Part (1)

The experiment that I have chosen to discuss is the "Sentiment and Topic Tagging" survey. From the preview of the survey, the experimenters are attempting to test our reaction to the tweets about a movie or a TV show. Specifically, after reading a tweet about a TV show or movie, respondents answer 3 items: Firstly, the sentiment of the text (from a range of positive to negative items), the emotion expressed in the text (nine types of emotions like joy), and lastly, what the tweet is about (movie/show, actor/character, plot, or unsure). Respondents are paid 0.05 for participating in the survey. No further information on the payment structure is provided. In terms of qualifications, respondents must be from the list of pre-determined set of countries: Australia, Great Britain, India, New Zealand, Ireland, Israel, Netherlands, Poland and South Africa. Additionally, the approval rate of the respondent must be greater than 90%. The respondent's total approved HITs must also be greater than 100 and respondents are required to take a short pre-test qualification survey. The time allotted for this survey is 20 minutes, as such, the implied hourly rate is $0.15/hour. This job expires in 2 days, on Wednesday, November 7. If one million people participated in the task, it would cost the HIT experimenter $50,000.

Part (2)

Costa and Kahn (2013) explore the following research question: does political ideology have an influence on the participants' receptiveness to a "nudge" about electricity conservation? The main dataset for this study is the residential billing data from January 2007 to October 2009, which contains "information on Kilowatt hours purchased per billing cycle, the length of the billing cycle (measured in days), whether the house use electric heat and whether the household is enrolled in the electric utility's program to purchase energy from renewable sources". They linked this data to the treatment and control data that contains "information on when the household began to receive the HERs, as well as information on the square footage of the house, information on whether the home heats with electricity or natural gas, and the age of the house". They also merged a dataset of individual voter registration and marketing data for March 2009, which provides information on party affiliation, and whether the individual donates to environmental organizations. They merged another dataset of the share of registered voters who were liberal in 2000 and the share of the college educated, sorted by the census block group. They also included an ancillary data set which includes the household attitudes about the HER by ideology.

The treatment group consists of 35,000 households that received a Home Energy Report (HER), which includes specific information on "own monthly electricity usage over time and relative to neighbors' usage over the same time period", and "energy saving tips". The control group consists of 49,000 households that did not receive a HER.

Beyond Schultz et al. (2007), Costa and Kahn (2013) also controlled for other variables like if the household's house is an electric house and the mean daily temperature within the billing cycle, and individual, house and block characteristics.

Costa and Kahn (2013) found that political ideology, whether measured by political party affiliation, donations to environmental organizations or the purchase of energy, is associated with different treatment effects. Specifically, they found that there is a statistically significant difference in the kWh reduction between household heads who are registered liberals (compared to registered conservatives), purchase energy from renewable sources (compared to those who do not) and who donate to environmental organizations (compared to those who do not), with those who are liberals lowering their electricity usage two to four times less than conservatives.

Part (3a)

The conditions that may make it better to focus resources on a small number of clinics or spread them more widely is based on Salganik's (2018) *Bit by Bit*. Specifically, there are two main assumptions under SUTVA (Stable Unit Treatment Value Assumption) that must be met to ensure that we can make accurate causal inferences. Firstly, there must be no spillover effects. In this context, one factor that researchers may consider is the potential locations of the clinics. For example, if we have 3 clinics ($300), 600 participants for 2 clinics ($600 for treatment) and 200 participants for 1 clinic ($100), and the two clinics with the large sample size are located in a small town, we may have a higher probability of some spill over effect- because we have a large sample size in those 2 clinics and people in a small town are more likely to know each other, the chances of participants knowing each other in these 2 samples may be higher, and participants in the treatment condition may inadvertently inform another participant in the control condition, therefore having a spill over effect. To minimize this effect, we may employ a wider spread of clinics and reduce sample size within each clinic instead.

Secondly, there must not be hidden treatments. If, for example, we have 9 clinics ($900) and had a sample size of 20 for 8 clinics ($80 for treatment) and a sample size of 40 for 1 clinic ($20 for treatment), then we must ensure that all 9 clinics participate in the experiment in a similar manner. For example, if one clinic has a different way of measuring the number of patients who receive these vaccinations, or if the clinic handles the treatment or control group differently, compared to the other 8 clinics, then this assumption may be violated. As such, to minimize the hidden treatment effect, we may have to use a smaller spread of clinics instead.

Alternatively, we can also answer this question according to the demographics of the samples in the clinics. Specifically, we can use a smaller spread of clinics if the potential participants within this small number of clinics are representative of the general population (assuming that we wish to generalize our findings to the wider population and not to a segment of the population). On the other hand, if the sample within the clinics are not representative, we can increase the number of clinics to increase representativeness. For example, if one clinic is known to be in an exclusively rich area, we should increase the spread of clinics by including other clinics that are in middle class areas and also poorer areas, to ensure that our sample as a whole, is representative of the socioeconomic demographics of the population. However, this depends on the research question as well- if researchers are only investigating the effects of this treatment on Americans with low socioeconomic status for example, then including more clinics in richer areas would not be relevant and a smaller spread of clinics with a large sample from each clinic in poorer areas, may be more appropriate in this case.

Part (3b)

Firstly, Salganik (2018) notes that the research design plays a role on the detection of effect size– the difference in difference approach, used mostly in mixed design, compared to difference in means approach, used in mostly between subject designs, can detect smaller effect sizes. Specifically, as the difference in difference approach has a smaller variance and a smaller standard error, it is easier to detect a small effect than compared to the difference in means approach. Additionally, one must also consider how sample size affects the detection of a small effect- increasing the sample size will decrease standard error, making it easier to reliably detect a smaller effect. This suggests that if researchers wish to detect a reliably small effect, one should increase the sample size within each clinic, instead of having a larger spread of clinics. As such, research design and the sample size are two factors that would determine the detection of effect size, given budget constraints.

References:

Costa, Dora L. and Matthew E. Kahn, "Energy Conservation Nudges and Environmentalist Ideology: Evidence from a Randomized Residential Electricity Field Experiment," *Journal of the European Economic Association*, June 2013, 11 (3), 680- 702.

Salganik, Matthew J., *Bit by Bit: Social Research in the Digital Age*, Princeton University Press, 2018.