Received: 14 June 2021 | Revised: 14 August 2021 | Accepted: 17 August 2021
DOI: 10.1002/acp.3868

RESEARCH ARTICLE

WILEY

Amplification of the status quo bias among physicians making medical decisions

Adrian R. Camilleri[1] | Sunita Sah[2]

[1]UTS Business School, University of Technology Sydney, Ultimo, New South Wales, Australia

[2]SC Johnson Graduate School of Management, Cornell University, Ithaca, New York, USA

Correspondence
Adrian R. Camilleri, UTS Business School, University of Technology Sydney, 14-28 Ultimo Road, Ultimo, 2007, New South Wales, Australia.
Email: adrian.camilleri@uts.edu.au

Funding information
Hummingbird Insight

Summary

The status quo bias (SQB) is the tendency to prefer the current state of affairs. We investigated if experts (physicians) fall prey to the SQB when making decisions in their area of expertise and, if so, whether the SQB is reduced or amplified for experts compared to non-experts. We presented 302 physicians and 733 members of the general population with a medical scenario and two non-medical scenarios. In each scenario, participants were asked to make a decision between two options. For half of the participants, one of the options was presented as the status quo. All groups displayed a SQB but physicians displayed an *amplification* of the SQB but only when making decisions in the medical scenario. Experts may be more swayed by status quo options when making decisions in their area of expertise. We discuss why the SQB may be amplified for experts and the implications for practice.

KEYWORDS
experiment, expert decision-making, status quo bias

1 | INTRODUCTION

At age 57, Nurse Marilyn Mecija, previously healthy, was diagnosed with stage II rectal cancer (MemorialCare, 2021). Her oncologist recommended an emergency colostomy, which would require Marilyn to wear a colostomy bag for the rest of her life. She sought a second opinion. Her second oncologist recommended an ileostomy, followed by chemotherapy and radiation therapy, before finally removing the tumor surgically. Marilyn opted for this second treatment, which was a success, and allowed her to return to her normal life.

In many cases, second opinions result in a change in decisions and recommendations, and are especially important in medical decisions that affect our quality of life. In this paper, we are interested in how experts make decisions when one particular course of action has already been selected.

1.1 | The status quo bias

The status quo refers to the "existing and longstanding states of the world" (Eidelman & Crandall, 2012, p. 270). When facing a decision, the status quo option is the one that will be implemented, or continue to be implemented, unless an active intervention to change is made. Samuelson and Zeckhauser (1988, p. 7) define the status quo as "doing nothing or maintaining one's current or previous decision."

An option can become the status quo in a variety of ways. A common way is that it has been designated as the default option that will be carried out in the case of no further action. For example, when an individual applies for a driver's license, if they do not answer the question about their willingness to become an organ donor, the no-action default becomes the status quo option (Johnson & Goldstein, 2003). Another way an option can become the status quo is when reviewing a decision made by someone else. For example, when a physician reviews the medical diagnosis or treatment decision of another physician, the initial decision becomes the status quo option. In our study, we examine situations when someone must actively choose between a status quo option and its alternative.

Research shows that people prefer the status quo option. Such behavior is considered a status quo "bias" (Samuelson & Zeckhauser, 1988) because having a status quo option can influence how people evaluate the benefits and costs of each option driven by a potentially irrational desire[1] to prefer the current state of affairs.

Although the bias can be innocuous, at its worst, the status quo bias causes people to ignore relevant information and simply go with the status quo option. The status quo bias has garnered much interest because of its breadth of impact; for example, in mutual fund selections (Kempf & Ruenzi, 2006), the adoption of new technology (Kim & Kankanhalli, 2009), and insurance policy choices (Johnson et al., 1993).

Most of the existing literature examining the status quo bias has been conducted with lay samples. For example, Samuelson and Zeckhauser (1988) asked student participants to make a choice in a series of scenarios with two, three, or four alternatives. For some of the students, one of the options in each scenario was made the status quo option. For example, one scenario asked the participant to choose in which portfolio to invest some inheritance money. The status quo option was created by the addition of a sentence to the scenario indicating that the money was already invested in one of the portfolios but this could easily be changed. Overall, an option was selected more often when it was the status quo compared to when it was the alternative to the status quo, or there was no status quo option. In the last three decades, the status quo bias has become a well-established phenomenon (Eidelman & Crandall, 2012), with more recent demonstrations extending the status quo bias to professional samples such as entrepreneurs (Burmeister & Schade, 2007), investors (Itzkowitz & Itzkowitz, 2017), and financial analysts (Gubaydullina et al., 2011).

1.2 | The present research

In this paper, we investigate expert decision-making, and focus on physicians who undergo many years of training. Medical decisions are also often high-stakes and thus an important context in which to explore the status quo bias. The treatment a patient receives, which causally relates to their wellbeing, should be based on their physician's evaluation of the expected benefits and costs of available options. If physicians are susceptible to the status quo bias, their flawed decisions could not only impact their patients and their clinical practice but also the cost of healthcare (Graber et al., 2005). For example, one study found that medical students initially biased toward the incorrect diagnosis ended up making the correct diagnosis only 12% of the time (vs. 80% when initially biased toward the correct diagnosis; LeBlanc et al., 2001). Despite the significance of potential errors caused by the status quo bias, a recent review of the cognitive biases and heuristics in medical decision-making identified only four papers examining "default bias or status quo bias" (Blumenthal-Barby & Krieger, 2015).

