Smokers' BMI and perceived health: Does the order of questions matter?

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ABSTRACT

We surveyed 431 daily smokers between November 2014 and March 2015 to examine the impact of the order of questions on the response to a self-reported health question as part of a larger experimental study. We randomized the question order, with some respondents providing their weight prior to self-reporting their health, while others did the opposite. We found that self-reported health outcomes are worse when smokers are first asked to report their weight. However, the order of questions only seems to impact those who are overweight as we did not find evidence that the order of questions affected responses for those with a BMI below 25. These findings suggest that the order of asking self-rated health and weight questions appears to matter, at least for overweight current smokers.

1. Introduction

There is significant research across multiple disciplines indicating that answers to surveys can be influenced by question order (Perreault, 1975–1976; McFarland, 1981; Lasorsa, 2003; Steenkamp et al., 2010; Schwarz, 1999; Pew Research Center, 2016; Idler and Benyamini, 1997; Jylhä, 2009). Lasorsa (2003) found that a survey that asked participants to rate their interest in politics, as well as assessed their political knowledge, found lower interest in politics from those who first were asked to answer difficult political knowledge questions. The Pew Research Center (Steenkamp et al., 2010) found that people were more likely to say they approved of civil unions for homosexual partners when they were previously asked a question about gay marriage. Another area where question sequence has been important is in reducing social desirability bias. Survey designers have recognized for years that misleading answers could be given on questions where people think there is a "right" way of thinking. Researchers have shown that the wording of questions, the order of questions, and how the research questions are introduced all can impact the answers to survey questions (Schwarz, 1999; Pew Research Center, 2016).

Self-reported health is an independent predictor of mortality and is also commonly used as a general indicator of health status (Idler and Benyamini, 1997). Jylhä (2009) reports that self-rated health has been used to predict mortality in "around one hundred" separate research

studies. Age is known to be associated with self-rated health, such that older people have worse self-assessments (Badley et al., 2015; Wagner and Short, 2014; Manderbacka et al., 1999). Body mass index (BMI), a common indicator of overweight and obesity, is often assessed in self-report surveys (usually by asking for self-reported weight and height). Measured (as opposed to self-report) BMI, obesity in particular, was recently shown to predict lower self-rated health status (Cullinan and Gillespie, 2015; Herman et al., 2013).

Some studies have examined how question order might influence self-reported health. Lee and Schwarz (2014) found that different surveys that asked about self-rated health but with different priming questions did not yield different responses when given on a survey written in English. However, those who answered the same questions after they had been translated into Spanish reported different self-rated health across the two surveys when different priming questions were provided.

An open question is how the order of questions on weight and health influences responses to self-reported health. Given the order of questions effects can matter in other contexts, we explored whether self-rated health responses were different based on whether a participant was first asked to provide their weight. Because individual concerns about weight can influence health (Sikorski et al., 2011; Carr et al., 2007), obesity can be socially stigmatizing, and that excess body weight is associated with poor health outcomes (Flegal et al., 2007), we sought to examine whether asking about weight first could influence self-rated health status. Using a sample of daily smokers (who smoked one or more cigarettes daily), the main objective of this analysis is to explore

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if making one think about their weight (and any positive or negative attitudes that activates) leads to differential responses in self-rated health.

2. Methods

2.1. Study design

Institutional Review Board approval was received both by the Susquehanna University and the Roswell Park Cancer Institute IRB. All survey respondents were smokers who participated in a single-session experimental auction to determine smokers' value for cigarettes and e-cigarettes (for background, see Rousu et al., 2007; O'Connor et al., 2016). Experimental auctions are common in economics and are used to estimate demand for products (e.g., see Rousu et al., 2007; Thrasher et al., 2011). These are actual auctions, for real money, where winners obtain products. The auction results will be analyzed in separate papers.

We used newspaper and radio ads to recruit smokers 18 and older to participate in the experiment. To be eligible, a person needed to be 18 or older (the legal age in both New York and Pennsylvania) and smoke at least one cigarette per day. The experimental auction took about 75 min to complete and, at the end of the experiment, we asked several survey questions to participants, including a question about health. 431

smokers in Buffalo, NY and Selinsgrove, PA completed the in-person survey.

