Status quo bias and health behavior: findings from a cross-sectional study

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Abstract

Background

Status quo bias (SQB) has often been referred to as an important tool for improving public health. However, very few studies were able to link SQB with health behavior.

Methods

Analysis were based on data from the population-based KORA S4 study (1999–2001, n = 2309). We operationalized SQB through two questions. The first asked whether participants switched their health insurance for financial benefits since this was enabled in 1996. Those who did were assigned a 'very low SQB', (n = 213). Participants who did not switch were asked a second hypothetical question regarding switching costs. We assigned 'low SQB' to those who indicated low switching costs (n = 1035), 'high SQB' to those who indicated high switching costs (n = 588), and 'very high SQB' to those who indicated infinite switching costs (n = 473). We tested the association between SQB and physical activity, diet, smoking, alcohol consumption, the sum of health behaviors, and BMI using logistic, Poisson and ordinary least square regression models, respectively. Models were adjusted for age, sex, education, income, satisfaction with current health insurance and morbidity.

Results

SQB was associated with a higher rate of physical inactivity (OR = 1.22, 95% CI [1.11; 1.35]), a higher sum of unhealthy lifestyle factors (IRR = 1.05, 95% CI [1.01; 1.10]) and a higher BMI (β = 0.30, 95% CI [0.08; 0.51]).

Conclusions

A high SQB was associated with unfavorable health behavior and higher BMI. Targeting SQB might be a promising strategy for promoting healthy behavior.

Key words: economics, behavioral; life style; public health; bias; prevention

Introduction

Status Quo Bias (SQB), as a human preference for the current state of affairs, supposedly is one of the most important tools for health promotion and disease prevention.[1-4] SQB, includes an increased likelihood for selecting the default option and a preference toward a presumably inferior option if the superior option means leaving the status quo, even when switching costs are negligible.[5]

Experimental studies in economics and psychology showed that status quo affects monetary but also health related decisions.[3,6] Dean et al., reported that a risky lottery decision was chosen more often when it was the default option.[6] Krieger et al, found that SQB affected health insurance choice although participants were clustered in a way that the inter–group differences regarding risk preferences were minimized.[7] Boonen et al. conducted a discrete choice experiment that showed SQB affecting physician choice.[8] Finally, Suri et al., found that participants were unlikely to leave the status quo even though they knew it would reduce their anxiety while waiting for an electric shock.[3] Examples of how SQB might affect public health are organ donation and vaccination behavior.[9,10]

However, as Loewenstein indicated, there are many other situations were SQB might be part of the explanation. Due to SQB individuals prefer doing what is automatic or what they have been doing in the past.[11] Hence, SQB, as a preference for the default and the path of least resistance,[11] might as well help to explain an unhealthy diet, physical inactivity, difficulties with smoking cessation or limitation of alcohol consumption. For example, SQB might affect our daily food choices, where large portion size and unhealthy side dishes often are the default option.[1]

However, SQB in large-scale studies has mostly been examined regarding its effect on financial decision making, e.g. decisions regarding health insurance plans.[12,13] Large-scale studies often exploit natural experiments, e.g. when at some point in life individuals are

offered to switch to a new superior health care plan.[12] For example, Sinaiko et al, and Afendulis et al, showed that the probability of switching to a superior insurance program among Medicare beneficiaries decreased with the time spent in an inferior program.[12,14] The advantage of such natural experiments is that they reflect real world decisions. However, few studies linked SQB with health behavior of individuals that supposedly is affected by SQB.

In this study, we use data from a natural experiment regarding health insurance choice and a hypothetical measure of SQB; second, we identify characteristics associated with SQB; and third, we examine the association between SQB, physical inactivity, unhealthy diet, smoking, alcohol consumption, and body mass index (BMI).

Methods

Data and study design

Our analyses are based on data from the KORA S4 study (Cooperative Health Research in the Region of Augsburg), a cross-sectional, population-based study that was conducted in southern Germany in the years 1999–2001 (n = 4261, response 66.4%). All participants visited the study center, where information was collected in interviews, self-administered questionnaires, and clinical examinations.

