cross-sectional	No
Frandsen et al. (2014)	Australia		X			Smoking cessation	Trial	Yes
Gorman et al. (2014)	USA			X		Cancer & fertility	Four studies with different designs	No
Gass et al. (2012)	USA				X	Sexual agreements between men who have sex with men	Cross-sectional	Yes
Gatt et al. (2014)	Australia	X				Eating disorders	Cross-sectional	No
Gilligan et al. (2014)	Australia		X			Alcohol	Trial	Yes
Gribble (2013)	Australia				X	Milk donors	Cross-sectional	No
Gribble (2014)	Australia				X	Milk donors	Cross-sectional	No
Hadgkiss et al. (2013)	Australia			X		Multiple sclerosis	Longitudinal	No
Haga et al. (2013)	Norway	X				Postpartum depression	Trial	No
Heffner et al. (2013)	USA		X	X		Smoking cessation	Trial	No
Hernandez-Romieu et al. (2014)	USA			X	X	HIV among men who have sex with men	Longitudinal	Yes
Hing et al. (2015)	Australia				X	Internet gambling	Longitudinal	No
Johnson et al. (2014)	USA			X		Neurofibromatosis type 1	Cross-sectional	Yes
Jones et al. (2012)	USA			X		Physical activity	Cross-sectional	No
Kapp et al. (2013)	USA			X		Mammograms	Cross-sectional	Yes
King et al. (2014) Study 1	Canada	X				Bipolar disorder	Cross-sectional	Yes
King et al. (2014) Study 2	Canada	X				Stress among paramedics and their families	Longitudinal	Yes
Kuhle et al. (2015)	USA				X	Communicating with sons and daughters about sex	Cross-sectional	No
Leonard et al. (2014)	Australia			X		Nutrition	Trial	No
Lewis et al. (2014)	UK			X		Prenatal testing for trisomy 21	Cross-sectional	No
Lohse (2013)	USA			X		Nutrition education	Cross-sectional	Yes
Lohse and Wamboldt (2013)	USA			X		Nutrition education	Trial	Yes
Maloni et al. (2013)	USA	X				Postpartum depression	Cross-sectional	No
Mann et al. (2013)	Canada			X		Chlamydia and gonorrhoea testing	Cross-sectional	No
Mannix et al. (2014)	Australia					Clinical leadership	Cross-sectional	Yes
Martinez et al. (2014)	USA			X		HIV	Cross-sectional	Yes
Middleton et al. (2014)	UK				X	Genetics	Cross-sectional	Yes
Mishra et al. (2014)	Australia		X	X		Women's health	Longitudinal	Yes
Mitchell and Petroll (2012)	USA			X		HIV	Cross-sectional	Yes
Miyagi et al. (2014)	Japan			X		Human papillomavirus/cervical cancer	Cross-sectional	Yes

(continued on next page)

Table 1 (*continued*)

