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Helpful Reminders? Health Survey Participation and Doctor's Visits

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*Objectives:*There is growing concern about how participating in longitudinal studies affects participants. However, assessments of survey participation effects on objectively measured behaviors are scarce. This study addresses this gap by assessing whether there is a relationship between participating in a longitudinal survey and respondents' registered doctor's visits. *Methods:* We used register-linked data from the Danish part of the Survey of Health, Aging and Retirement in Europe, a biennial panel survey of adults aged 50+, to assess whether survey participation is associated with changes in self-reported and actual doctor's visits. *Results:* Neither self-reported nor register-recorded doctor's visits significantly differed by survey participation. Observed increases in doctor's visits over time are likely age-related. Discussion: Our findings add to literature about survey participation effects, suggesting that they may not be present for either self-reported or objective measures of this important health behavior.

Keywords: Doctor's/physician's visits; survey participation; health behavior; panel conditioning

1 Introduction

Researchers across a range of disciplines have recognized that simply asking people about their attitudes, knowledge, and behaviors can alter the course of these outcomes (see Spangenberg et al., 2016; Warren & Halpern-Manners, 2012; Wilding et al., 2016, for reviews). For studies intended to provide real-world accounts of social patterns, this can have consequences for the validity of the findings. Moreover, if study participation has measurable implications for people's lives, even researchers adhering to the most minimally invasive guidelines may need to reinvestigate ethical considerations surrounding human participants. The increased availability and usage of large-scale social surveys over the past several decades has been accompanied by growing concerns about whether being surveyed affects individuals (e.g., Das et al., 2011; Sturgis et al., 2009; Warren & Halpern-Manners, 2012). Indeed, several recent studies have found that panel survey participation is associated with changes in self-reports of certain behaviors (Das et al., 2011; Halpern-Manners et al., 2014; Torche et al., 2012). Explanations for these effects hinge closely upon whether the apparent changes are real or merely self-reported (Warren & Halpern-Manners, 2012). However, information about whether participation in social surveys affects actual behaviors—health-related or otherwise—is currently scarce due to a lack of objective behavioral data.

In the context of research on the health of aging populations, doctor's visits are a highly salient health behavior. They increase in frequency as individuals experience age-graded health declines and are closely related to self-rated health (Segovia et al., 1989). They are also often the first point-of-contact with a health professional when seeking treatment, and are an important means for preventing future health problems (Andersen & Newman, 2005; Miilunpalo et al., 1997; Rosenstock, 1974; Rosenstock, 2005; Wolinsky & Johnson, 1991). What, if any, effects might participating in lengthy surveys about their health have on the frequency of aging adults' visits to doctors?

In this paper, we assess whether self-reported and population register-recorded doctor's visits change in association with participation in the initial waves of the Danish part of the Survey of Health, Aging and Retirement in Eu-

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rope (SHARE; Börsch-Supan, 2020a, 2020b), a longitudinal health survey of adults aged 50+. Our study is the first that we know of to assess whether changes in a real health behavior are associated with participating in a major longitudinal survey. More broadly, the findings offer novel insights to persistent questions about how large-scale social surveys may affect participants.

2 Background

Research in a variety of disciplines has documented situations in which being questioned appears to affect individuals' attitudes and behaviors. For example, experimental consumer science studies have shown that exposing potential buyers to questions about purchase preferences and intentions can subtly influence buying decisions (Fitzsimons & Williams, 2000; Morwitz & Fitzsimons, 2004). Similarly, in health psychology, asking about plans to eat healthily, attend health screenings, receive vaccines, and purchase insurance has increased the adoption of these behaviors (Fitzsimons & Moore, 2008; Fitzsimons & Williams, 2000; Spangenberg et al., 2016). The panel studies that form the basis of much current quantitative research in the social sciences generally do not contain such embedded experiments. However, a growing literature on panel conditioning—the changes in survey responses that occur as a result of repeated participation—indicates that participating in these surveys can influence self-reports of certain behaviors, including increased labor force participation and decreased substance use and criminal activity (Halpern-Manners & Warren, 2012; Halpern-Manners et al., 2017; Torche et al., 2012; Warren & Halpern-Manners, 2012).

