

A Focus Group Pilot Study of Use of Smartphone to Collect Information about Health Behaviors

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Abstract

Smartphone web access is immediate, accessible, and confidential, a combination of features that could make them a powerful tool for public health surveillance and evaluation. The purpose of the study is to evaluate factors that promote and hinder participation in use of smartphones for population-based surveys. Two focus groups with participants aged 18-34 and 35-65 years were conducted. The semi-structured, facilitated discussions covered pros and cons of conducting surveys via smartphone, barriers to and facilitators of using this novel data collection mode, and other issues. Audiotapes of the group discussions were transcribed and analyzed qualitatively. Facilitators of increasing participation included using contingent incentives, limiting use of open-ended questions, providing flexibility in response time, and emphasizing the survey data's social benefits. Potential barriers included usability issues with certain types of smartphones, and considerations related to work-issued smartphones; some differences were observed by age group. As smartphones continue to evolve, understanding of how they can be used to collect data is critical to surveillance and evaluation efforts.

Key Words: smartphone survey, focus group design, public health surveillance, feasibility, population-based survey

1. Introduction

Public health practice depends on having access to valid and reliable assessments of populations. Traditionally, paper-based surveys (including interviewer-administered and self-administered) and telephone surveys have been the primary data collection modes for population-based data on health and behavioral indicators. However, these modes have various drawbacks including errors resulting from interviewer transcription and data entry; challenges with conducting studies on tight timelines; and inaccurate data resulting from retrospective self-report. With advancing technology and methods, traditional survey modes are being increasingly replaced by electronic methods of data collection which merge the processes of data collection and data entry. This merging may be beneficial for data accuracy. For example, Lai observed that electronic diaries were more accurate than other survey modes that rely on patient memory for recall (Lai, 2009).

Given the continuing rise in the use of smartphones among the general population, smartphones present an attractive mode to reach populations for survey research. Nearly 116 million Americans will use a smartphone at least monthly by the end of this year, up from 93.1 million in 2011. By 2013, smartphones will represent over half of all mobile phone users, and by 2016, nearly three in five consumers will have a smartphone (eMarketer, 2012). With this recent and continuing rise of smartphone use and

availability, approaches to data collection are being revolutionized: smartphone survey applications offer additional data collection features, including instant location data, multimedia (camera/video), and communication tools such as push notifications, e-mail, and short message service (SMS). However, because smartphones are primarily used as personal devices there is a need to understand perspectives from users on the feasibility and usability of smartphones for participating in surveys. Some initial studies have shown that willingness to participate in smartphone surveys may vary by demographic characteristics. For example, previous research has found that younger individuals may be more willing to participate in smartphone surveys (Haberer, 2010; Lai, 2009; Stapleton, 2011). For example, one study which compared participation by survey mode observed that smartphone respondents were younger, more diverse, and less affluent than traditional computer respondents (Stapleton, 2011). In addition, Mays found that college students liked completing a daily assessment of their drinking via mobile surveys more than they liked completing via paper surveys (Mays, 2010). However, enthusiasm for a particular survey mode does not necessarily translate into compliance: smartphone surveys have higher abandonment rates than other survey modes (Buskirk, 2010; Mays, 2010). However, the offering of contingent incentives (i.e., incentives given upon survey completion) as well as respondents' curiosity and interest in the research project are strong motivators for smartphone participation and compliance (Lai, 2009).