Natural experiment to measure status quo bias

To measure and operationalize SQB, we took advantage of a major change in the German health care system that took place in 1996.[15]

The natural experiment

In Germany, it is mandatory to have health insurance. Most of the population is covered by statutory insurance (86.7% in 2000 and 87.7% in 2016). Statutory insurance has been compulsory for individuals with a gross wage of less than € 39,574 (equals DM 77,400, DM = Deutsche Mark, German currency until the introduction of the Euro in 2002) in 2000, whereas people above this threshold have a choice between statutory and private health insurance plans. In 2000, the premiums for statutory health insurance averaged 13.6% of the employee's gross salary that were equally shared by the employees and employers who both paid 6.8%.[16]

Before 1996, membership to a particular sickness fund of the statutory health scheme was determined by occupation and could not be freely chosen by individuals. The monthly rates between the many existing sickness funds differed. However, the service packages including co-payments and deductibles differed not or only marginally. Since 1996, individuals were allowed to choose and change health insurance on a yearly basis, irrespective of their

occupation. The reform was made to improve competition between insurance companies, which included reducing their contribution rates.[15]

With an occupation based default health insurance at different contribution rates but almost identical service packages, followed by a policy change that gave individuals the freedom to switch health insurance, the data represents a great natural experiment to measure status quo effects.

Measure of status quo bias

Individual SQB was derived in four steps in a sample of n = 3080 individuals with statutory health insurance.

First, individuals were asked in an interview whether they had switched their health insurance since 1996. Participants, who had switched their health insurance and stated monetary benefits as the main reason for this, were assigned a "very low" status quo bias.

Second, all individuals who had not switched their health insurance, were asked to state the minimal reduction in the monthly premium that is needed to make them switch from their current insurance (status quo) to an alternative health insurance plan that offers the exactly same benefits. Participants could withhold the answer to this question ("do not know"), state that they would never switch their insurance ("I would never switch my insurance plan"), or provide a monetary value.

Given the German health care system, this question represented a realistic and contemporary scenario. Furthermore, it represents a matching question without risk similar to questions described in other studies. For example, in the seminal work by Samuelson and Zeckhauser, a maximum rent increase participants would just be willing to pay for a move from an old to a new office with their company, and a minimum rent decrease required for a move from a new to an old office with their company were used to derive SQB.[5]

In our context, the willingness to switch health insurance plans depends on the perceived switching costs, e.g. bureaucratic effort, and the utility gain, i.e. cost savings. Therefore, the monetary value stated by the participants in our study represents the margin at which perceived switching costs, e.g. bureaucratic effort, are matched by their utility, i.e. cost savings.

Thus, in a third step, we used potentially important reasons for increased switching costs (i.e. age, sex, education, income, satisfaction with current insurance plan, and morbidity) as independent variables to estimate the stated switching costs.[13,17] We assumed the mean estimate of this model as the appropriate margin for switching health insurance, given the specific characteristics of an individual. The appropriate margin was estimated under the assumption of a gamma model with log link, as the outcome variable was highly right-skewed.

In a fourth step, we compared an individual's stated switching costs with the individual's estimated margin that was calculated in the third step. Individuals who stated switching costs that were lower or equal to the estimated margin were assigned a "low" SQB. Individuals who stated switching cost that were higher than the estimated margin were assigned a "high" SQB. Individuals who would not switch their insurance irrespective of potential rate reductions were assigned a "very high" SQB (Figure 1).