Explanations for these changes in self-reported behaviors depend on whether they are assumed to reflect a genuine behavioral change (Warren & Halpern-Manners, 2012). There are a few reasons why being surveyed may indeed change people's behaviors. Firstly, questions may introduce people to beneficial behaviors or resources about which they were previously unaware (Warren & Halpern-Manners, 2012). For example, German-based studies indicate that being asked about participation in programs for unemployed persons increases subsequent participation in those programs (Bach & Eckman, 2019; Yan & Eckman, 2012). As the authors note, the surveys likely alerted some individuals to these programs' existence. Additionally, experimental studies suggest that survey questions can activate existing knowledge and beliefs about certain behaviors, making these behaviors more accessible (Fitzsimons & Moore, 2008; Fitzsimons & Williams, 2000; Spangenberg et al., 2016). In other words, questions about respondents' behaviors may effectively remind them of the potential to engage in them. Experimental consumer and health psychology studies also frequently ask about future behavioral plans, and participants may be motivated to follow through with answers they provided (Morwitz & Fitzsimons, 2004; Spangenberg et al., 2016).

There are also explanations for why participating in panel surveys might affect self-reported but not actual behaviors. Participants may disingenuously or subconsciously change behavioral answers as they participate in subsequent surveys for several reasons. For one, providing certain answers may evoke feelings of embarrassment or stigma, leading individuals to avoid giving these responses in the future (Halpern-Manners & Warren, 2012; Torche et al., 2012; Williams et al., 2006). For example, Halpern-Manners and Warren (2012) found that non-working participants in the Current Population Survey were more likely to claim that they were "out of the labor force" rather than "unemployed" the more times they had already participated in the survey. Participants may also catch on to features of the survey design, and provide different answers as a way to minimize their time burden. Duan et al. (2007) showed that survey respondents were less likely to report using mental health services if screener questions were asked, likely motivated by a desire to speed up the survey. Respondents may also become more comfortable with the survey process and report their behaviors more accurately over time (Sturgis et al., 2009; Warren & Halpern-Manners, 2012).

Although the question of whether self-reported behavioral changes associated with participating in social surveys are real is thus an important one, researchers typically do not have access to objective measures of these behaviors. We are aware of three exceptions, all of which employ survey-linked administrative data to test whether survey participation influences economic behaviors. As previously mentioned, research assessing the effects of being surveyed about employment program use in Germany found that those surveyed were more likely to subsequently participate in the programs (Bach & Eckman, 2019; Yan & Eckman, 2012). Additionally, a Dutch study linking a cross-sectional savings survey to tax records found that respondents actually saved somewhat less the following year (Crossley et al., 2017). The authors suggest that participants may have realized that they were saving more than needed. Information about the potential effects of participating in surveys on other objectively measured behaviors, including health behaviors, remains absent.

What is by now clear from the literature on survey participation effects is that the time between being questioned and when the behaviors are measured matters. The experimental studies that characterize consumer and health services work on this topic generally assess behaviors immediately or up to a few months after a survey has been implemented (e.g., Conner et al., 2011; Williams et al., 2006; Wood et al., 2014). Indeed, reviews suggest that studies with shorter-term follow-up periods are more likely to find participation effects, which are seldom found in studies with follow-ups longer than a year (Spangenberg et al., 2016; Warren & Halpern-Manners, 2012; Wilding et al., 2016). However, follow-up times for

studies investigating panel conditioning effects depend on when additional surveys were conducted, and are thus often a year or longer (e.g., Halpern-Manners et al., 2017; Sturgis et al., 2009; Toepoel et al., 2009; Torche et al., 2012; Wilson & Howell, 2005). If shorter-term survey participation effects exist, they may be missed in analyses relying on the panel responses.

In this study, we investigate whether participating in a longitudinal health survey affects an actual health behavior that is highly salient to aging populations: doctor's visits. Using health care services is an important strategy for the prevention and detection of health problems (Rosenstock, 1974; Rosenstock, 2005). Visits to doctors occur for a range of health-protective and promoting reasons, including screening tests, immunizations, diagnostic consultations, and regular check-ups, and visits to doctors are the first point of contact for all kinds of health concerns (Rosenstock, 2005; Wolinsky & Johnson, 1991). Drawing on Rosenstock's work on health care use as a preventive health behavior (1974, 2005), it is possible that lengthy or in-depth health surveys act as "cues to action," triggering individuals to use health care services. In other words, we suggest that reflecting on one's current health in the process of answering extensive health status and health care use questions may cause individuals to focus on a health problem or change that they previously had not fully acknowledged, or to notice that it has been a long time since a check-up with a doctor, perhaps prompting a visit to a physician. The results of the experimental health psychology studies mentioned above, which show increases in certain health promoting behaviors after targeted surveys, are consistent with this possibility (Fitzsimons & Moore, 2008; Fitzsimons & Williams, 2000; Spangenberg et al., 2016). We also assess whether self-reports of this behavior differ between naive respondents participating in the survey for the first time and experienced respondents participating for a second time. The findings are thus instructive about the validity of inferences made using this and potentially other health behavior measures on social surveys. They also speak to whether participating in health-focused panel surveys may precipitate a real change in health behavior.