Rapid response, which may be defined as the ability to generate data on emerging topics rapidly and efficiently, has been identified as one of the key steps for enhanced surveillance in tobacco control, and smartphones can play an important role in enhancing surveillance efforts and meeting the needs of tobacco control programs. First, tobacco control requires the ability to make rapid assessments in an ever evolving environment of changing levels of tobacco control funding and policies and tobacco industry promotions. A study looking at the feasibility of using mobile phones for data collection showed that data collection with a mobile phone has the potential to dramatically improve data quality, accuracy and timeliness in diverse areas of data collection including disease monitoring to agricultural management to emergency response services (Mourão, 2010). Second, in some instances there is a need to follow tobacco users over time to understand cessation as well as exposure to promotions and can provide ecological momentary assessments—experiential and behavioral data in real time, especially in rapidly changing environments (Shiffman et al., 2008, Mulvaney, 2011). Fourth, smartphone survey features can provide additional data points such as tobacco industry influences, point of sales/retail environment, and product pricing by screening bar codes from tobacco products. Finally, smartphones may be utilized to target specific populations.

Despite the numerous advantages of smartphone data collection, some challenges persist, including maintaining participation over time, issues related to usability, and the costs of implementation. In general, evaluating the feasibility and usability of smartphones for data collection from the end user perspective is needed. Therefore, the present evaluation assessed the perceived feasibility, advantages and disadvantages of conducting surveys via smartphone. The more specific goals of the evaluation were to explore: 1) how smartphones should be used to collect the highest quality data; and 2) whether and under what circumstances smartphone scan be used to collect public health data.

2. Methods

2.1 Subjects and site selection

Two focus groups were conducted in Burlington, Vermont in April, 2012. A total of eight people participated, four in each group. Participants were recruited via Random Digit Dialing (RDD) of telephone numbers in Chittenden County, Vermont. Participants needed to be at least 18 years of age and own a smartphone to be eligible to participate. To assist in recruitment, we offered participants an honorarium of \$50. A sampling frame was developed to ensure diversity in terms of age, sex, race/ethnicity, and smoking status. Because the ways in which people use smartphones varies by age, the groups were formed so that Group 1 consisted of participants aged 18-34 years, and Group 2 consisted of participants aged 35-65 years. Overall, 2 participants were Asian, 6 were White; 2 were female and 4 were smokers.

2.2 Focus group process

Each focus group was approximately 90 minutes long. The focus groups were conducted by a certified focus group moderator who was not known by the participants, and observed through a one-way mirror by staff with experience in research design and methodology. To reinforce the safety and confidentiality of focus group members, ground rules were reviewed and participants agreed that topics discussed in the group would remain confidential unless they impacted an individual's immediate safety.

2.3 Warm-up

A warm-up session had each group introduce participants to the moderator and each other, learn about participants' access to and familiarity with technology, and provide an "ice-breaker". The moderator handed out two checklists. One checklist listed types of devices that access the web (such as a smartphone, tablet computer, electronic reader, or laptop), and the other listed online activities that can be done on these devices. Participants checked off the devices they own or regularly use and the ways they use them. The moderator then went around the room and asked the participants to share their name, interests/hobbies, the devices they own or regularly use, and the ways they use them.

2.4 Smartphone study scenarios

Following the warm-up, participants were presented with three scenarios in order to evaluate motivators and barriers to participation in smartphone data collection studies. The first study scenario involved responding to questions about the number and type of alcoholic beverages consumed; the second focused on smoking behaviors and had an additional component requiring participants to use their smartphone to scan bar codes from cigarette packs at the time of purchase to obtain brand and price; the final scenario described a study on sexual health, which asked very detailed questions about sexual activity. Participants read each scenario and discussed what would influence their decision to participate in the study.

2.5 Moderator guide

Following each scenario, follow-up questions with alternative study designs were offered that either increased or decreased respondent burden (such as changing the number of text messages to respond to, changing the length of the survey, or changing the amount of the incentive) to determine what would change their decision to participate, and to encourage further discussion on the pros/cons of participation. If the participants seemed unwilling to participate in the test scenario, the moderator offered alternatives of increased incentives, reduced participant burden (i.e., reducing number of questions, etc.), etc. If participants seemed willing to participate in the test scenario, the moderator offered alternatives that increased burden and reduced incentives. This method allowed

us to assess the relative impact of different motivators and barriers to smartphone participation.