Measure of health behavior and BMI

Health behaviors were obtained with questionnaire. Smoking status was assessed by the question "Do you currently smoke cigarettes?" Distinction was drawn between current smokers and non-smokers. Physical inactivity was estimated by the sum score of two separate questions on the time per week spent engaged in physical activity during leisure time in summer and winter. Answer categories were (1) > 2 hours, (2) 1 to 2 hours, (3) < 1 hour and (4) none. A sum score > 4 combining the summer and winter question was categorized as

physically inactive.[18] Dietary behavior was assessed by a validated Food Frequency Questionnaire summarizing the frequency of consumption ("nearly daily" to "never") with regard to 15 different food categories in a single score (Supplementary Table S1). Details of a very similar questionnaire have been described elsewhere.[19] Level of alcohol consumption was derived from self-reported intake of beer, wine, and spirits over the last working day and during the last weekend (Supplementary Table S2) The total amount was categorized based on a toxic threshold (men: > 40g/day, women: > 20g/day).[20]

We calculated a lifestyle score (0–4) where one point was attributed per criterion (smoking, high alcohol consumption, physical inactivity, and unhealthy diet) in each individual. In the score, a higher value was associated with more unhealthy behaviors. Finally, BMI was calculated based on weight and height measured at the study center. We chose BMI, as weight status is correlated with current and past dietary habits and physical activity and can be regarded as an objective measure associated with lifestyle.

Covariates

Age, sex, gender, education and income were retrieved from self-report. Satisfaction with the current insurance provider was assessed by the question "How satisfied are you with your current insurance provider in general?" Answer categories ranged from "not at all satisfied" (1) to "very satisfied" (5). Satisfaction was utilized as proxy for the relationship with and loyalty to the current insurance company.[13] Morbidity was assessed by asking participants whether they had ever been diagnosed with type-2 diabetes, stroke, or myocardial infarction.

Statistical analysis

First, we report characteristics for all levels of SQB. Assuming an interval scale from 0 (*very low SQB*) to 3 (*very high SQB*), we then analyzed the characteristics associated with SQB (0–3), in an ordinary least square (OLS) regression analysis. Additionally, we analyzed the characteristics associated with not having switched health insurance since it had been allowed

in 1996, and the characteristics associated with a high SQB in reference to a low SQB in two separate logistic regression models.

Finally, we examined the association between SQB and health behavior using logistic regression models. Associations with the lifestyle score and BMI were analyzed with a Poisson regression model and an OLS regression model respectively. We adjusted all models for age, sex, education, income, satisfaction with the current insurance plan, and morbidity. Statistical analyses were performed using RStudio.[21]

Results

The final data set included n = 2309 participants (Figure 1). Characteristics are presented in Table 1. Our SQB measure resulted in n = 213 individuals with a very low SQB, n = 1035 with a low SQB, n = 588 with a high SQB and 473 with a very high SQB. The different levels of SQB showed substantial differences regarding the mean age of individuals included. A relevant number of individuals was excluded from analysis (Figure 1). Their characteristics are presented in Supplementary Table S3.

Characteristics associated with a higher SQB

Older individuals, participants with at least one morbidity and those who were more satisfied with their health insurance had a higher SQB. Education and a higher income were associated with a lower SQB (Table 2, left). In the analysis of the hypothetical scenario, where we compared individuals with high SQB (SQB = 1) to individuals with a low SQB (SQB = 2), males were more likely to have a high SQB (Table 2, right).

Status quo bias, health behavior, and BMI

A higher SQB was associated with a higher likelihood of physical inactivity (OR = 1.22, 95% CI [1.11; 1.35]). Furthermore, the sum of unhealthy lifestyle factors was higher in individuals with a higher SQB (IRR = 1.05, 95% CI [1.01; 1.10]). Finally, participants with a higher SQB had a higher BMI (β = 0.30, 95% CI [0.08; 0.51]) (Table 3).

When we distinguished only individuals who switched their health insurance and those who did not, the association between SQB and physical inactivity (OR = 1.35, 95% CI [1.00; 1.84]), and SQB and BMI (β = 0.40, 95% CI [–0.26; 1.05]) were of the same direction but not significant anymore (Table 3).

When we compared individuals with a high SQB to individuals with a low SQB, the results were similar. A high SQB was associated with a higher rate of physical inactivity (OR = 1.15,

95% CI [0.94; 1.42]) and a higher BMI (β = 0.46, 95% CI [0.00; 0.93]). However, both associations were not statistically significant (Table 3).