2.1 Methods

2.2 Data and Study Design

The Survey of Health, Aging, and Retirement in Europe (SHARE) is an ongoing panel survey of European adults aged 50+ and their coresidential spouses that began in 2004 (Börsch-Supan & Jürges, 2005). The study includes representative samples of adults from eleven European countries, including Denmark. Seven waves of data collection have been completed as of 2018, with the second and third waves being collected in 2006/07 and 2008/09 (hereafter 2006 and 2008), respectively. Designed to provide a comprehensive cross-national assessment of aging European adults' well-being and retirement activities, the survey includes extensive questions about respondents' current health, health histories, health care use, and other health behaviors. The REGLINK-SHAREDK project was undertaken by a consortium of Danish universities and institutions to link the Danish SHARE survey data to national register data[1]. Through Statistics Denmark, Denmark maintains registers that provide extensive demographic information about the total population of Danish residents, including primary healthcare and hospital care registries. Denmark has had a universal, nationalized health care system since 1973, and access to hospitals and medical doctors is free for all residents (Olejaz et al., 2012; Vallgårda et al., 2001). Although there are some socioeconomic inequalities, utilization of health care resources is high across the Danish population (Olejaz et al., 2012).

1,706 individuals were interviewed at the time of the first SHARE survey in 2004 ("Cohort 2004"). In 2006, a refresher sample of 1,367 persons was added to the study ("Cohort 2006"). The distinction between these two cohorts—which divides the sample based on when they entered the study—acts as the key independent variable in our analyses. After dropping individuals from both cohorts due to linkage problems (N=50), there were 1,675 individuals in Cohort 2004 and 1,348 in Cohort 2006. Starting from this base, we created two different study populations, Sample A and Sample B, to answer our research questions.

Sample A consists of all individuals who participated in either the baseline 2004 or 2006 SHARE surveys. We use Sample A to assess whether survey participation is related to register-recorded doctor's visits. To do so, we compare changes in register-recorded doctor's visits between the years before and after the initial 2004 survey among those who participated in the first wave (Cohort 2004) with the change in doctor's visits during the same period that occurred among those who had not yet entered the study in 2004, but would enter two years later in 2006 (Cohort 2006). Hence, we are effectively comparing whether doctor's visit frequency increases among survey participants relative to a sample of non-participants, who will also self-select into participating in the survey down the road. To create Sample A from the base sample just described, we dropped an additional 7 cases with missing data on income in 2004. We also dropped 628 respondents who were under 50 or over 79 at the time of the 2004 interview.[2] The resulting Sample A size was 2,388 individuals (1,396 respondents in Cohort 2004 and 992 in Cohort 2006).

[1] http://www.share-project.org/special-data-sets/record-linkage-project/reglink-sharedk.html

[2] We excluded respondents aged 80+ because of imbalances between the proportion of respondents in Cohort 2004 and Cohort 2006 in this oldest age group. Supplemental analyses including all adults age 50+ produce substantively identical results.

Sample B consists of individuals who entered the study in 2004 and were reinterviewed in 2006, as well as those who first entered the study in 2006 and were reinterviewed in 2008. We use Sample B to assess whether self-reported doctor's visits differ between individuals who participate in a survey for the first and second time. More specifically, we explore whether doctor's visits as self-reported on the 2006 survey differ between those who were being reinterviewed at this point (Cohort 2004), and those who were new to the interview (Cohort 2006). We restrict Cohort 2006 of Sample B to those who went on to participate in the third wave of SHARE in 2008 to help account for differences between the cohorts that may have been driven by panel attrition. Panel attrition is the drop-off in participation that occurs in the successive waves of a panel study due to respondents dying, not being located, or refusing to participate. Scholars have long recognized that individuals differentially attrite from panel studies based on factors that include their health (e.g., Radler & Ryff, 2010). To account for the fact that by 2006, Cohort 2004 is a selected group of those who agreed to participate a second time, we also limit Cohort 2006 respondents to those who went on to participate in 2008. This method has been used by other scholars to help distinguish panel conditioning from panel attrition (Das et al., 2011; Halpern-Manners & Warren, 2012; Halpern-Manners et al., 2017). After dropping 450 individuals of Cohort 2004 that did not participate in Wave 2 and 479 individuals of Cohort 2006 that did not participate in Wave 3, there were 1,226 individuals in Cohort 2004 and 869 in Cohort 2006 of Sample B. We dropped another 26 cases with missing data on reported doctor's visits or income in 2006. We also dropped 250 respondents who were under 50 or over 79 at the time of the 2006 interview. The resulting Sample B size was 1,819 individuals (1,032 respondents in Cohort 2004 and 787 in Cohort 2006).

