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Comparing in person and internet methods to recruit low-SES populations for tobacco control policy research

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Abstract

Tobacco use and the associated consequences are much more prevalent among low-SES populations in the U.S. However, tobacco-based research often does not include these harder-to-reach populations. This paper compares the effectiveness and drawbacks of three methods of recruiting low-SES adult smokers in the Northeast. From a 5-year, [funding blinded] grant about impacts of graphic warning labels on tobacco products, three separate means of recruiting low-SES adult smokers emerged: 1) in person in the field with a mobile lab vehicle, 2) in person in the field with tablet computers, and 3) online via Amazon Mechanical Turk (MTurk). We compared each of these methods in terms of the resulting participant demographics and the "pros" and "cons" of each approach including quality control, logistics, cost, and engagement. Field-based methods (with a mobile lab or in person with a tablet) yielded a greater proportion of disadvantaged participants who could be biochemically verified as current smokers—45% of the field-based sample had an annual income of < $10,000 compared to 16% of the MTurk sample; 40–45% of the field-based sample did not complete high school compared to 2.6% of the MTurk sample. MTurk-based recruitment was substantially less expensive to operate (1/14th the cost of

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field-based methods) was faster, and involved less logistical coordination, though was unable to provide immediate biochemical verification of current smoking status. Both MTurk and field-based methods provide access to low-SES participants–the difference is the proportion and the degree of disadvantage. For research and interventions where either inclusion considerations or external validity with low-SES populations is critical, especially the most disadvantaged, our research supports the use of field-based methods. It also highlights the importance of adequate funding and time to enable the recruitment and participation of these harder-to-reach populations.

Keywords

Recruitment; Disadvantage; Low-SES; Field based sampling; Internet sampling; Amazon mechanical turk; Inclusion; Tobacco control policy

1. Introduction

Decades of tobacco control policies and interventions have contributed to massive reductions in tobacco use among U.S. adults, dropping from a prevalence of 42% in 1965 to less than 16% in 2016 (Jamal et al., 2018). Despite these reductions, rates of tobacco use are disproportionately high among low-income adults, those with lower levels of formal education, American Indians/Alaska Natives, and multi-race individuals (Jamal et al., 2018). Individuals with low income or low education (hereafter low socioeconomic status (SES) populations) are more likely to start smoking, less likely to quit, and more dependent on nicotine (Bobak, 2000; Hiscock et al., 2012; Paul et al., 2010; Siahpush, 2006). For example, smoking prevalence in 2016 was 25.3% among those living below the poverty line (versus 14.2% among those at or above the poverty threshold) and at least 24% among those with a high school education (versus 8% among those with a college degree) (Jamal et al., 2018).

Disparities such as these have not gone without note. The 1998 Surgeon General's Report on Tobacco Use called for the elimination of health disparities in tobacco use (Passey and Bonevski, 2014; Surgeon General, 1998). Disparities in smoking rates suggest that current tobacco control approaches, and the science on which they are based, do not adequately meet the needs of low-SES populations (Jamal et al., 2018). Yet, relatively few studies include these hard-to-reach groups in tobacco research. For example, in a review of research on graphic warning labels on tobacco products, only 18% included low-income participants (Noar et al., 2016). In another review of studies on cessation, only 24% of studies from the United States or Canada included low income or homeless populations (Courtney et al., 2015).

From multiple fronts, there are calls and requirements for research to be more inclusive of low-SES populations (Brown et al., 2014; Hiscock et al., 2012; Passey and Bonevski, 2014). Each call highlights the need for methodological strategies to include disadvantaged populations in tobacco studies in order to make equitable contributions to tobacco-related policy and health interventions. Failure to include low-SES groups has implications for study generalizability, external validity, and efficacy of broad public health measures, and may inadvertently contribute to health inequalities by privileging perspectives of those who suffer lower tobacco-related burden (Bonevski et al., 2014; Courtney et al., 2015; Passey and

Bonevski, 2014; Paul et al., 2010; Siahpush et al., 2010). In addition, because smoking rates are not equally distributed across the general population, relying on traditional, population-based sampling strategies may inadvertently isolate those who are both most affected by and stand to benefit most from the research (Bolland et al., 2017; Courtney et al., 2015; Hiscock et al., 2012; Paul et al., 2010).