Sensitivity analysis

Since age was highly associated with SQB we stratified our sample based on the median age, i.e. 50 years. In both strata, i.e. ≤ 50 and > 50 years of age, a higher SQB was significantly associated physical inactivity (OR = 1.24, 95% CI [1.07; 1.45] and (OR = 1.20, 95% CI [1.05; 1.37])). Moreover, SQB was associated with BMI in both strata, although not statistically significant in those > 50 years of age (β = 0.35, 95% CI [0.02; 0.68] and β = 0.28, 95% CI [0.00; 0.56], Supplementary Table S4).

Discussion

We combined information from a natural experiment regarding health plan choice with hypothetically stated switching costs from a population-based survey to measure SQB. We examined the data regarding characteristics associated with SQB and differences in health behavior associated with the different levels of SQB.

Our first finding was that age and morbidity were associated with a higher SQB, while education and income were associated with a lower SQB. Afendulis et al., who compared the enrollment decisions of Medicare beneficiaries in the United States, found that the longer an individual had been enrolled in an inferior program, the less likely the individual was to switch to a newly offered superior program.[12] In our study, individuals had not been allowed to switch their health insurance before 1996. Hence, age can be seen as a proxy for the length of enrollment and the age effect might be at least partially explained by that. However, Leukert-Beckert & Zweifel, as well as Becker & Zweifel who measured SQB regarding health insurance decisions in discrete choice experiments found age associated with SQB.[22,23] Therefore, it can be assumed that the age effect in our study represents both the effect of time spent in the status quo and age. Our results regarding SQB, education and morbidity are in line with reported findings in Leukert-Beckert & Zweifel and Stromboom et al.[13,22] Furthermore, the association with education is supported by an experimental study by Fraenkel et al., who reported that higher numeracy skills were associated with a lower SQB.[24]

Our second finding was that a higher SQB was associated with higher rates of physical inactivity. Anticipating a strong age effect, we repeated the analysis stratified by age. However, stratification did not alter direction or significance of the effect. Considering that SQB includes a preferences for the path of least resistance,[11] an association with physical inactivity was not unexpected. However, to the best of our knowledge, there have been no other studies yet that examined the association between SQB and physical activity.

Our third finding was that a higher SQB was associated with a higher BMI. One explanation for the higher BMI is physical inactivity. However, considering the significantly higher sum of unhealthy behaviors in individuals with a higher SQB, the association could also be partly driven by more frequent unhealthy food choices and a higher consumption of alcohol. Overall, one possible explanation for the differences explained by SQB, could be that the individuals' environment at least sometimes had the unhealthy option as the status quo or as the option of least resistance.

To measure SQB we followed up on a major change in the German health care system, which took place in 1996. Since 1996 individual were allowed to switch their health insurance, which was often associated with monetary benefits.[15] We distinguished individuals who had switched their health insurance for monetary benefits between 1996 and our study (1999–2001), and individuals who had not. Furthermore, we made a relative distinction regarding the extent of SQB in those who had not switched, based on their hypothetical willingness to do so. Both parts of our method were based on prior work and theory. Taking advantage of a natural experiment like changes in a health care system, has been done several times in former studies.[2,5,12] Furthermore, the relative distinction of SQB, where we used stated switching costs to approximate the reasonable individual margin for switching costs, was based on a study conducted by Samuelson & Zeckhauser, who also used stated switching costs to measure SQB.[5] Finally, the associations of our SQB measure with socioeconomic characteristics are in line with former research,[12,22] indicating that our operationalization is a good measure for SQB.