2.3 Outcome Variables

Register-recorded doctor's visits. Register-recorded doctor's visits are the outcome for analyses using Sample A. This information comes from the National Health Service register (NHS), which documents all health services provided by private general practitioners and specialists in Denmark (Olejaz et al., 2012). We limited doctor's visits to those types that are fully covered by the national health care system, are not indicative of long-term therapeutic or non-medical visits, and that are likely to be included in respondents' answers to the self-reported medical doctor's visits question just described. Thus, we included general practitioner visits, laboratory visits and specialist visits, but not dentist, physiotherapist, chiropractor, optician, podiatrist and psychologist visits. To calculate the pre-2004 interview visits for Cohort 2006, who had yet to enter the study at this point, we used the median survey month (15th August) for Cohort 2004.

Self-reported doctor's visits in 2006. The outcome of interest for analyses using Sample B is doctor's visits as self-reported on the 2006 SHARE survey. At each wave the questionnaire prompts: "Please think about your care during the last 12 months. Since [month of last year], how many times in total have you seen or talked to a medical doctor about your health? Please exclude dentist visits and hospital stays, but include emergency room or outpatient clinic visits."

2.4 Control Variables

We include covariates for several other characteristics that are associated with individuals' use of physicians and may vary between the two cohorts. Age, income, employment status, and civil status are based on register information from 2004 for Sample A and 2006 for Sample B; the time periods during which all other control variables are measured is consistent across the two samples. Information about respondents' age in years (at the time of the 2004 interview for Sample A and at the 2006 interview for Sample B), gender, and nativity status all come from the Danish Civil Registration System (DCRS; Pedersen, 2011). In regression analyses, age is coded into 10-year age intervals: 50-59, 60-69, and 70-79. We use information about education level as self-reported on the SHARE survey in 2006. Based on the International Standard Classification of Education (ISCED), we created three categories for education: low (ISCED levels 0-2; up to lower secondary education), middle (ISCED level 3; secondary education), and high (ISCED levels 4-5; post-secondary education). Disposable personal income data for 2004 and 2006 come from the Income Statistics Register (Baadsgaard & Quitzau, 2011). This measure estimates income after taxes and interest expenses, and was coded according to the tertiles of individuals' mean income over the three years leading up to the 2004 survey for Sample A and over the three years up to the 2006 survey for Sample B. We considered the 3-year average to avoid income reduction due to temporary unemployment or retirement. Civil status in 2004 and 2006 also come from the DCRS. Employment status comes from the Integrated Database for Labour Market Research (Petersson et al., 2011). Parental status is also taken from the SHARE responses, and was thus measured in 2006.

2.5 Analytic Approach

We conducted two sets of multivariate regression analyses. First, using Sample A we regressed respondents' registered doctor's visits per month in the year before and after the 2004 survey on survey cohort and covariates using a Generalized Linear Mixed Model (GLMM), assuming a Poisson distribution (Table 2). Model 1 includes a dummy variable for time (before or after the survey), survey cohort, and a term interacting these two measures. This model thus

reveals whether there are differences in the count of individuals' monthly registered doctor's visits in the year before and after the survey for the whole sample and by survey cohort. It also indicates whether the change between the two periods differs by survey cohort. In Model 2, we add sociodemographic and control variables to account for the other variations between the two cohorts—such as slight differences in age, education, and gender distribution—that are also likely related to doctor's visits and may thus help explain any relationships between survey cohort and visits. We also conduct identical analyses using average monthly doctor's visits over the 3- and 6-month periods before and after the survey to capture more immediate measurement windows. We calculated 95% confidence intervals using a parametric bootstrap method.

To assess whether self-reports differ between those participating in the survey for the first and second time, the second set of multivariate analyses uses Sample B to regress doctor's visits reported by respondents during the 2006 survey on sample cohort status and control variables using GLM negative binomial regression (Table 3). We choose a negative binomial model over a Poisson model due to the excessive over-dispersion of self-reported visits. The two models presented here are analogous to those assessing registered visits in Table 2.