Much discussion has covered real and perceived reasons that low-SES populations are considered hard-to-reach and not pursued for or included in research: distance from academic centers; concerns about time, travel, expense, and safety (Bolland et al., 2017); participants' distrust of outsiders (Dibartolo and McCrone, 2003); distrust of researchers (Yancey et al., 2006) or the research process (Bonevski et al., 2014; Jenkins et al., 1998); and difficulty in recruitment or access due to low-literacy, absenteeism, work schedules, transportation, child care, prioritization of daily needs over research participation (Dibartolo and McCrone, 2003; Loftin et al., 2005). Recommendations emerging from this body of work include the need for researchers to combine multiple sampling strategies to maximize opportunities for involvement and to develop data collection methods that are innovative, flexible, and adaptable to population needs (Ellard-Gray et al., 2015; Passey and Bonevski, 2014; Thompson and Collins, 2002; Watters and Biernacki, 1989).

This paper addresses how well three different methods (in person recruitment with a mobile research lab in urban and rural areas, in person recruitment with tablets but no mobile lab, and online via Amazon Mechanical Turk) enroll low-SES adult smokers in urban and rural areas. We made these comparisons in the context of study jointly funded by the National Institutes of Health (NIH) and Food and Drug Administration (FDA); this research explored several recruitment methods to recruit low-SES smokers in order to evaluate their understanding of and reactions to proposed graphic warning labels on cigarette packages and advertisements (Byrne et al., 2017; Skurka et al., 2018). To put demographics in context, we also compare the pros and cons of our field-based recruitment methods versus internet-based data collection with MTurk in terms of quality control, logistics, cost, and engagement. The inclusion of low-SES populations takes on an additional degree of importance in studies designed to inform population-level interventions (like mandated product warning labels), which may reach all SES groups but also run the risk of exacerbating tobacco use disparities if they are designed in ways that appeal to and work better among higher SES populations (Thomas et al., 2008). Ensuring that an intervention is widely applicable and effective among diverse audiences is therefore critical. In order to do so, those diverse audiences need to be involved to ensure a proposed intervention works and whether or not there is a need for more tailored approaches for marginalized groups (Ceci and Papierno, 2005; Passey and Bonevski, 2014).

Although the primary goal of the larger NIH/FDA grant was not to compare data collection strategies, the evolution of the project over four years provided us with three different means of collecting data, each of which presented opportunities and challenges for involving low-SES smokers. This enables us to compare these methods. In the sections that follow, we (a) describe these strategies to involve low-SES populations, (b) compare demographic characteristics of those included in each of the three studies, and (c) discuss the pros and cons (in terms of cost and access) for reaching low-SES smokers. We pay particular

attention to the benefits and tradeoffs of in-person, field-based strategies versus web-based methods.

2. Methods

2.1. Method 1: In person in the field with mobile laboratory vehicle

The mobile lab is a 25-foot long vehicle with five private research stations outfitted with eye-tracking computers. We collected the adult smoker mobile lab sample (N = 2037) over a period of 16 months from March 2016 to July 2017. We purposefully recruited participants from low-SES rural and urban areas across the Northeastern United States. To do so, we selected locations based on a variety of factors, including U.S. census data (median income ≤ $35,000 in a zip code), in-person scouting, and site-specific community partnerships (i.e. stores, social services, libraries). To diversify the sample and avoid repeat participation, we traveled to each site for one day (if a rural location) or up to three times (if situated within a large city, choosing geographically disparate locations each time). We set up a variety of signs around the mobile lab and distributed flyers to nearby stores and pedestrians to attract participants. In cases where we had a community partner, the partner also advertised in-person, via list serves, or through social media. We required participants to be 18 or older. We obtained informed consent, biochemically verified their smoking status (using the Covita breath test or the Alere saliva test), and invited participants into the mobile lab and seated them at one of the five eye-tracking stations. We then asked participants to view a series of images of cigarette boxes or ads (depending on the specifics of the study) containing various iterations of warning label content or plain pictures of cigarette packs without such warnings (Byrne et al., 2017; Skurka et al., 2018). After viewing these images, participants completed a post-test survey on a tablet that included a self-report of demographics. After survey completion, each participant received $20 as compensation upon completion. The entire process, from consent to compensation, took approximately 25 minutes.

2.2. Method 2: In person in the field with tablet computers only

Concurrent with the mobile lab parent study, we conducted a supplemental discrete choice experiment (DCE). The aim of the DCE was to determine how flavors change the attractiveness and use of tobacco products (cigarettes, smokeless tobacco, little cigars and cigarillos, and e-cigarettes) among low-SES adult smokers in urban and rural areas. DCEs are conducted by asking individuals to make purchase decisions under multiple scenarios where the products stay the same but the products' characteristics, such as flavors, vary. Products were described on an iPad followed by questions about purchasing preference.