Paper	Country	Topic of study					Study design	Reported details of Facebook recruitment
		Mental health	Substance use	Physical health/ disease	Other	Specify		
Morgan et al. (2013)	Australia	X				Depression	Trial	Yes
Morris (2013)	UK				X	Disability benefits and services	Cross-sectional	No
Nelson et al. (2014)	USA			X		Human papillomavirus vaccine	Cross-sectional	Yes
Norman et al. (2014)	UK		X			Legal highs	Cross-sectional	No
Osborne et al. (2015)	Australia			X		Human papillomavirus	Cross-sectional	Yes
Parkinson and Bromfield (2013)	Australia				X	Child maltreatment	Cross-sectional	Yes
Paxton et al. (2014)	USA			X		Physical activity in breast cancer survivors	Cross-sectional	No
Popenko et al. (2012)	USA				X	Rating facial portraits for attractiveness	Cross-sectional	No
Pursey et al. (2014)	Australia			X		Self- reported height and weight	Cross-sectional	No
Quach et al. (2013)	Canada			X		Influenza vaccine	Cross-sectional	No
Ramo and Prochaska (2012)	USA		X			Tobacco	Cross-sectional	Yes
Ramo et al. (2015b)	USA		X			e-Cigarettes	Cross-sectional	No
Ramo et al. (2015a)	USA		X			Tobacco/smoking cessation	Cross-sectional & qualitative	Yes
Ramo et al. (2014)	USA		X			Tobacco/smoking cessation	Cross-sectional	Yes
Raviotta et al. (2014)	USA			X		Human papillomavirus vaccine	Cross-sectional	Yes
Remschmidt et al. (2014)	Germany			X		Human papillomavirus vaccine	Cross-sectional	Yes
Rice et al. (2012)	USA			X		HIV prevention	Cross-sectional	No
Richards et al. (2014)	UK			X		Psychosocial impact of myasthenia gravis (an autoimmune disease)	Cross-sectional & qualitative	Yes
Rogers et al. (2009)	USA	X				Emotional self-disclosure in young adults	Cross-sectional	Yes
Ross et al. (2013)	USA			X		Postural tachycardia syndrome	Cross-sectional	No
Sadasivam et al. (2013)	USA		X			Tobacco	Trial	No
Schlomer et al. (2014)	USA			X		Hypospadias	Cross-sectional	No
Schluter et al. (2015)	NZ			X		Tooth brushing	Trial	No
Schumacher et al. (2014)	USA			X		Rare diseases (Fontan-associated protein losing enteropathy and plastic bronchitis)	Cross-sectional	No
Shackley et al. (2014)	Australia				X	Public attitudes towards sex offenders	Cross-sectional	No
Shadbolt et al. (2013)	Australia			X		Endometriosis	Cross-sectional	No
Shaeer and Shaeer (2012, 2014)	Middle East			X		Female genital cutting	Cross-sectional	No
Shaeer and Shaeer (2012)	USA			X		Erectile dysfunction	Cross-sectional	No
Shaeer and Shaeer (2014)	Middle East				X	Male homosexuality	Cross-sectional	No
Shah et al. (2015)	USA			X		Pemphigus vulgaris	Cross-sectional	No
Shere et al. (2014)	Canada			X		Pregnancy	Trial	No
Sowe et al. (2014)	Australia				X	Homophobia	Cross-sectional	No
Stein et al. (2014)	Thailand			X		Influenza-like-illness	Cross-sectional	Yes
Stephenson et al. (2011)	South Africa			X	X	Intimate partner violence and HIV infection	Cross-sectional	Yes
Sturm et al. (2014)	USA			X		Urologic health	Cross-sectional	Yes
Thornton et al. (2013)	Australia	X	X			Tobacco, alcohol and cannabis use among people with and without mental disorders	Cross-sectional	Yes
Tour et al. (2014)	UK			X		Vitiligo	Cross-sectional	No
Valdez et al. (2014)	USA			X	X	Study 1: consumer health IT, Study 2: type 2 diabetes	Cross-sectional	Yes
Vial et al., 2014	USA			X		HIV	Cross-sectional	No
Vrangalova and Savin-Williams (2012)	USA				X	Sexual orientation	Cross-sectional	Yes
Wagenaar et al. (2012)	USA and South Africa			X		HIV knowledge	Cross-sectional	Yes
Worth et al. (2013)	UK			X		Anaphylaxis	Cross-sectional	No
Youn et al. (2013)	USA	X				Depression	Cross-sectional	Yes
Young et al. (2013a, 2013b, 2013c)	Australia			X		HPV vaccination	Cross-sectional	No
Young et al. (2013b)	USA					Sexual risk behaviour	Cross-sectional	No
Young et al. (2013c)	USA			X		HIV prevention	Trial	No
Yuan et al. (2014)	USA			X		HIV	Cross-sectional	Yes
Zhang et al. (2014)	China	X		X		Physical and psychological well-being	Cross-sectional	No

mean = $17.48, SD = $23.06, median = $11.59). Across topics, there was little variation in costs, with three mental health studies paying $7.51 (per study mean = $12.70, SD = $5.03, median = $11.45), four substance abuse studies paying $5.33 (per study mean = $11.45, SD = $11.11, median = $8.80), and 13 physical health/disease studies paying $8.40 (per study mean = $24.23, SD = $30.98, median = $15.61) per completer, with no significant differences between mean study costs across study types ($p > 0.05$ for all t-test comparisons).