3 Results

Table 1 shows means for all study variables in Sample A and Sample B. Descriptives are measured in 2004 for Sample A and 2006 for Sample B. Mean register-recorded doctor's visits in the year before the 2004 survey were 5.53 for Sample A (in 2004) and 5.9 for Sample B (in 2006). Table 1 also shows register-recorded visits after the 2004 survey and 6 and 3 months before and after the 2004 survey for Sample A, which is the sample that we utilize to answer the research question about potential changes in registered doctor's visits. 11.4% of Sample A had not visited the doctor at all in the year before the 2004 interview. With respect to doctor's visits as self-reported in 2006 by Sample B, they range from 0-31, with a mean of just under four self-reported visits a year. This figure is significantly lower than the mean register-recorded number of doctor's visits for this period (5.9).

Table 1 also shows that in 2004, Sample A respondents' mean age was about 62 years and 5 months, about 52% of the sample was female, and just 3.2% were born outside of Denmark. In 2004, 34.7% of Sample A had a high education level, 42.7% had a medium level of education, and 22.6% had a low level of education. Most respondents were married, with 11.5% of Sample A being divorced, the same proportion being widowed, and 5.9% having never been married in 2004. The vast majority of respondents (about 92 percent in Sample A) had at least one child in 2004. About 58% of Sample A respondents were not working in 2004. These descriptive statistics are very similar when measured two years later in the more selected sample of repeat participants, Sample B. However, Sample B is somewhat more likely to be female, better educated, lower income and less likely to be working in 2006 than Sample A was in 2006.

Table 2 shows the rate ratios for fixed terms of GLMM Poisson regressions for registered monthly doctor's visits in the years before and after the 2004 survey on survey cohort within Sample A. Model 1 shows that study participants of Cohort 2004 and Cohort 2006 had fewer monthly doctor's visits in the year before the interview than in the year after the interview ($\exp(\beta) = 0.959$, $p = 0.007$). Table 2 also shows that Cohort 2006 had fewer monthly visits before and after the interview than Cohort 2004 ($\exp(\beta) = 0.892$, $p = 0.002$) . To test whether the increase in doctor's visits in the years before and after the 2004 interview varied by survey cohort we interact time and cohort in this model. With a rate ratio of 0.982 and a p-value of 0.462, this interaction term provides no support for this hypothesis. That is, the increase in doctor's visits from one year to the next did not meaningfully differ between Cohort 2006, who had yet to enter the study, and Cohort 2004, who were interviewed between these two years.

To interpret population-averaged estimates (rather than directly interpret the fixed effect coefficients of the GLMM), we use the expectations after marginalizing random effects (Granath, 2016; Hadfield, 2019; Molenberghs & Verbeke, 2006) and present them in Figures 1 and 2. These expectations provide similar interpretations of the results from those that can be inferred directly from the fixed term coefficients in Table 2. Doctor's visits increase from 5.73 to 5.97 in Cohort 2004 and from 5.17 to 5.49 in Cohort 2006 (by about 0.24 visits in Cohort 2004 and 0.32 visits in Cohort 2006) over time as respondents age from one year to the next. Cohort 2006 has somewhat fewer visits than Cohort 2004 (left panel; 0.56 visits before and 0.49 visits after the interview). While this increase in monthly visits between the year before and after the interview is slightly greater in Cohort 2006 than Cohort 2004, consistent with the interaction term from Table 2, this is not a meaningful difference.

Model 2 adds sociodemographic and status controls that may vary by cohort and predict the frequency of doctor's visits. Respondents aged 70-79 had more average monthly doctor's visits than those aged 50-59 ($\exp(\beta) = 1.428$, $p < 0.001$), and women ($\exp(\beta) = 1.281$, $p < 0.001$) and foreign-born respondents ($\exp(\beta) = 1.20$, $p = 0.042$) had more doctor's visits than men and native Danes, respectively. Those with the lowest incomes ($\exp(\beta) = 1.143$, $p = 0.006$) had higher average monthly visits than those in the highest income category. Non-working was also related with higher health care service use ($\exp(\beta) = 1.353$, $p < 0.001$. However, the relationships between monthly doctor's visits and interview time, cohort, and the cohort-interview time interac-

Table 1
Means, percentages and standard deviations for Sample A and Sample B.