This study also targeted low-SES rural and urban smokers across the Northeastern U.S. (N = 571) but did not use eye-trackers. We selected locations and recruited participants using similar methods to the mobile lab study described in Method 1. Because there was no physical research space supplied by the research team, the study took place at tables set up on the sidewalk, existing outdoor seating or in a shopping mall, grocery store, library, restaurant, or other community-partner indoor space. Although the participants did not complete the study in the mobile lab, there were some instances where the lab was also present, so it served as a visual indicator beyond the other forms of advertising (flyers,

street-intercept). On the few occasions both studies were running concurrently, we estimate that a maximum of 50 people could have participated in both studies (10% of Method 2 sample, 2.5% of Method 1; this is discussed further in the limitations section).

As with the mobile lab studies, we biochemically confirmed adult participants (18+) as smokers; following consent, they viewed several sets of paired stimuli and survey questions on a tablet, including a similar set of self-reported demographic questions. Each participant received $20 in compensation upon completion. The study, from consent to compensation, took approximately 20 min.

2.3. Method 3: Online with MTurk

With growing internet accessibility, web-based surveys are increasingly popular in research, including health and communication research, as a low-cost strategy to involve a larger number of participants and expand beyond college-based samples (J. Chandler and Shapiro, 2016; Gosling and Mason, 2015; Jeong et al., 2018). In August 2017, approximately one month after the conclusion of mobile lab data collection, we recruited smokers on Amazon's Mechanical Turk (MTurk) for a supplemental study. We sought to replicate the demographics of the in-person sample as best as the platform would permit – specifically, aiming to involve low-SES adult smokers in the U.S. (N = 503). We used MTurk's premium qualifications to stratify the sample by income in an effort to recruit a demographically similar sample online to what we had been able to recruit in the studies with the mobile lab. Based on available income brackets set by MTurk, we set quotas for 75% of participants to have self-reported household incomes < $25,000, 20% with household incomes from $25,001 to $50,000, and 5% not restricted to a particular income level. Other qualifications included smoker status, U.S. residence, and > 95% approval rating on previous MTurk studies or tasks. We exposed participants in the MTurk study to the same stimuli as the final round of data collection with the mobile lab (though we were not able to track their eye movements), and they completed the same measures as the mobile lab study. We compensated these participants with $1, a rate which was in line with what similar tasks online pay. The study, from consent to compensation, took approximately 12 minutes on average.

3. Results

3.1. Comparing demographics

The tables that follow include participants who completed at least some of the demographic questions in their post-test survey. Table 1 provides a summary of demographic factors that were measured across all three modes of data collection. In general, the demographics of those participating in the two field-based methods (mobile lab and field with tablet) are similar to one another. The aggregate demographics of the field-based methods are quite dissimilar from those participating via MTurk. There are inconsistent patterns with age, although the in-person studies have larger proportions of participants 45+. The mobile lab and field with tablet samples are more balanced than the MTurk in terms of self-reported gender identity (56.3% and 57.3% male, compared to 36.2% in the MTurk sample). The MTurk sample is also less diverse in terms of race and ethnicity; 77% of respondents

identify as white, compared to 54% in the mobile lab and 65% in the field with tablet study. Those taking MTurk are more likely to be employed full time and are less likely to have moderate or high nicotine dependence than either the mobile lab or field with tablet samples. The samples are similar in terms of history with quit attempts and having young children at home. Those on MTurk are more likely to have tried an e-cigarette and less likely to have received emergency food assistance.

Both income (Fig. 1) and education (Fig. 2) differ between the field-based and MTurk samples. The difference in income is of note, particularly at the lowest ends, because recruitment constraints in MTurk were designed to replicate to the extent possible the incomes of those recruited via the mobile lab. The most notable difference is in the lowest income (< $10,000) category; nearly 45% of the field-based sample identifies this as their annual income compared to 16% of the MTurk sample (see Fig. 1). This low end of the category is relevant. The prevalence of smoking nationally is much greater below the poverty threshold than above; in 2016, the poverty threshold for a single adult was $12,228 (United States Census Bureau, 2018). Education shows a similar trend, between 40% and 45% of the field-based sample did not complete high school, compared to 2.6% of the MTurk sample (see Fig. 2) and, nationally the smoking prevalence is highest among those who did not complete high school.

3.2. Pros and Cons of Each Method

We compared the pros and cons we experienced for each of the three data collection methods with regard to quality control; logistics, participation & recruitment; engagement with participants, community partners and the general public; and cost. These are detailed in Tables 2 and 3 and discussed in depth below. This summary is not meant to be reflective of all field- or internet-based options but reflects our experience with the methods we used for our specific studies. MTurk was much less expensive to operate, was comparatively faster to recruit participants, and overall required fewer inputs (staff time, equipment, travel). With MTurk, we were limited in how much we could tailor recruitment using their premium qualifications (i.e. income, smoking status), were unable to biochemically verify current smoking status, and could not control the viewing environment for the images that were evaluated. Field-based methods did not require that participants have access to the internet or own a computer. Field-based methods also enabled interaction with participants for questions about consent or the project, development of partnerships with community entities, immediate biochemical verification of smoking status, and word-of-mouth recruitment. However, field-based methods were substantially more intensive in terms of cost, staff time, coordination, and study duration.