The cost-per-completer could only be calculated for studies published in 2012–2014. Cost-per-completer in studies published in 2012 was $7.08, $15.46 in studies published in 2013 and $7.22 in studies published in 2014. Similarly, studies reporting sufficient details to calculate cost-per-completer were only conducted in the US ($n = 14$), Australia ($n = 4$) and Canada ($n = 1$). Cost-per-completer was $6.18 in US studies, $10.01 in Australian studies and $11.69 in the Canadian study.

In terms of study design, cross-sectional surveys reported a cost per completer of $6.48 (per study mean = $17.15, SD = $25.40, median = $11.46), while trials reported a cost of $8.30 (per study mean = $18.81, SD = $11.81, median = $20.00), with no significant differences ($p > 0.05$). The qualitative and longitudinal studies either did not report costs or used methods that did not incur a charge.

3.3. Gender distribution

Forty studies reported the gender distribution of participants recruited via Facebook including 17 studies that targeted participants of one gender only. Among the 23 studies that did not recruit participants on the basis of gender, 60% of participants recruited were female (median per study = 62.2%, range: 13% to 89%). Mental health studies recruited the highest proportion of females (mean = 68.7%, median = 74%, range: 58% to77.4%), followed by physical health (mean = 61.5%, median = 62.1%, range: 48% to 78%), other (mean = 59.6%, median = 66.8%, range: 13% to 80.8%) and substance use studies (mean = 53.4%, median = 52.5%, range: 31% to 89%). All two-way comparisons of these gender ratios were significantly different based on Fisher's exact test ($p < 0.05$), with the exception of the comparison between physical health and other studies ($p = 0.51$).

The three trials that reported gender distribution recruited samples consisting of 70.6% female participants (median = 70%, range: 52.9% to 89%). Cross-sectional research recruited 58.4% female participants (median = 61.1%, range:13% to 80.8%), while qualitative research recruited 45.9% female participants (median = 45.9%, range:29.8% to 62%). Comparisons of these gender ratios were significantly different based on Fisher's exact test ($p < 0.05$).

3.4. Method of recruitment

The majority of studies utilized Facebook's paid advertising feature to recruit participants. Many also offered incentives for participation. A number of studies (Akard et al., 2014; Boyce et al., 2013; Fazzino et al., 2015; Gilligan et al., 2014; Thornton et al., 2013; Ramo and Prochaska, 2012) offered participants the chance to enter the draw to win a substantial prize (e.g., an iPad, iPod, $25 gift card), while others (Ahmed et al., 2013; Fenner et al., 2012; Fazzino et al., 2015) offered all participants a small gift or reimbursement for their time (e.g., $15–25 reimbursement) or the chance to win one of a number of small prizes (e.g., one of 20 $15 prizes). Child et al. (2014) combined these strategies and offered all participants a $5 e-gift card as well as the chance to win an iPad. Four studies that offered incentives for participation and reported information about cost and number of completing participants paid $15.41 per completer (per study mean = $14.71, median = $14.70, SD = $8.48, range: $4.34 to $25.11) compared to 16 studies that did not offer incentives for participants and reported cost information that paid $5.78 per completer (per study mean = $18.18, median = $11.47, SD = $25.63, range: $1.36 to $109.55). There was no significant difference in recruitment costs by study based on incentives offered ($t = 0.26$, df = 18, $p = 0.796$).

Other methods used to recruit participants included posting information about the study on the Facebook pages of existing groups related to the topic of interest, and sending private messages to people identified through a search of Facebook (Child et al., 2014; Barratt et al., 2015; Fazzino et al., 2015; DiBenedetti et al., 2014; Gilligan et al., 2014; Martinez et al., 2014; Richards et al., 2014; Parkinson and Bromfield, 2013; Valdez et al., 2014). Boyce et al. (2013) and Mannix et al. (2014), for example, used a snowball recruitment approach inviting the researchers' personal Facebook friends to participate in the study and in turn forward the invitation onto their own Facebook friends. Child et al. (2014) also posted a short video describing their study on the Facebook pages of three relevant groups.