	Sample A		Sample B	
	Mean/%	Std. Dev.	Mean/%	Std. Dev.
Register-recorded doctor's visits (range in parentheses)				
Year before 2004/06 survey (0-30)[a]	5.5	4.4	5.9	4.4
Year after 2004 survey (0-26)	5.8	4.4	-	-
6 months before 2004 survey (0-17)	2.8	2.4	-	-
6 months after 2004 survey (0-15)	2.9	2.4	-	-
3 months before 2004 survey (0-11)	1.3	1.4	-	-
3 months after 2004 survey (0-9)	1.5	1.4	-	-
No register-recorded doctor's visits (%)				
Year before 2004 survey	11.4	-	-	-
Year after 2004 survey	10.7	-	-	-
Self-reported past year doctor's visits in last year, 2006 (range 0-31)	-	-	3.9	4.8
No self-reported past year doctor's visits in last year, 2006 (%)	-	-	17.5	-
Age in 2004/06 (range 50-79)[a]	62.4	8.3	62.5	8.2
Female (%)	52.0	-	52.9	-
Foreign-born (%)	-	3.2	3.3	-
ISCED education level in 2004/06 (%)[a]				
High	34.7	-	38.6	-
Medium	42.7	-	42.1	-
Low	22.6	-	19.3	-
Mean disposable personal income in 2004/06 (%)[a]				
High	41.2	-	37.8	-
Medium	26.7	-	35.4	-
Low	32.1	-	26.8	-
Not working 2004/06 (%)[a]	58.3	-	53.9	-
Parent 2004/06 (%)[a]	91.5	-	92.1	-
Civil status 2004/06 (%)[a]				
Married / partnered	71.1	-	71.3	-
Divorced / separated	11.5	-	12.1	-
Widowed	11.5	-	10.1	-
Never married	5.9	-	6.6	-
N	2,388		1,819	

[a] Measured in 2004 for Sample A and 2006 for Sample B.

tion remain essentially unchanged with the addition of these covariates. In short, Table 2 provides no evidence for the hypothesis that participating in the SHARE survey affected respondents' actual doctor's visits.

To investigate whether changes in monthly doctor's visits occur over shorter time spans, we also conducted analyses using 3- and 6-month follow-up periods. The results of the analysis covering doctor's visits 3 months before and after the 2004 survey are summarized graphically in Figure 2. During this shorter window, the mean number of doctor's visits increases very little for either cohort (by about 0.04 visits for Cohort 2004 and 0.20 visits for Cohort 2006; left panel). This increase in monthly doctors' visits from 3 months before to 3 months after the interview is thus actually greater in Cohort 2006 than in Cohort 2004 (right panel). However, this difference is far outside the range of typical significance levels and too small to have practical significance for individuals' health behaviors. The results for the 6-month interval (not shown) reveal the same patterns. Again, there is no support for the hypothesis that individuals increase the frequency of their doctor's visits after participating in a health-focused survey relative to their peers who will go on to par-

Table 2
Rate ratios from GLM Poisson regressions of mean registered doctor's visits per month in the years before and after the 2004 survey on survey cohort (Sample A; N=2,388: N Cohort 2004 = 1,396, N Cohort 2006 = 992).

	Model 1		Model 2	
	exp(β)	p	exp(β)	p
Intercept	0.392	< 0.001	0.258	< 0.001
Before 2004 interview	0.959	0.007	0.959	0.007
Cohort 2006	0.892	0.002	0.895	0.001
Before 2004 interview * Cohort 2006	0.982	0.462	0.982	0.468
Age in 2004 (Ref.: 50-59)				
60-69	-	-	1.027	0.563
70-79	-	-	1.428	< 0.001
Female	-	-	1.281	< 0.001
Foreign-born	-	-	1.200	0.042
ISCED education level (Ref.: High)				
Medium	-	-	0.948	0.156
Low	-	-	0.914	0.061
Mean disposable personal income 2004 (Ref.: High)				
Medium	-	-	1.085	0.059
Low	-	-	1.143	0.006
Not working 2004	-	-	1.353	< 0.001
Not a parent 2004	-	-	1.022	0.730
Civil status 2004 (Ref.: Married/partnered)				
Divorced / separated	-	-	1.057	0.291
Widowed	-	-	0.945	0.298
Never married	-	-	0.941	0.440
Random effects standard deviation (Intercept)	0.767		0.696	

ticipate in the survey, even during this relatively short follow-up period.

Table 3 shows rate ratios from negative binomial regressions of the number of times respondents reported that they visited a doctor in the 12 months before the 2006 survey on survey cohort and covariates among Sample B. Recall that both Cohort 2004 and Cohort 2006 are limited to respondents who participated in the SHARE survey at least twice. Model 1 includes survey cohort without other covariates. While Cohort 2006 reported somewhat fewer doctor's visits than Cohort 2004 (exp(β) = 0.909), this was not a strong effect ($p < 0.069$). Model 2 adds sociodemographic controls, which do not change the relationship between cohort and self-reported visits and, in fact, are largely unrelated to self-reports, except for that respondents in the 60-69 age group reported substantially (about 13.8%) more doctor's visits (exp(β) = 0.862, $p = 0.035$) than those who were 50-59, and unemployed respondents reported 53.4% more visits (exp(β) = 1.534, $p < 0.001$) than working respondents. In short, Table 3 shows that individuals who had already participated in the SHARE survey once approximately two years earlier (Cohort 2004) did not report any more or fewer visits than those participating for the first time (Cohort 2006).