4. Conclusions and implications

4.1. Demographics

The populations we recruited through the most time- and resource-intensive method (the mobile lab) closely resembled populations we recruited through in-person data collection with an iPad. This similarity is noteworthy as access to a mobile research lab is likely not an option for the vast majority of studies. The two field-based approaches allowed us to recruit

a more diverse sample in terms of race and ethnicity and involve participants who had lower incomes (especially less than $10,000), limited education (less than high school), and a greater dependency on nicotine. Given limited inclusion of these low-SES populations in tobacco-related research, this comparison of these field-based methods offers insight as to how to involve these populations compared to web-based surveys. While not reported here, field-based methods from the [funding blinded] study also enabled the participation of youth (n = 2000), another population that can be difficult to involve in IRB-approved research via mechanisms like MTurk.

That a field-based sample might be different than a web sample is not new, but these differences are important to highlight as web-based research grows in popularity and is compelling in terms of cost and efficiency. Web surveys offer clear advantages in terms of efficiency, speed, scale, recruitment considerations, longitudinal data collection, cost, staffing, equipment, and safety (Farrell and Petersen, 2010; Heerwegh and Loosveldt, 2008; Klausch et al., 2013; McMorris et al., 2009). These advantages must be weighed against the issue under study, the populations it affects, and the applicability of the findings.

Despite the proliferation of internet-based surveys and panels, there is general agreement in the literature that internet surveys are not necessarily representative of the general population (Blom et al., 2015; Yeager et al., 2011) even when they are not convenience samples like MTurk. Around 11% of the US population does not use the internet (Anderson et al., 2018). While the percent of non-use is similar based on race (White 11%, Black 13%, Hispanic 12%), prevalence of access differs by income, education and locality: of those earning less than $30,000 annually, 19% do not go online; 35% of those with less than a high school education and 22% of those in rural locations also do not use the internet (Anderson et al., 2018). Who is able and likely to participate is especially relevant for implementation - in the case of tobacco, the groups that are least represented online or likely to participate in online research are those most affected by the issue under study. It is similarly relevant for external validity when there is reason to believe that those groups who are excluded by mode of recruitment, for example, those with less education, may absorb and process the intervention differently than those included (S. Durkin, Brennan and Wakefield, 2012; S. J. Durkin, Biener and Wakefield, 2009; Niederdeppe et al., 2011).

4.2. Quality control, engagement and visibility

Field-based data collection enables important components for quality control – namely the ability to biochemically verify current smoking status, ensure all participants take the study in roughly the same environment, and guarantee consistent viewing experience for iPad based studies (as all participants use the same equipment). Currently, a major limitation of the internet platform we used is the absence of biochemical verification of current smoking status and a reliance on self report only, though it does enable other important forms of targeted recruitment. Biochemical verification is recommended for participation in tobacco-related research and clinical interventions to distinguish between use and nonuse (Courtney et al., 2015; SRNT Subcommittee on Biochemical Verification, 2002). While self-reports are often accurate, deception does occur, though usually in the form of underreporting smoking (Gorber et al., 2009; Patrick et al., 1994; Russell et al., 2004). For this research, we deemed

biochemical verification in the field to be important to assess both currency and intensity of smoking to distinguish between current, daily smokers (required to participate in our studies) and previous or occasional smokers. The screening tool that MTurk uses for the smoking premium qualification ("Qualification to work on Tasks for Workers who smoke. A score of 1 means you smoke. A score of 0 means you do not") does not permit this level of granularity, and Workers who meet a given qualification are those individuals who opted into providing that information (i.e., MTurk does not require its Workers to complete premium qualification screeners). Further, when there is a financial incentive, people may be deceptive about their relevant status (in this case smoking) in order to participate. This type of deception to enable financial gain has been reported in MTurk, and it may be particularly prevalent when hard-to-reach populations are targeted for inclusion (J. J. Chandler and Paolacci, 2017). We also observed a relatively large number of nonsmokers and occasional smokers who attempted to participate in the field studies; we were able to exclude them via biochemical verification.

Finally, compared to the MTturk study, the two field-based methods enabled opportunities for engagement with, and visibility of, academic research. There was opportunity for extended discussion with participants after they completed the study – in addition to enabling a more thorough debrief, these conversations have seeded ideas for future work.