Examples of follow-up questions and probes included:

- Would you be likely to participate in the survey? Why, why not?
- What if you were only required to respond to *four* text messages throughout the day? *Three*?
- What if you were provided with *[\$[INSERT INCREASING FINANCIAL COMPENSATION]* a week for your participation? What if you got to keep the Smartphone?
- What if the survey only took five minutes to complete?
- How do feel about receiving online payments through ZashPay?
- How do you feel about answering questions about your smoking behaviors?
- Do you have any concerns about scanning the price tags of cigarette packs at local stores?
- How do you feel about answering questions about your sexual activity using a Smartphone?
- Do you have any concerns about your answers being kept confidential?
- How easy/difficult is it for you to type in one or two sentences on a Smartphone?
- Would you have difficulty completing the survey at work/school? Thinking of your work/school schedule, would there be times that you would be likely to miss the surveys? What if you were given an hour to respond?
- Would you prefer to receive a text message with a web address that would link to the survey versus taking the survey directly on your phone?
- Would you be more likely/less likely to participate if this was a traditional computer/mail/phone survey?
- Are there any other ways this study could be changed to increase your willingness to participate?

3. RESULTS

Focus groups were audio- and video-recorded for additional review and assessment. The main issue categories covered in the groups were: access to and familiarity with technology; barriers to participation in a smartphone study (including recruitment, security concerns, and usability concerns); motivators to participation in a smartphone study (including incentives and perceived social benefit); and other considerations to participation in a smartphone study (perceived burden, sensitivity of information being collected, and other requirements to participation). Each is discussed briefly below and comparisons and contrasts with findings from the Nielson study are made where appropriate (Lai 2009).

3.1 Access to and familiarity with technology

Both groups had access to, and felt comfortable with, smartphone and touchscreen technology. In addition to the regular use of the smartphones, which includes calling, social texting, Group 1 participants (ages 18-34) reported that they have access to the Internet “all the time” and that touchscreen technology and texting is “second nature” to them. Group 1 participants primarily use smartphones to access the Internet for social networking and leisure, such as using e-mail, uploading information on social networking sites, and downloading music. According to one participant, “Between music, sports, e-

mail, and Facebook, I'm always on the phone." Group 1 participants also use text messaging to manage their phone, credit card, and bank accounts.

Group 2 participants (ages 35-65years) were also familiar with multiple technologies, but only one participant expressed that she uses her smartphone "constantly." Group 2 participants also use their smartphones to visit social networking sites like Facebook, but most expressed that they "rarely" upload photos or other content about themselves. Primarily, Group 2 participants use their smartphones for banking, paying bills, e-mail, and reading online content. However, one participant stated that he prefers to do banking on his laptop rather than on his smartphone, because he is "used to that platform."

3.2 Barriers to participation

Recruitment: Participants in both groups expressed that the first barrier to participation in smartphone studies would come at the recruitment phase. Repeatedly, participants in both groups stressed the importance of ensuring study legitimacy at the recruitment phase. A Group 1 participant reported that he would want to see "a legit website before participating." Other participants in Group 1 added that if they received a letter in the mail on government letterhead, they would be more inclined to participate, but one added, "Unless I didn't open it." Group 1 participants also expressed that they would be likely to participate if the study came from a local entity, whose legitimacy they could easily confirm. According to one Group 1 participant, "I trusted that the focus group was legitimate because I recognized the College Street address." Another added, "I would be more inclined [to participate] if the letter came from [my state]." In addition, one Group 1 participant stated that he would like to know how and why he was selected: "I like a personal letter... It would be more legit if it said how I had been selected. I wanted to know if it was completely random, or if I had been targeted in some way." Participants in both groups agreed that they would be very reluctant to participate if they were recruited over e-mail. A Group 1 participant stated, "I would not respond to an e-mail request...it would seem not legit. It is too easy to press delete." Another added, "I wouldn't give out my phone number on e-mail." A participant in Group 2 agreed that for him, an e-mail recruit would be ineffective: "If received it [invitation to participate] in my e-mail, I would delete it."