Our study has several limitations. The cross-sectional data do not allow any causal interpretations and made temporal association analysis impossible. Furthermore, most of the information is based on self-report, which is prone to recall bias. Moreover, while we adjusted for many socioeconomic confounders, e.g. age, income and education, there are

other possibly confounding factors that we could not adjust for, e.g. health literacy. Furthermore, we only examined individuals with statutory insurance where we were able to estimate their SQB. Thereby, examined individuals differed systematically from excluded individuals (e.g., individuals with private insurance had a higher mean income, Supplementary Table S3). However, this was necessary in order to take advantage of the natural experiment. Furthermore, the context of the natural experiment was the German health care system, hence cannot be directly transferred to other countries. However, similar situations occur elsewhere.[12,13] Furthermore, the hypothetical part of our SQB measure can be transferred to many scenarios and beyond the scope of health insurance choice. Finally, we ran multiple regression analyses without adjusting p-values for multiple testing.

One strength of our study is that we were among the first to use information from a natural experiment that elicited SQB and add detailed information on individuals, i.e. socioeconomic characteristics, health behavior and BMI. Additional strengths are a representative sample size and a large number of measured health behaviors.

We found that SQB was associated with a higher rate of physical inactivity, a higher sum of unhealthy behaviors and a higher BMI. This suggests SQB as a relevant factor for explaining health behavior in the studied sample. Therefore, public health might profit from facilitating healthy choices and introducing healthy defaults or making adverse effects more salient.[4]

Funding

Not applicable.

Conflict of interest

None declared.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the ethics committee of the Bavarian Medical Association and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Key-points

- We combined the validity of a natural experiment with the details of a cohort study, i.e. socioeconomic status and health behavior
- Status Quo Bias was associated with less physical activity and a higher body-mass-index
- Public health might profit from facilitating healthy choices and introducing healthy defaults

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Table 1. Characteristics of the study population.

	Very low SQB[a]	Low SQB[b]	High SQB[c]	Very high SQB[d]
N	213	1035	588	473
Age (years) (SD)	37.8 (9.61)	48.7 (14.1)	48.3 (12.4)	60.6 (12.0)
Male sex (%)	113 (53.1)	492 (47.5)	339 (57.7)	259 (54.8)
Education (%)				
Basic school	87 (40.8)	565 (54.6)	293 (49.8)	371 (78.4)
Secondary school	74 (34.7)	278 (26.9)	177 (30.1)	64 (13.5)
Higher school	52 (24.4)	192 (18.6)	118 (20.1)	38 (8.0)
Income/1000	2.3 (1.1)	2.2 (1.0)	2.3 (1.0)	2.0 (1.0)
Satisfaction (1–5)	3.9 (0.6)	3.9 (0.6)	3.9 (0.6)	4.2 (0.6)
No. of morbidities > 0 (%)	1 (0.4)	59 (6.7)	43 (7.3)	82 (17.3)
Stated switching costs (DM)	-	39.7 (16.7)	121 (55.5)	-
Lifestyle (%)				
Physical inactivity	86 (40.4)	509 (49.2)	306 (52.0)	301 (63.6)
Unhealthy diet	80 (37.6)	365 (35.3)	198 (33.7)	137 (29.0)
Smoking	77 (36.2)	281 (27.1)	163 (27.7)	93 (19.7)
Alcohol	45 (21.1)	195 (18.8)	125 (21.3)	98 (20.7)
BMI	25.7 (4.2)	27.0 (4.83)	27.4 (4.9)	29.0 (4.4)

Data are mean (standard deviation) or n (%). *SQB* = status quo bias, *Alcohol* = high alcohol consumption, *Morbidity* = prevalence of type-2 diabetes, stroke, and myocardial infarction, DM = Deutsche Mark, German currency until 2002.

[a] Participants who had switched their health insurance for monetary reasons since 1996.

[b] Participants who stated switching costs lower or equal to the estimated margin.

[c] Participants who stated switching costs higher than the estimated margin.

[d] Participants who would not switch health insurance irrespective of potential rate reductions.