4.3. Logistical and financial considerations

Field-based methods, despite their ability to reach low-SES participants and increase the visibility of academic research, have considerable logistical and financial considerations compared to web-based methods. These constraints make MTurk-style data collection methods substantially more accessible in terms of timing, cost, logistics and staff. In terms of time, field-based methods require more staff to recruit participants and guide them through the study, more time to coordinate the recruitment sites, and a greater length of time to involve the desired number of participants. Field-based methods also involve field-based expenses (lodging, gas, food and security) and demand more of the research staff psychologically (in terms of interaction with participants) and physically (travel, set up, recruitment). Staff schedules can influence the timing of and ability to proceed with data collection. In contrast, online methods can reach large populations quickly (thousands in several days or weeks), do not require staff to recruit or interact with participants in order to collect data, are not impacted by weather or site selection, and require less payment for each individual. For participants in online studies, they do not need to travel to a research site, be available during a particular time of day, or wait for a space.

The following is an illustrative cost comparison of data collection only for field-based vs MTurk methods, *once data were ready to be collected (i.e. not accounting for time designing the study):*

- To involve 500 participants via MTurk, the total cost for data collection was $1187. For this particular data collection exercise, it took two weeks to involve ~500 participants with the desired demographics. Factors: $1 payment per participant, 40% of participant fee payment to MTurk, premium fees for low-

SES ($0.50 per participant) and smoker ($0.30 per participant); 5 h (at $20 an hour) for staff time monitoring during data collection.

- To involve 500 participants in the field without overnights or the mobile lab, the cost for the data collection portion is estimated to be $16,965. Factors - 7 days of data collection of 75 participants per day (additional days may be needed to meet recruitment goals), $20 payment per participant, hourly costs for 4 staff members (average of $20 per hour for 10 h for seven days), gas/car rental @ $75 per day, and meals @ $30 per person per day. If security is needed, include at least $400 per day; rental of a mobile lab would be likely at least an additional $350 per day. It is possible that we could have paid participants less, thereby reducing the data collection cost considerably. If participant flow is high and not far from the university, it may not require 10 h days for travel and data collection; it is possible to conduct this with fewer staff but not necessarily advisable.

4.4. Limitations

There are several limitations to this study. First, this comparison emerged out of a larger study rather than being an intentional design to compare participants from two different methods of recruitment from the beginning. As such, some of our sample likely participated in both field-based methods, and the sample sizes are different. Much of our field-based data were collected during daytime hours (8am to 6pm); research teams with different data collection hours may recruit different demographic proportions. The comparisons we make here are rooted in university-initiated research in a specific context (tobacco research with low-SES populations in the Northeast). As such, the specific costs, pros and cons may not apply to all institutions conducting research, to other research topics, for issues with different quality control needs or for topics where SES is not as important a factor. While we endeavored to be as thorough as possible in articulating the strengths and weaknesses of each method, others may have additional considerations to add.

Our web-based sample is based on MTurk data that were collected in 2017; associated policies, fees and screening/recruitment practices may have changed since then. We were also limited by Mturk's existing stratification categories for income. Adding our own screening questions for both income and smoking status later in the survey to try to better access the correct number of current daily smokers (our criteria) for each of our income categories of interest would be an improvement in future work, though we do not know the size of the pool for extremely low income individuals. This approach could add some time and expense but would circumvent MTurk's imposed categories and question structure. However, it does not address the issue of biochemical verification or deception about income status in order to gain entry, as people could still work around this option (J. J. Chandler and Paolacci, 2017). Additionally, MTurk is including a feature for its Workers so they can evaluate and look at the evaluations others have given the Requestors (those who develop the tasks, surveys). In-survey screening may frustrate those who were excluded midway through a survey and this frustration may impact researchers' ability to collect data by deterring potential survey takers (Workers) by way of negative evaluations. Finally, MTurk is an example of one internet-based data collection method but is not necessarily representative of all such platforms in terms of participants and practices.

4.5. Implications

Inclusion of low-SES populations in research on tobacco and other addictions, especially the most disadvantaged in terms of income and education, is important along a number of domains: 1) how well the results of a study apply to a population of interest, especially when the most disadvantaged are not only most affected and but also least likely to be included in previous research (rising potential external validity concerns if these groups are rarely included); 2); the political and representational importance of including affected populations, and 3) to reduce health disparities, the ability to understand how well a proposed intervention works for those most affected. Based on our example, field-based methods can better access these populations – especially the most disadvantaged—and may allow for additional elements of study rigor and quality control (immediate biochemical verification of current smoking status). This inclusion currently comes at a substantial cost in terms of money, personnel, and time.