3.5. Targeting strategy

Studies that used the paid advertising feature employed three main strategies when targeting their Facebook advertisements. Firstly, 13 studies simply used their inclusion criteria to target their advertisements. Ahmed et al. (2013), for example, recruited English speaking women aged 16–25 years, living in Victoria, Australia. They targeted their advertisements by age, gender, location and language so that it only appeared on the profiles of people meeting these inclusion criteria. These studies recruited a combined total of 3925 completers and paid $6.61 per completer (per study mean = $8.93, median = $9.43, SD = $5.64, range: $1.36 to $14.70). Studies using this approach tended to have quite broad inclusion criteria.

Secondly, a number of studies ($n = 7$) with more specific inclusion criteria, particularly those involving characteristics not routinely collected in a Facebook user profile, targeted their advertisements to a broader population than they were aiming to recruit. For example, while Arcia (2014) aimed to recruit US women aged 18–44 who were pregnant with their first child, they targeted their advertisement to appear on the profile of any woman aged 18–44 years living in the US. These studies aimed to attract eligible participants to their studies by highlighting the focus of the study via the wording and images used in the advertisements. They recruited a combined total of 576 participants for a cost of $20.49 per completer (per study mean = $38.61, median = $17.98, SD = $47.50, range: $8.92 to $109.55). The recruitment cost of studies using this strategy was significantly higher than the first targeting strategy ($t = 2.28$, df = 18, $p = 0.035$), although the first targeting strategy may not be appropriate for recruiting on the basis of characteristics that are not assessed by Facebook.

The third strategy employed by 15 studies, particularly those with more specific inclusion criteria, was to additionally target their advertisements to appear on the Facebook profiles of users who listed a range of interests or likes on their profiles related to the topic of study. A study described by King et al. (2014), for example, aimed to recruit paramedics and their cohabiting spouses. Advertisements were targeted to appear on the profiles of users indicating an interest in paramedics, paramedicine, emergency medicine, EMS, prehospital care or emergency health care. These studies recruited a combined total of 2848 participants for a cost of $4.29 per completing participants (per study mean = $12.41, median = $10.13, SD = $8.72, range: $4.28 to $25.48). The recruitment cost of studies using this strategy was significantly lower than the second targeting strategy that targeted a broader sample than was sought ($t = 2.12$, df = 20, $p = 0.047$), but not significantly different to the first strategy that targeted advertisements using the studies' broad inclusion criteria ($t = 1.23$, df = 26, $p = 0.229$).

3.6. Advertisement wording

Most studies highlighted in their advertisements that they were recruiting for a research study, or looking for people to complete an online survey regarding a particular topic that they also mentioned in the advertisement. Among the 13 studies that used the words “research”, “study” or “survey” in their advertisement, and reported sufficient detail to calculate cost-per-completer, the cost-per-completer was $6.52 (per study mean = $12.77, median = $10.19, SD = $9.04, range: $1.36 to $30.91). In contrast, studies that did not use these words in the advertisement paid $7.83 per completer (per study mean = $28.49, median = $13.11, SD = $40.01, range: $4.28 to $109.55), although there was no significant difference between these costs ($p > 0.05$ for all comparisons).

Many studies also highlighted that the research was being conducted by a university or hospital (e.g., Thornton et al., 2013; Gilligan et al., 2014; King et al., 2014; Ramo et al., 2014). Cost-per-completer among studies highlighting their affiliation with a university or hospital ($n = 9$) was $7.19 (per study mean = $14.16, median = $11.45, SD = $10.63, range: $1.36 to $30.91) compared to $7.34 among studies that did not