4 Discussion

Our study is the first we know of to assess whether participating in a major health-focused social survey—the Survey of Health, Aging, and Retirement in Europe (SHARE)—predicts a change in an objectively-recorded health behavior. We found that the age-related increase in register-recorded doctor's visits did not differ between Danish adults aged 50-79 who participated in the SHARE survey for the first time and their peers who had yet (but would go on) to participate. We also found that doctor's visits as self-reported on the second wave of the survey did not differ between individuals being interviewed for the second time and a refresher sample being interviewed for the first time. Comparisons of registered and self-reported doctor's visits indicated that respon-

Table 3
Rate ratios from GLM negative binomial regressions of self-reported doctor's visits in the year before the 2006 survey on survey cohort (Sample B; N=1,819: N Cohort 2004 = 1,032, N Cohort 2006 = 787).

	Model 1		Model 2	
	exp(β)	p	exp(β)	p
Intercept	4.091	< 0.001	3.006	< 0.001
Cohort 2006	0.909	0.069	0.952	0.341
Age in 2006 (Ref.: 50-59)				
60-69	-	-	0.862	0.035
70-79	-	-	0.928	0.399
Female	-	-	1.075	0.171
Foreign-born	-	-	1.060	0.680
ISCED education level (Ref.: High)				
Medium	-	-	1.034	0.573
Low	-	-	1.060	0.450
Mean disposable personal income (Ref.: High)				
Medium	-	-	0.981	0.784
Low	-	-	1.061	0.454
Not working 2006	-	-	1.534	< 0.001
Not a parent 2006	-	-	0.875	0.210
Civil status 2006 (Ref.: Married/partnered)				
Divorced / separated	-	-	1.114	0.186
Widowed	-	-	1.041	0.654
Never married	-	-	1.220	0.085

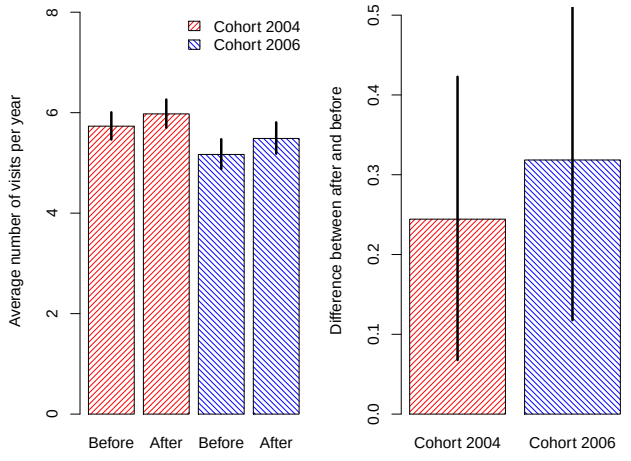

Figure 1. Registered doctor's visits 12 months before and after 2004 survey by survey cohort (Sample A). Model 1 predictions including marginalized random effects with parametrically bootstrapped 0.95 confidence intervals. The left panel shows the average number of doctor's visits per month over the 12 months following the 2004 interview for Cohort 2004 and Cohort 2006, and the right panel shows the difference in visits 12 months before and after the interview for each cohort. The error bars indicate 95% confidence intervals.

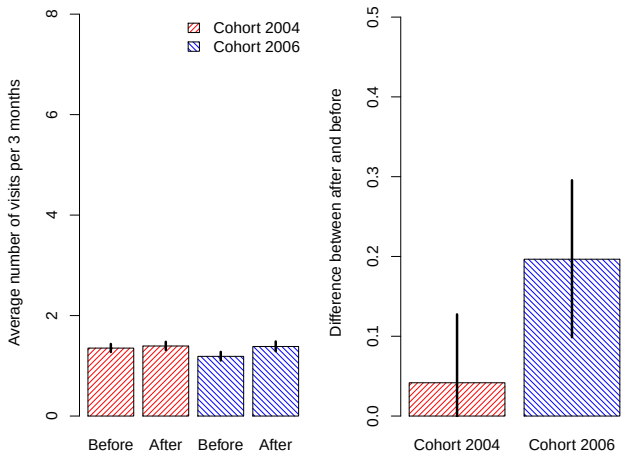

Figure 2. Registered doctor's visits 3 months before and after 2004 survey by survey cohort (Sample A). Model predictions including marginalized random effects with parametrically bootstrapped 0.95 confidence intervals. The left panel shows the average number of doctor's visits per month over the 3 months following the 2004 interview for Cohort 2004 and Cohort 2006, and the right panel shows the difference in visits 3 months before and after the interview for each cohort. The error bars indicate 95% confidence intervals.

dents underreported their health contacts, which is consistent with the findings of prior studies (Bhandari & Wagner, 2006; Hunger et al., 2013; Oksuzyan et al., 2009; Roberts et al., 1996).