Researchers interested in low- and extremely low income populations and internet samples should consider clarifying the demographics of the platform's participant pool to assess whether that platform enables sufficient access. Based on our findings with this particular platform, to the extent that researchers interested in understanding impacts on low or extremely low income populations, endeavoring to include even part of the sample via field methods could help ensure their inclusion and assess whether patterns in responses are different from online methods. Increasingly, institutions are interested in community-engaged research, increasing diversity of study participant representation and addressing health disparities, and may devote resources to enable data collection that addresses these ends. For university-based work, there is often a ready supply of students interested in field experience off campus – opportunities to assist for course credit may defer some costs. While data collection equipment and larger resources such as a mobile lab are costly, institutional investment or collaborative endeavors across multiple projects could make these available to a wider range of researchers.

More structural changes can also be made in the practices of services such as MTurk. The more these tools can provide transparency about how they screen and recruit participants, the better researchers can assess how well these tools meet their specific needs. Efforts to expand their pool of participants who have low levels of income and education - while likely logistically challenging - would be another means to address inclusion concerns. Finally, given the added cost and logistical burdens of this kind of work, funders interested in including these populations in research and addressing health disparities should consider making sufficient resources available to enable their inclusion.

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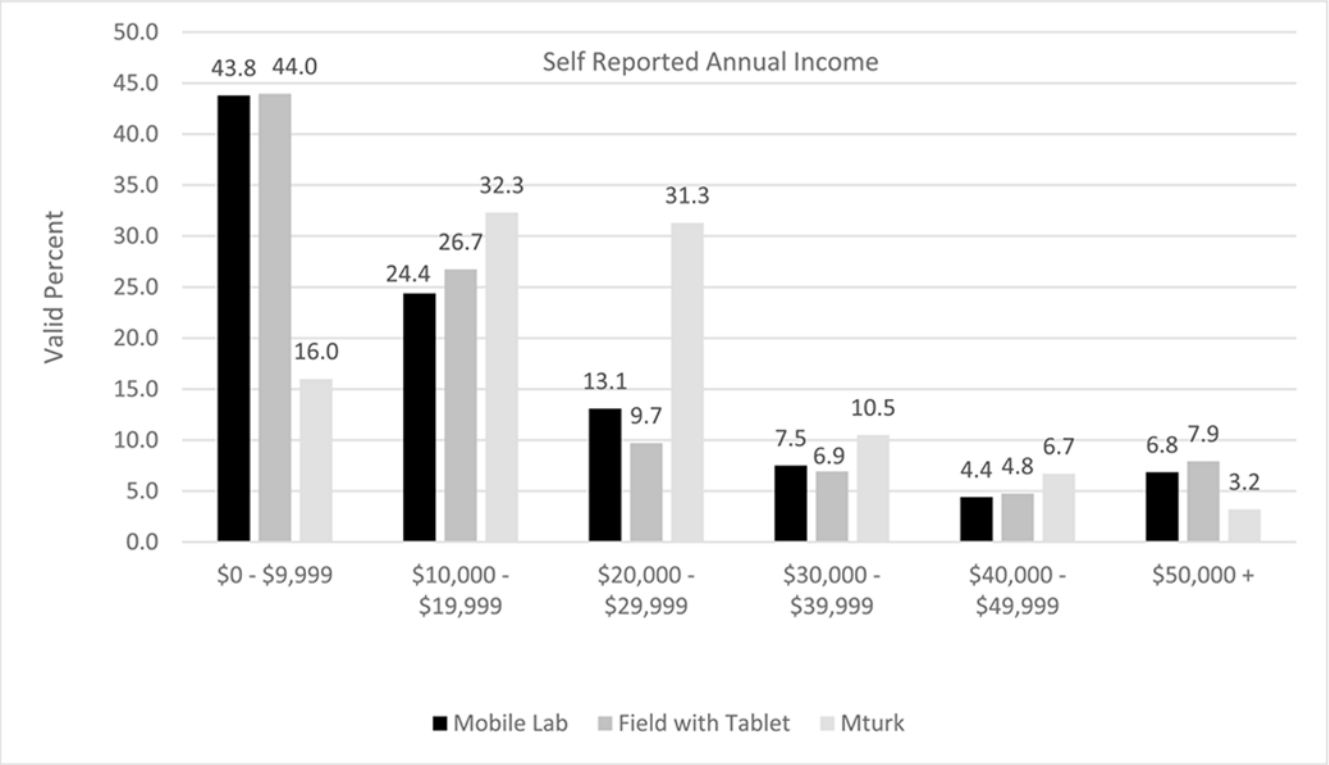

Fig. 1.
Participant self-reported annual income, by type of data collection.