mention a university or hospital affiliation (per study mean = $20.20, median = $11.69, SD = $30.04, range: $3.98 to $109.55), with no significant difference in costs ($p > 0.05$ for all comparisons). Another common feature of Facebook advertisements was the mention of incentives offered for participation (e.g., Akard et al., 2014; Nelson et al., 2014; Ahmed et al., 2013). Among these studies, cost-per-completing participant was $7.16, excluding the cost of incentives (per study mean = $15.41, median = $14.69, SD = $10.10, range: $1.36 to $30.91). Studies making no mention of an incentive paid $6.81 per completing participant (per study mean = $19.19, median = $11.48, SD = $30.36, range: $3.98 to $109.55), with no significant cost difference ($p > 0.05$ for all comparisons). Nine studies reported using all three strategies in their advertisements (Akard et al., 2014; Balfe et al., 2012; Frandsen et al., 2014; Gilligan et al., 2014; Lohse and Wamboldt, 2013; Nelson et al., 2014; Ramo et al., 2014; Thornton et al., 2013; Youn et al., 2013), and seven reported sufficient participant and cost details. The cost-per-completing participant in these studies was $4.40, excluding incentives (per study mean = $15.35, median = $11.45, SD = $11.65, range: $1.36 to $30.91). In contrast, among studies that used none of these strategies in their advertisement ($n = 6$) the cost-per-completing participant rose to $7.83 (per study mean = $28.49, median = $13.11, SD = $40.01, range: $4.28 to $109.55), although the per-study cost difference was not significant ($p > 0.05$ for all comparisons).

3.7. Recruitment bias

Many studies discussed the representativeness of the recruited samples. However, only 16 studies included a formal test of representativeness, either testing differences between the recruited sample and characteristics of the population of interest (11 studies: Ahmed et al., 2013; Altshuler et al., 2014; Arcia, 2014; Batterham, 2014; Bauermeister et al., 2012; Fenner et al., 2012; Gilligan et al., 2014; Osborne et al., 2015; Ramo et al., 2015a; Nelson et al., 2014; Miyagi et al., 2014), or by testing differences in representativeness relative to samples obtained by traditional recruitment methods, such as post or phone (seven studies: DiBenedetti et al., 2014; Fazzino et al., 2015; Frandsen et al., 2014; Fenner et al., 2012; Hernandez-Romieu et al., 2014; Batterham, 2014; Vrangalova and Savin-Williams, 2012). Studies reported mixed findings on the representativeness of Facebook-recruited samples, with only 36% reporting that their samples were overall representative of the population of interest. However, in comparing Facebook to traditional methods, findings were more consistent, with 86% of studies reporting that samples recruited through Facebook were similarly representative to samples recruited through traditional methods. Characteristics that were most frequently reported to be imbalanced included gender (no consistent trend across studies), age (no consistent trend) and education (higher education overrepresented).

3.8. Limitations of Facebook recruitment

The main limitation surrounding Facebook recruitment mentioned regarded accurate tracking of participants. Akard et al. (2014) recruited parents and highlighted that their inability to track if parents from the same family had completed the study was a limitation. However, this issue could apply to any study using an online recruitment method and could be addressed by tracking participants IP addresses and preventing multiple entries from the same IP address. Similarly, Frandsen et al. (2014) discussed that they were unable to guarantee that the Facebook users who clicked on the study advertisements were the same people who were recruited to the study. They highlighted that it would be possible for someone to click on the study advertisement then forward the details onto a friend or colleague who might be the one to actually participate in the research. They also note, however, that a similar situation is possible with traditional recruitment methods and that this issue could be addressed by utilizing other online tools to track the actions of people after they click on the study advertisement. Ramo et al. (2014) reported previous use of the conversion tracking tool provided by Facebook that allows advertisers to link clicks on a website (in this case their consent form) to a specific ad. However, in the current study they experienced technical difficulties and were unable to track participants.

4. Discussion

This review found that the number of studies recruiting participants through Facebook is increasing rapidly. Facebook recruitment was found to be cost-effective and rapid. The range of studies identified by the review suggests that this method may be useful for research in a wide array of topics, study populations, study designs and settings, with particular utility in accessing hard-to-reach populations. The results suggest that Facebook can be used to obtain a representative sample, although similarly to traditional recruitment approaches, selection biases may imbalance the characteristics of the sample. Nevertheless, many of the studies reported that social media recruitment was the most feasible and cost-effective method to recruit, particularly for hard-to-reach populations and for specific or rare health conditions. Compared to traditional recruitment, Facebook recruitment tended to result in similarly representative samples with lower cost per participant and more rapid recruitment. Additionally, the main limitations associated with using Facebook as a recruitment source regarded technical issues which may, for the most part, be addressed by tools that already exist (e.g., tracking participants' IP addresses, conversion tracking tools). However, the ethical implications of tracking the activity of even those participants who may click on an advertisement, but choose not to participate, may mean that comprehensive tracking of people who interact with study advertisements and pages may not be possible.