Table 2. Regression analysis: characteristics associated with status quo bias

	SQB (0-3)[a]	Did not switch[b]	High SQB vs. low SQB[c]
Covariates	β [95% CI]	OR [95% CI]	OR [95% CI]
Age/10	0.22 [0.19; 0.24]	2.17 [1.89; 2.50]	0.97 [0.89; 1.05]
Male sex	0.04 [-0.03; 0.11]	0.82 [0.61; 1.10]	1.50 [1.22; 1.84]
Education	-0.06 [-0.11; -0.01]	1.02 [0.84; 1.24]	1.07 [0.93; 1.22]
Income/1000	-0.05 [-0.08; -0.01]	0.84 [0.73; 0.97]	1.10 [0.99; 1.23]
Satisfaction	0.14 [0.09; 0.20]	0.91 [0.72; 1.14]	1.08 [0.92; 1.27]
Morbidity	0.18 [0.05; 0.31]	7.06 [1.53; 125.5]	1.09 [0.72; 1.64]

Age has been divided by 10 and income has been divided by 1000 within regression analysis for better interpretability, *Morbidity* = prevalence of type-2 diabetes, stroke, and myocardial infarction, *SQB* = status quo bias.

[a] Main measure of SQB. Very low SQB (Participants who had switched their health insurance for monetary reasons since 1996) = 0, low SQB (Participants who stated switching costs lower or equal to the estimated margin) = 1, high SQB (Participants who stated switching costs higher than the estimated margin) = 2, very high SQB (Participants who would not switch health insurance irrespective of potential rate reductions) = 3.

[b] Participants who had switched their health insurance for monetary reasons since 1996 as reference to all other participants.

[c] Participants who stated switching costs lower or equal to the estimated margin (low SQB) as reference to participants who stated switching costs higher than the estimated margin (high SQB)

Table 3. Regression analysis: status quo bias and unhealthy behavior.

Covariates	Physical inactivity	Unhealthy diet	Smoking	Alcohol	Sum of unhealthy behaviors	BMI
	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	IRR [95% CI]	β [95% CI]
Main SQB measure[a]						
SQB (0–3)	1.22 [1.11; 1.35]	1.04 [0.93; 1.16]	1.02 [0.91; 1.15]	1.03 [0.91; 1.16]	1.05 [1.01; 1.10]	0.30 [0.08; 0.51]
Low to very high SQB vs. very low SQB[b]						
Very low SQB	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Did not switch	1.35 [1.00; 1.84]	1.28 [0.94; 1.76]	1.01 [0.74; 1.39]	0.91 [0.64; 1.33]	1.09 [0.96; 1.23]	0.40 [-0.26; 1.05]
High SQB vs. low SQB[c]						
Low SQB	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
High SQB	1.15 [0.94; 1.42]	0.87 [0.70; 1.09]	1.02 [0.80; 1.29]	1.13 [0.87; 1.45]	1.02 [0.93; 1.11]	0.46 [0.00; 0.93]

All regression models have been adjusted for age, sex, education, income, satisfaction with current insurance plan, and morbidity; *Morbidity* = prevalence of type-2 diabetes, stroke, and myocardial infarction, *SQB* = status quo bias. Results are reported as odds ratios (OR) for the logistic regression results and as incidence rate ratios (IRR) for the Poisson regression results. Ordinary least square regression (OLS) results are reported as β coefficients. Every OR or IRR above 1 represents an increased risk of showing the unhealthy expression of the respective lifestyle factor. Likewise, an estimate larger than zero with regard to BMI in the OLS model represents a higher BMI.

[a] Very low SQB (Participants who had switched their health insurance for monetary reasons since 1996) = 0, low SQB (Participants who stated switching costs lower or equal to the estimated margin) = 1, high SQB (Participants who stated switching costs higher than the estimated margin) = 2, very high SQB (Participants who would not switch health insurance irrespective of potential rate reductions) = 3.

[b] Participants who had switched their health insurance for monetary reasons since 1996 as reference to all other participants.

[c] Participants who stated switching costs lower or equal to the estimated margin as reference to participants who stated switching costs higher than the estimated margin.

Figure legends

Figure 1. Patient flow diagram. The figure displays the patient flow within our study. *SQB* = status quo bias. *Imputation was performed with predictive mean matching as proposed by Little (1988) using the R package "Mice" [25,26].