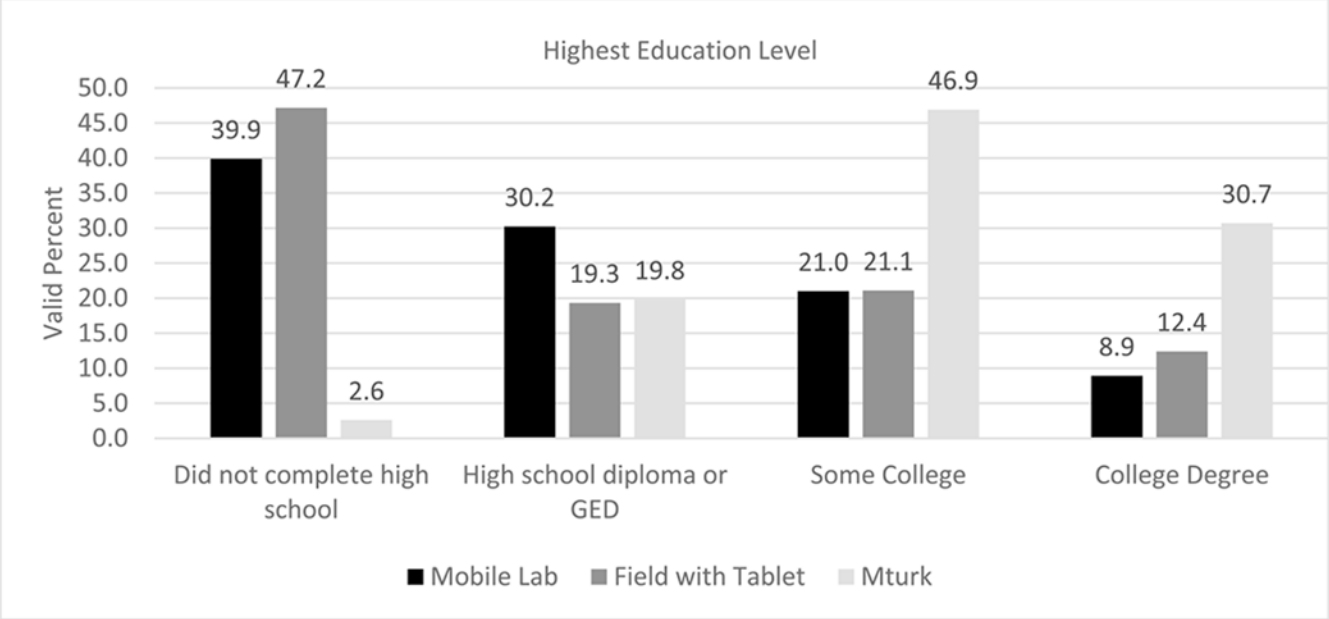

Fig. 2.
Participant self-reported highest education level achieved, by type of data collection.

Table 1

Demographics of participants across three methods.

	Means (*SD*) or *N*s (valid %)		
	Mobile Lab	**Field with Tablet Only**	**MTurk**
N	2037	571	495
Age			
18-24	272 (13.8%)	102 (20.2%)	57 (11.5%)
25-34	454 (23.0%)	148 (29.4%)	196 (39.6%)
35-44	372 (18.9%)	96 (19.0%)	105 (21.2%)
45-54	433 (22.0%)	95 (18.8%)	82 (16.6%)
55-64	348 (17.7%)	52 (10.3%)	43 (8.7%)
65 +	88 (4.5%)	10 (2.0%)	12 (2.4%)
Sex			
Male	1129 (56.3%)	290 (57.3%)	179 (36.2%)
Female	853 (42.6%)	211 (41.7%)	310 (62.6%)
Transgender[#]	6 (0.3%)	*	6 (1.2%)
None of the above/Prefer not to say	16 (0.7%)	5 (1.0)	–
Ethnicity			
Hispanic, Latino or Spanish origin	241 (12.2%)	61 (12.2%)	35 (7.1%)
Race			
American Indian or Alaska Native	26 (1.3%)	9 (1.8%)	1 (0.2%)
Asian	9 (0.4%)	3 (0.6%)	11 (2.2%)
Black or African American	651 (32.5%)	113 (22.3%)	40 (8.1%)
Hispanic, Latino or of Spanish Origin	42 (2.1%)	6 (1.2%)	9 (1.8%)
Native Hawaiian or Pacific Islander	4 (0.2%)	1 (0.2%)	–
Multiple Races Selected	140 (7.0%)	30 (5.9%)	47 (9.5%)
White	1090 (53.4%)	331 (65.4%)	381 (77.0%)
Other/Unknown	42 (2.1%)	13 (2.6%)	6 (1.2%)
Smoking variables			
FTCD[**] (range 1–10)	M = 5.22 (SD = 2.4)	*	M = 4.10 (SD = 2.50)
Tried to quit 1 day or more in past 12 months	1120 (55.8%)	230 (46.2%)	259 (52.3%)
Ever tried an e-cigarette	386 (49.2%)	–	387 (78.2%)
Children under 10 in the home	666 (33.6%)	210 (42.0%)	138 (27.9%)
Benefits program recipient			
Emergency food	1141 (57.0%)	262 (51.9%)	116 (23.4%)
SNAP[***]	1345 (67.1%)	311 (61.5%)	212 (42.8%)

Notes. Percentages are based on the number of respondents with non-missing data for that variable.