Participants were asked to complete the sentence that started with "Would you say that in general your health is:" and could indicate if they felt their health was excellent (Perreault, 1975–1976), very good (McFarland, 1981), good (Lasorsa, 2003), fair (Steenkamp et al., 2010), or poor (Schwarz, 1999). Participants were also asked to indicate their height and weight. We used the participants' self-reported height and weight to calculate a BMI value (e.g., see NIH, 2016).

We randomly varied the order of these questions to examine whether a person's self-reported health varied based on whether they were first asked to report their weight. Forty-three percent of participants were asked to rate their health first, then provide their height and weight. The remaining 57% of participants were asked to provide their height and weight first, then rate their health. The items were adjacent to each other, and the surrounding questions were otherwise consistent and related to smoking behaviors.

To further examine the impact of the order of questions on self-reported health scores, we used a probit model. For all data analysis, we used SAS version 9.4. If a smoker reported he/she was in good, fair, or poor health (the three lowest categories), we define this as $H_i = 1$. To examine the impact of weight, along with demographic and background characteristics on the probability of reporting oneself in good, fair, or

Table 1
Demographic and self-reported health characteristics – overall and by weight.

	Overall (N = 431)	BMI under 25 (N = 165)	BMI 25 or greater (N = 266)	Test for difference between BMI < 25 vs. BMI ≥ 25
Race:white	N = 256 60%	N = 100 61%	N = 156 59%	χ^2 P-value = 0.420
Race:black	N = 143 33%	N = 53 32%	N = 90 34%	
Race:other	N = 32 7%	N = 12 7%	N = 20 7%	
Age – under 30	N = 123 29%	N = 61 37%[d]	N = 62 23%	χ^2 P-value = 0.000
Age – 30 to 50	N = 161 38%	N = 53 32%	N = 108 41%	
Age – over 50	N = 147 33%	N = 51 31%	N = 96 36%	
Female	N = 190 44%	N = 60 36%[c]	N = 130 49%	χ^2 P-value = 0.013
Smokes pack or more of cigarettes per day	N = 112 26%	N = 42 25%	N = 70 26%	χ^2 P-value = 0.840
Income_below 30 K	N = 124 52%	N = 83 50%	N = 141 53%	χ^2 P-value = 0.806
Income – between 30 K–60 K	N = 59 14%	N = 21 13%	N = 38 14%	
Income – over 60 K	N = 26 6%	N = 11 7%	N = 15 6%	
Income – chose not to reveal	N = 122 28%	N = 51 30%	N = 71 27%	
Moderately or very worried about future quality of life	N = 239 48%	N = 91 38%	N = 148 54%	χ^2 P-value = 0.272
Site – NY	N = 222 52%	N = 81 49%	N = 141 53%	χ^2 P-value = 0.502
Site – PA	N = 209 48%	N = 84 51%	N = 125 47%	
Perceived health (1 = excellent, 2 = very good, 3 = good, 4 = fair, 5 = poor)	2.67 (0.90)[e]	2.52 (0.93)	2.76[a] (0.85)	t-Test P-value = 0.008
Perceived health when asked about weight first (N = 244)	2.74 (0.87)	2.57 (0.90)	2.83[b] (0.85)	t-Test P-value = 2.21
Perceived health when not asked about weight first (N = 187)	2.57[b] (0.90)	2.48 (0.96)	2.65 (0.85)	t-Test P-value = 0.197
BMI	28.17 (6.92)	22.34 (2.33)	31.78 (6.25)	t-Test P-value = 0.000

Surveys took place between November 2014-March 2015.
[a] Difference is statistically significant at the 1% level using a one-sided *t*-test and Wilcoxon rank sum test.
[b] Difference in scores for self-reported health is statistically significant among those first asked their weight at the 5% level using both a *t*-test or a Wilcoxon rank-sum test.
[c] Difference in percentage of female that were overweight in our sample is statistically significant at the 5% level using a chi-squared test.
[d] Difference in percentage in age groups that were overweight is statistically significant at the 1% level using a chi-squared test.
[e] Standard deviations in parentheses.