Concerns about security: Participants in both groups expressed some concern over the privacy of transmitting information on their smartphones. According to a Group 1 participant, "Sometimes I'm concerned using phones for stuff. You download an app and then they have all your info." A Group 2 participant stated, "My perception is that my laptop is safer than my smartphone." Both groups expressed concerns over sending and receiving surveys over e-mail due to the risks posed by viruses and spam. Another Group 1 participant expressed concerns over whether the data collected would be stored on the device: "Smart phones are easy to get stolen, and then they have all your information."

Concerns about usability:

In both groups, opinions about smartphone usability depended on whether participants owned an iPhone or another smartphone such as a Blackberry or Droid. Overwhelmingly, participants in both groups expressed that the iPhone is "much easier to use" and complained of issues with Blackberries and older phones that would create barriers to participating in smartphone studies. Screen size was a major issue for non-iPhone users. According to one participant, "The screen size on the iPhone is better than the Blackberry and more 'magical.'" Another added, "I have a Blackberry, and it's not easy to read the screen. A laptop is easier to read." A non-iPhone user in Group 1 stated that completing

a survey on his smartphone would be an “annoyance with the screen size” and “I find it difficult to scroll, and the screen size is difficult.” This same participant added that some websites are unreadable on his older phone: “I have a less fancy smartphone, so when there is a page that doesn’t format correctly...like it puts all the pictures up front...it is annoying for me.” A participant from Group 2 expressed the same difficulty on his smartphone: “Types of sites can be different, and formatting looks different on different phones.”

Preference for responding: texting or weblink: Participants were also asked whether they would prefer to answer survey questions directly through text messaging, or by being provided a hyperlink to a web survey. Again, the type of smartphone that participants owned impacted their response. A participant from Group 1 mentioned that although on newer phones it would not make a difference, it would be more difficult to complete the survey on a website using an older phone. Other participants also confirmed that texting would be their preferred mode for completing a smartphone survey, “Texts would be more successful than a web survey. It is quicker and easier to text” and “Texting is an easy way to communicate, I will always respond.” However, some participants mentioned that they would be less likely to complete surveys via text message when sensitive information was being requested.

Response length and overall survey length: Participants from both groups expressed that there are times when completing a survey on a laptop or desktop computer would be preferable to completing it on a smartphone. This was primarily tied to the length of the survey. According to a Group 1 participant, “When I research or look at something from my phone, I will only look at it with a quick glimpse. My attention span is short.” A Group 2 participant also stated that smartphones may not be the best platform for longer surveys: “On a laptop, I can type as fast as I talk and do longer surveys.” The types of responses required also impacted whether participants would prefer to complete the survey on a smartphone or traditional computer. A Group 1 participant remarked, “Anytime you have to type a lot, you use a laptop. It takes three times as long on a phone. Anything more than five or six sentences and I will use a laptop.” Participants in Group 2 commented that they would not be willing to enter more than a couple of words on a smartphone survey. The challenge of incorporating open-ended questions in smartphone surveys has been encountered in previous studies. In the Nielson Study, over half of the respondents expressed difficulty typing open-ended responses using the smartphone’s small keypad (Lai, 2009). Also, some respondents in the Nielson Study stated that the use of a touchscreen, which requires precision, increased the burden of the task over an extended period of time (Lai, 2009).

In general, participants were open to the idea of completing surveys on a smartphone, and preferred this mode to mail or phone surveys. As a Group 1 participant stated: “smartphone is a good option. It’s a good idea to be flexible.” However, there were many instances when participants from both groups stated that they would prefer to use a traditional computer: “No phone is preferable: on a laptop, on my terms.”

