CPS ASEC Sample Size for Test Questions
Finding True Differences

DSMD's Sample Size and True Difference Calculations

DSMD was asked to find the difference one would be able to detect for a test questionnaire given certain known population proportions. The two proportions involving income and health insurance were 0.07189 and 0.03700, respectively. DSMD used the following formula to calculate sample size given a margin of error – to find the margin of error, or true difference detectable, we used Excel's Analytic Solver:

$$sample\ size = \left(\frac{\sqrt{p * (1-p)} * z_{\alpha/2}}{e}\right)^2$$

$$e = margin\ of\ error = z_{\alpha/2}\sqrt{\left(1 - \frac{n}{N}\right)} * \frac{S}{\sqrt{n}}$$

$$Where\ S = \sqrt{p * (1-p)}$$

Using the formulas laid out above, we are able to use the same means and sample sizes in the table produced by Ben Sommers and Colleen Carey to show our true differences (margin of error, *e*); the column True Difference is the true difference detectable with the given sample size:

Mean	Given Sample	True Difference (*e*)
3.7%	5,000	0.439%
3.7%	13,600	0.266%
15.0%	5,000	0.831%
15.0%	8,200	0.649%
15.0%	13,600	0.504%
15.0%	39,000	0.297%
65.0%	5,000	1.110%
65.0%	13,600	0.673%
65.0%	15,200	0.636%
65.0%	39,000	0.397%