[#] - this response option was included for the last two mobile lab studies only;

[*] = item not asked;

[**] FTCD = Fagerström Test for Cigarette Dependence (higher scores indicate greater cigarette dependence)

*** SNAP = Supplemental Nutrition Assistance Program.

Table 2

Pros of each method in the domains of quality control, logistics/participation/recruitment, engagement and cost.

Field with Mobile Lab	Field with Tablet	MTurk
Quality Control • Biochemically confirm current smoking status • Maintain standardization of methods (setting, procedure, screen size) • Ability to observe participants, make notes, exclude based on concerns (inebriation, lack of comprehension) • Provide support during survey **Logistics, Participation & Recruitment** • Ability to use equipment-intensive research (i.e. eye-tracking) • Access to diverse, low-SES populations – Do not require participants to have internet access or own a computer/ smartphone/tablet – Access to people who may not otherwise hear about study • Allows word of mouth/street intercept recruiting • Provide own space for data collection (do not require classrooms or community center) **Engagement** • Public engagement with federally funded research (site partners, passers by) • Can facilitate establishment of research relationship with community partners • Potential for Q&A with participants	**Quality Control** • Biochemically confirm current smoking status • Ability to observe participants, make notes, exclude based on concerns (inebriation, lack of comprehension) • Provide support during survey **Logistics, Participation & Recruitment** • Can use existing infrastructure • Access to diverse, low-SES populations – Do not require participants to have internet access or computer/ smartphone/tablet – Access to people who may not otherwise hear about study • Allows word of mouth/street intercept recruiting **Engagement** • Public engagement with federally funded research (site partners, passers by) • Can facilitate establishment of research relationship with community partners • Potential for Q&A with participants	**Quality Control** • Enables targeted recruitment • Can customize inclusion parameters (i.e. income) **Logistics, Participation & Recruitment** • Respondents can participate at own convenience (late night, after hours). • No field based data collection coordination – Limited infrastructure needs – No safety concerns – Limited logistic coordination for recruitment • Ability to quickly reach large N, national sample • Participant payment managed by external party (Amazon) • In general, shorter data collection time needed for sample size **Cost** • Fewer staff needed (compared to mobile lab) • Less staff time needed than field based designs • No travel expenses • Participants supply own equipment (phone, computer, tablet) • Lower incentive payment required than for an in person study

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Table 3

Cons of each method in the domains of quality control, logistics/participation/recruitment, engagement and cost.

Field with Mobile Lab	Field with Tablet	MTurk
Logistics, Participation & Recruitment • Geographic limitations due to expense and time • Participants need to be physically present when lab is available • Coordination time with sites and partners, adjustments made based on weather and site performance • Unclear duration of data collection to reach desired N • Emotional and physical demand on staff • Safety concerns for staff **Cost** • Staff time – large number needed for field based data collection for large N, training for fieldwork • Duration of data collection • Security • Food, lodging, gas • Substantial infrastructure needed (mobile lab, tablets, data collection equipment) • Higher incentive likely needed than an online study	**Logistics, Participation & Recruitment** • Coordination time with sites and partners • Unclear duration of data collection to reach desired N • Safety concerns • Rely on finding community space • Cannot conduct equipment-intensive research (e.g., eye-tracking) • Inability to conduct outdoor data collection in inclement weather **CostCost** • Staff time – large number needed for field based data collection for large N, training, • Duration of data collection • Equipment (tablets) • Security • Food, lodging, gas • Higher incentive likely needed than an online study	**Quality control** • Current smoking status not biochemically verified • Cannot observe participants' behavior during survey (attending to stimulus, capacity, leaving mid-study) • Image/Stimulus size not consistent, due to type of device • Participants take study in highly variable settings **Logistics, Participation & Recruitment** • Unable to use certain methods at current time (eye-tracking) • Increased likelihood of involving career survey takers • Confined to pre-existing recruitment and stratification categories (for premium qualifications) • Requires respondents to have internet access, computer/smartphone and existing MTurk worker account **Engagement** • Unable to engage public, community partners • Researchers not immediately available to answer questions about the study