3.3 Motivators to participation

Incentives: All focus group participants expressed that incentives to complete smartphone surveys would be an important motivator. The minimum incentive amount varied by participant, but all participants agreed that the incentive amount should reflect the level of effort required for participation in the study. According to one participant, “I would need to know the total time commitment versus what I am getting back. Time is money.”

Participants from both groups agreed that providing contingent incentives based on survey completion would motivate them to continue with the study. According to a Group 1 participant, contingent incentives would provide an “instant reward” that would encourage compliance. A participant in Group 2 suggested a study design where participants would receive a certain dollar amount per survey, plus an extra bonus for completing all surveys on time. However, one participant mentioned that if she was interested in the survey subject matter, the incentive would not matter as much. The focus group discussions on incentives were consistent with findings from other smartphone data collection studies. In the Nielson Study, respondents earned \$100 for completion of the mobile diary portion of the survey, but could earn up to \$150 at the end of the survey period upon completion of all tasks (Lai, 2009). Most respondents reported that this contingent incentive was the primary motivation for their continued participation.

Online incentives: Despite their frequent use of the Internet, participants were generally skeptical of receiving online incentives. Some participants mentioned that they hardly ever shop online, and that “Not all people are comfortable buying things on the Internet.” None of the participants had heard of ZashPay, and thus would be “skeptical to use it.” Participants from both groups remarked that although they were familiar with online payment services such as PayPal, they would never use it from their smartphone. In general, all participants stated that they would prefer cash, and one suggested that a Visa gift card would motivate him to participate.

Perceived social benefit: For participants in Group 2, a survey’s social value is a strong motivator to participate. According to one participant, “The type of study is important...the social reason.” Another remarked, “I would participate because it helps people.” Participants in Group 1 had a similar reaction to Scenario #2; participants in this group felt that frequent smartphone surveys, such as diary studies, could help people keep track of their health behaviors in a positive way. One participant stated, “As a smoker, I would not have any issue participating. Only recently have I started tracking my smoking, and it’s alarming, so that’s good.” In the Nielson Study, respondents also found the social benefit of tracking their behaviors an important motivator to participate (Lai, 2009). According to one respondent: “At first I was uneasy with all the detailed information, I thought, why do they want so much? But as I went through it, I learned so much about how I spent my time throughout the day. It opened my eyes on how I spent my time, doing so much laundry when I should be spending time with my kids”.

3.4 Other considerations to participation

Perceived burden: Perceived burden of the study was a significant factor in participants’ decisions as to whether or not they would participate in a smartphone study. For both groups, the flexibility of response time to the survey would also impact their decision to participate. One Group 1 participant stated, “I don’t like being bugged to do anything ‘right now,’ I would rather set it up so once a day at my convenience I could fill it out.” Another participant agreed that if he had to complete a survey by a specific time, he would be less likely to participate. One Group 1 participant recommended the development of a customized application, where participants could enter their behaviors as they occurred throughout the day. Participants in both groups commented that they do not keep their phones on them at all times, so they might have difficulty complying if the survey had tight parameters for response time. Group 2 participants reported that, as long as the survey only required a quick “yes or no,” they would not have any difficulty responding at work or during a meeting. One Group 2 participant stated that she would be more likely to respond while at work, because she is guaranteed to have her

smartphone with her. However, other participants expressed that the ability to complete the survey outside of work hours would be best. Both groups thought there should be restrictions as to when they could be contacted to participate in the study. Group 1 came to a consensus that texts before 12:00pm would be too early. Most participants in Group 2 commented that contacts should not happen past 10:00pm.

Sensitivity of information being collected: Scenario #3 (see section 2.4, Moderator Guide) was included in the focus group design in order to measure participants' willingness to answer sensitive questions using a smartphone. The study described in this scenario would require participants to answer detailed questions about their sexual activity. Despite the sensitive nature of this survey design, all but one focus group participant responded that they would be willing to participate in the study.