Studies should consider a number of strategies to maximise efficiency and effectiveness of recruitment. In particular:

- Carefully considering the target group and how best to use Facebook to reach this group. These results suggest that using a study's inclusion criteria (e.g., age, location, gender) to target an advertisement, may be an effective and cost-efficient way to recruit a broad and general study sample. When aiming to recruit a more specific sample of participants, using listed interests or likes to target a Facebook advertisement appeared to be more cost-effective than using a broad targeting strategy.
- Carefully considering wording of advertisements. Including the information in an advertisement that the study constitutes research, is affiliated with a university or hospital and/or any incentives offered for participation, may enhance recruitment via Facebook, although significant cost differences across studies were not found.
- Offering incentives for participation: There was limited evidence that offering incentives for participation or mentioning incentives in advertising enhances Facebook recruitment. Researchers need to weigh the costs of incentives against the cost of recruitment.
- Considering no-cost recruiting methods such as snowball sampling.
- Considering whether to purposively sample subgroups, such as males, who may be underrepresented.

Research that is cross-sectional tended to dominate this review. This dominance may reflect the broader research literature, as cross-sectional studies are less resource-intensive than trials and longitudinal studies. It may also be that Facebook recruitment may be more suited to one-off data collection activities. Furthermore, as highlighted by the findings regarding representativeness, the purpose of a research study should be considered before embarking on recruitment through Facebook. Specifically, studies that require representative samples, such as prevalence studies, and studies that require ongoing participation may benefit from more intensive engagement with potential participants. The emergence of additional data from unpublished trials and longitudinal studies may further clarify the utility of Facebook for recruitment to such research.

Limitations of this review include that it excluded non-English studies and did not search databases of literature from a broader array of social science and non-science disciplines. It should also be noted that the specific requirements of Facebook advertising have changed a number of times since its launch. Additionally the advertising procedure used by Facebook means that, even without specific targeting, advertisements are more likely to appear on the pages of people whose activity on the site involves mention of the words contained within study advertisement (Facebook.com, 2013). It is, however, unclear exactly how this automatic targeting functions, and how frequently Facebook updates the algorithm that underlies this process. It is possible that different automatic targeting protocols were applied by Facebook across the period covered by this review, meaning that results from different studies may not be directly comparable. Future studies may also achieve different advertising success as a result of changing Facebook algorithms and policies.

As reported in a previous review of research recruiting via Facebook (Amon et al., 2014), a limited proportion of included studies provided complete data on recruitment costs and sample size. Only half of the included studies reported specific details on the process of recruiting via Facebook. Even fewer (18.2%, $n = 20$) reported sufficient details for the cost per completing participant to be calculated and only three studies (2.7%) (Altshuler et al., 2014; Arcia, 2014; Fenner et al., 2012) contained information about all the variables collected in the current study. The comparisons made in this review across different topics, designs and other study characteristics may have been limited both by incomplete reporting and considerable study heterogeneity. As such, it remains difficult to definitively determine the effectiveness of Facebook as a recruiting method for specific types of studies. More thorough reporting regarding the processes followed and results obtained when using Facebook to recruit participants will assist with future investigations into the effectiveness of this approach, as well as the identification of the most appropriate methods to use for different types of research. Additionally, few of the included studies were conducted in non-English-speaking countries or developing nations.

The majority of studies included in this review continued to target youth or young adult populations, so it remains unclear whether Facebook is likely to be an effective method to recruit older adults. However, the success of a number of studies that recruited adults of all ages suggests that it might be. Facebook was also successfully used by a number of researchers to recruit participants from a range of low-incidence, hidden populations, as well as to recruit participants to research regarding sensitive and stigmatized topics (e.g., mental health and substance use research, sexual behaviours). It is suggested that researchers aiming to recruits these types of populations, or to conduct research regarding sensitive or stigmatized topics, consider using Facebook as a recruitment source.

Overall the results of this review indicate that Facebook is an effective and cost-efficient recruitment method. It is hoped that this review will assist researchers to make decisions regarding the use of Facebook as a recruitment tool in their future research.

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