The finding that respondents' actual doctor's visits did not increase along with participation in the SHARE survey is somewhat inconsistent with expectations informed by several experimental studies in consumer and health psychology, which show increases in preventive health behaviors—including visits to doctors—among individuals who are questioned about these behaviors (Conner et al., 2011; Sandberg & Conner, 2009; Wood et al., 2014; Zwane et al., 2011). There are several key differences between the designs of these studies and surveys like SHARE that likely explain much of this inconsistency. First, because they are experimental, the consumer/health psychology studies on this subject give researchers substantial control over factors that could interfere with subtle behavioral effects. Additionally, the questionnaires in these studies tend to be brief and targeted to the particular behaviors being assessed, which is why researchers quite reasonably argue that they may bring these behaviors to the forefront of study participants' consciousness. Although much of the comparatively lengthy SHARE questionnaire concerns health, it also focuses on other domains, and the question about doctor's visits represents a small part of the survey. Additionally, questions in the experimental psychological studies often prompt respondents to state their plans to engage in certain behaviors, which may compel them to act in consistent ways. By contrast, surveys like SHARE are not aimed at directly testing or evoking behavioral changes, and do not ask about intended behaviors. For all these reasons, it is possible that the SHARE survey—along with other major health-focused panel studies—simply does not have the effect of acting as a "cue to action" (Rosenstock, 2005) that may activate respondents' beliefs about and future engagement in this and potentially other health behaviors.

The focus on doctor's visits may also help explain why we do not observe behavioral effects. As described earlier, people often visit doctors as a means to prevent serious health problems and maintain good health (e.g., Rosenstock, 1974; Rosenstock, 2005). However, individuals also visit doctors simply because they are already ill, and visits increase in frequency when people age and are on declining health trajectories (Liao et al., 2001; Miilunpalo et al., 1997). Doctor's visits that occur because of health crises or that reflect acute health declines are less likely to be responsive to a hypothetical "reminding" effect of health-based questions. Unfortunately, there is no clear-cut way to distinguish between visits for the purposes of obtaining medications, preventive visits and visits prompted by serious health issues in these data. Future studies should explore objectively-measured health behaviors which may be more sensitive to changes from being surveyed, including specific preventive behaviors such as cancer screenings or changes in lifestyle behaviors.

The finding that respondents' self-reported doctor's visits did not differ by the number of times they had participated in the survey also runs counter to expectations supported by some existing studies, which find changes in self-reported behaviors across waves of panel surveys (Halpern-Manners & Warren, 2012; Torche et al., 2012). However, the literature also points out that these changes rarely appear in studies with a gap of more than one year between waves (Spangenberg et al., 2016; Warren & Halpern-Manners, 2012; Wilding et al., 2016). It is thus perhaps expected that by 2006, responses from those who participated in the survey two years earlier would not differ from those of new participants. Additionally, studies that do find changes in self-reports generally focus on behaviors or statuses which may be embarrassing or stigmatizing, such as drug use (Torche et al., 2012) and unemployment (Halpern-Manners & Warren, 2012), which is less likely to be the case for a failure to visit doctors. Further research focusing on health outcomes which may be more likely to motivate changes in responses over time, especially those which when persistent may illicit feelings of shame, is needed.

Our study is particular to the sample and population it represents. With a healthcare system that has been nationalized for decades, Denmark experiences high utilization of physicians across segments of the population (Olejaz et al., 2012), and preventive doctor's visits may be comparatively immune to further increases. Additionally, at age 50+, many SHARE respondents may be encountering significant age-related health declines that have a direct impact on their health behaviors, including visits with physicians. Patterns may differ in other countries or among individuals of different ages.

Even so, the findings provide an important contribution to the literature on study participation effects by showing that in the case of this widely-used longitudinal health survey, participation was unrelated to the aging adult respondents' self-reported or actual uptake of an important health behavior. Thus, they provide a counterpoint to recent concern about panel conditioning effects and their potential to undermine measurement validity by re-emphasizing that they are likely limited to select behaviors and question formats. More broadly, our results indicate that at least for this survey and behavior, participation did not affect respondents' subsequent actions—an auspicious conclusion for researchers who may be concerned about the consequences of participating in such studies for individuals' lives.

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