When asked why they would prefer to participate in this study over the other study scenarios provided, participants in both groups responded that they found this topic to be more interesting. According to a participant in Group 1, "This topic is much more interesting; I would get a laugh out of it, and would share it with friends." Participants in Group 2 responded, "This is a very interesting topic" and "Initially people would be hesitant, but answers would be confidential, and it's interesting." All participants trusted that their answers would be kept confidential. One participant stated, "It's confidential, so I'm not worried." The one participant who said he would not participate (Group 2) stated that he was not concerned about confidentiality, but that he just preferred to keep this information private. Another participant from Group 2 added later in the discussion that she would want to see the survey questions first, to see how detailed the questions would be. The findings from the focus group discussion was consistent with findings of the Nielson Study, which found that how interested the respondent was in the survey topic was a major motivator in their decision to participate (Lai, 2009).

Interestingly, some participants stated that they would be more likely to participate in this kind of survey over their smartphone than other survey modes. One participant stated, "I would prefer the smartphone for sensitive questions. I would not want to talk to someone on the phone about it." Another added, "I wouldn't want to use mail for these questions... what if it fell out of the mailbox and a neighbor picked it up?" Although, in general, participants mentioned that they would prefer to answer survey questions using text messaging, one participant remarked that for sensitive questions, he would only answer questions through a web link.

Focus group participants were also asked whether they would be able to answer sensitive questions like these at work. All but one participant in Group 2 stated that they would not have any difficulty answering these questions at work, as long as it was on their personal phone and not their work phone. This is significant, since most of the Group 2 participants' smartphones were issued to them by their employers. Consequently, when recruiting participants for smartphone surveys including sensitive questions, it may be important to include a question as to whether the smartphone in their possession is owned by them or their employer.

3.5 Other requirements: scanning cigarettes

All participants in Group 1 stated that they would be uncomfortable scanning prices of cigarettes using their smartphones. In Group 1, three of the participants had an immediate negative reaction to the scanning component of the study scenario, and initiated

discussion before being prompted by the moderator. One respondent first wanted confirmation that he had understood the requirements of the study:

Participant 1: “Now, whenever we buy a cigarette pack, we have to scan it?”

Participant 2: “What about just having a checklist instead of taking a camera phone out?”

Participant 3: “That would just be socially awkward... My phone has Siri, but I wouldn’t want to be seen talking to my phone in public, because that would just be strange.”

Following this dialogue, one participant acted out the action of taking out his smartphone to scan the price of a pack of cigarettes, and the other participants laughed. This exchange seems to indicate that some individuals may perceive scanning products into smartphones for surveys to be outside of the realm of socially acceptable smartphone behavior. Participants in Group 1 agreed that they would prefer to answer a survey question rather than scanning the price. When the moderator probed whether the act of scanning was too burdensome, one participant confirmed, “I think it would be easier and more convenient to check a box.” Following this comment, all other participants in Group 1 nodded or commented in agreement. One participant mentioned that if he smoked a lot, he would be less inclined to participate “because of the scanning thing.” Another participant mentioned that scanning is only possible on some smartphones: “If you are going to consider his phone a smartphone [motioning to the participant with an older smartphone], it wouldn’t scan.” The smoker in Group 1 questioned the study design, stating that smokers typically only smoke one brand, and prices remain fairly consistent: “Smokers have their brands and buy the same thing every time. The whole time you are scanning things, you are scanning the same thing.” Participants in Group 2 did not have a strong reaction to the scanning aspect of the study. One participant mentioned that the incentive was not enough for the requirement to both answer questions and scan products. A participant in Group 2 mentioned that even if she was willing to scan prices, she did not know how to scan images into her iPhone, so she would need a tutorial.

3.6 Group 1 versus group 2: differences as a function of age

Table 1 summarizes the differences in the discussions of the two groups, which may be correlated with membership in a specific age cohort.

Table1. Differences by Age Cohort

Subject	Group 1 (Ages 18-34)	Group 2(Ages 35-65)
Use of Technology	Uses technology primarily for e-mail, social networking, and leisure activities; posts information about themselves online.	Uses technology for banking, paying bills, e-mail, and reading online content. Participants also visited social networking sites, but rarely upload information.
Scanning Cigarettes	Strong negative reaction to scanning prices of cigarette packs as part of a data collection project; perceives this as “socially awkward” behavior.	Less concerned with scanning prices of cigarette packs as part of a data collection project. May not understand scanning/picture taking technology. Would need greater incentives to participate in a survey and scan products.
Motivators	Emphasized incentive amount and flexibility in response time as primary motivators.	Emphasized incentive amount and social good as primary motivators.

Sensitive Questions	Work phone vs. personal phone was not mentioned in the discussion.	While the location (home/work) did not pose a barrier to participation, whether the Smartphone is work-issued or personally owned was an important consideration. Participants would not answer survey questions on a work-issued phone.
Usability	Participants would be willing to enter five or six sentences of open-ended response on their Smartphone, but would prefer a lap/desktop computer for anything longer.	Participants would be willing to enter a couple words of open-ended response on their Smartphone, but would prefer a lap/desktop for anything longer.

4. CONCLUSION

While ownership of a smartphone was a requirement for participation in these focus groups, there are indications that the general U.S. population increasing their use of, and familiarity with, smartphone technology. As the use of smartphones continues to rise, it can be expected that more potential respondents will become increasingly at ease with the concept of smartphone data collection.

However, the focus groups illuminated possible generational differences in the ways that individuals use their smartphones, and such differences may impact the success of data collection via smartphone. Group 1 (ages 18-34 years) not only consumed online content using their smartphones, but also contributed to online information by uploading information about themselves. This trend has been noted by the Nielson Company, which uses smartphone data collection in their time diary studies. In the digital age of Facebook, MySpace, Twitter, etc., the general public, in particular the younger cohort, has become more prone to sharing their day-in-the-life activities with friends, family or whoever may be interested. By leveraging this trend in information sharing and some of the advances in telecommunications, survey researchers are now in a position to make observations of their subject of interest remotely and wirelessly (Lai, 2009).

Although participants in Group 2 (ages 35-65 years) consumed information on social networking sites like Facebook, they stated that they rarely upload information about themselves. Future research should assess whether differences in smartphone usage by various age groups may impact their willingness to participate in smartphone surveys. Focus group participants from both groups were generally accepting of the concept of utilizing smartphones to collect health and behavioral data. Participants provided useful feedback on ways to increase participation in such studies, including the provision of contingent incentives based on study completion, limiting the use of open-ended questions, providing flexibility in response time, and emphasizing the survey data's societal benefits. Participants also provided useful insight into potential barriers to participation, including usability issues with certain types of smartphones, and considerations related to those who have work-issued smartphones. In addition, the focus groups revealed differences in the motivators and barriers to participation in smartphone surveys as related to different age groups. Utilizing the information obtained from both the literature review and focus groups, we will continue to test the feasibility of smartphone data collection through a pilot test survey on alcohol and tobacco use.

Limitations: The focus group method is typically employed to obtain consensus information by groups of people who are similar in some way (for example, youth, teachers, men, Asian Americans, diabetes patients, etc.). Once target populations have been identified, researchers often attempt to diversify attributes of individuals within the sample to ensure that the findings are correlated with membership of the target population, and not some other shared attribute. The Smartphone Feasibility Study was designed to target and compare smartphone users of different age groups. However, one limitation of this study is that the younger cohort was comprised all of males (the two recruited females did not show). When making comparisons across the two groups differences may be a function of gender as well as age (an all-male group may arrive at a different consensus than a mixed-gender group). Differences in findings by gender or ethnicity can not be examined, as these were not the target populations for the focus groups. Phase III of the Smartphone Feasibility Study, will be another pilot project and will include participants of different ages, genders and ethnicities, and differences by these demographic characteristics will be assessed.

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