Research suggests that physicians make similar cognitive errors as the general population (Dawson & Arkes, 1987; Klein, 2005; Saposnik et al., 2016). Of note, one scenario-based study revealed that physicians were more likely to choose the default treatment when there were two alternatives compared to just one (Redelmeier & Shafir, 1995). The added complexity of comparing one more alternative caused some physicians to simply dismiss both.

The focus for our current study is on the extent to which physicians (vs. members of the general public) fall prey to the status quo bias in medical (vs. non-medical) contexts. Are physicians more or less likely to succumb to the status quo bias in their own domain of expertise compared to an unfamiliar one? On the one hand, experts usually make good judgments in areas of their expertise (Klein, 2008; Salas et al., 2010) and are more willing to make adjustments from initial decisions (Shanteau, 1988). Thus, as we state in our pre-registration, physicians may be *less* prone to the status quo bias when making medical decisions compared to decisions in other domains and compared to members of the general population.

On the other hand, due to extensive experience and reliance on pattern recognition, experts more frequently use heuristics to make decisions in their domain of expertise (Hutton & Klein, 1999; Shanteau, 1992a, 1992b). However, incorrect application of such heuristics often results in irrational biases (Kahneman et al., 1982). Also, physicians may simply trust their colleagues' decision-making and believe their peer spent the adequate time and diligence to figure out what was best for the patient and thus not spent as much cognitive effort on the decision that they would have done otherwise. These reasons would lead to an *amplification* of the status quo bias for physicians in the medical-decision domain versus other domains, and compared to the general population. We examined these competing hypotheses on physicians and the general population across medical and non-medical domains.

2 | METHODS

2.1 | Participants

In November and December 2019, we recruited 1035 Australian participants online from a single marketing research firm's medical and general consumer panel in exchange for financial compensation. All members of the medical panel were verified by the research firm by cross-referencing each participant's registration number with the Medical Board of Australia and also checking with the place of work. Our only inclusion criteria was that the participant was at least 18 years old (the median age turned out to be 46). There were no exclusion criteria. The 302 participants recruited from the medical panel were entered into a draw for an AUD$1000 check or gift card. The 733 participants recruited from the general consumer panel were entered into a draw for an AUD$100 check or gift card.

2.2 | Study design and procedure

The study was pre-registered and approved by the University of Technology Sydney ethics committee (ETH19-4367). The funding source had no role in the design, data analysis, interpretation, or conclusions of the study.

The experimental design was a 2 (status quo option: present vs. absent) x 2 (sample: physician vs. general population) x 3 (scenario: medical vs. 2 x non-medical) mixed-subject design where the first two independent variables varied between-subjects and the third independent variable varied within-subjects. In other words, physician participants were randomly allocated to one of two conditions—(1) Scenarios with status quo option present; (2) Scenarios with status quo option absent; likewise, members of the general population were also randomly allocated to the same two conditions; (1) Scenarios with status quo option present; (2) Scenarios with status quo option absent. All participants were presented with three scenarios, one scenario was a medical decision-making scenario and the other two were in non-medical contexts.

The study was conducted online using the Qualtrics platform (www.qualtrics.com/). The introduction to the study described its purpose as to understand how people make judgments and decisions. After providing consent, participants answered a series of demographic questions related to gender, age, education, income, and employment. For those currently employed, participants were asked to report their occupation job title, years of work experience in that occupation, and then categorize their occupation based on the Australian and New Zealand Standard Classification of Occupations. Our "physicians" sample consisted of those who categorized their occupation as "Professional," then "Health Professional," then "Medical Practitioner," then "General Practitioners and Resident Medical Officers" or "Specialist Physicians" or "Surgeons". As noted above, these participants were verified to be actual physicians. All other participants were allocated to our "general population" sample.

2.2.1 | Scenarios

On the following pages, participants were presented with three scenarios, one in a medical domain, and two in non-medical (financial and academic) domains (see Appendix A). In each scenario the participant had to choose between two options: two different treatment options (medical scenario), two different investment portfolios (financial scenario), and two different journals to send a manuscript for publication (academic scenario).

The order of the scenarios was counterbalanced so that each appeared equally often as first, second, or third in the sequence of scenarios. The order of the options was also counterbalanced so that each appeared equally often as the first or second presented on screen.

Participants were randomly allocated by the Qualtrics survey randomizer function to whether or not there was a status quo option present in the scenario. Participants were randomized to one of three conditions such that one option was presented as the (a) status quo option, (b) alternative to the status quo option, or (c) no status quo option was provided.

If allocated to the status quo absent condition, all three scenarios were described without any reference to a previous decision made by someone else. Moreover, the language used to describe the options was neutral. For example, in the medical scenario, the decision was to "choose" treatment A or to "choose" treatment B (Figure 1a).

If allocated to the status quo present condition, all three scenarios were the same but contained additional text indicating that a peer had already chosen one particular option (Figure 1b). For example, in the medical scenario, the additional sentence read, "The overnight admission doctor had initiated Treatment A but you can change this without cost." Furthermore, the language used to describe the options was to "retain" that treatment versus "shift" to the alternative. Following prior research on the status quo bias (Samuelson & Zeckhauser, 1988), the status quo option was always presented as the first option.

After making their choice, participants were also asked to indicate their confidence in their decision on a 5-point Likert scale ranging from 1 = "Not at all confident" to 5 = "Extremely confident."

After completing the three scenario decisions, participants were asked an attention check question to identify the scenario role that had

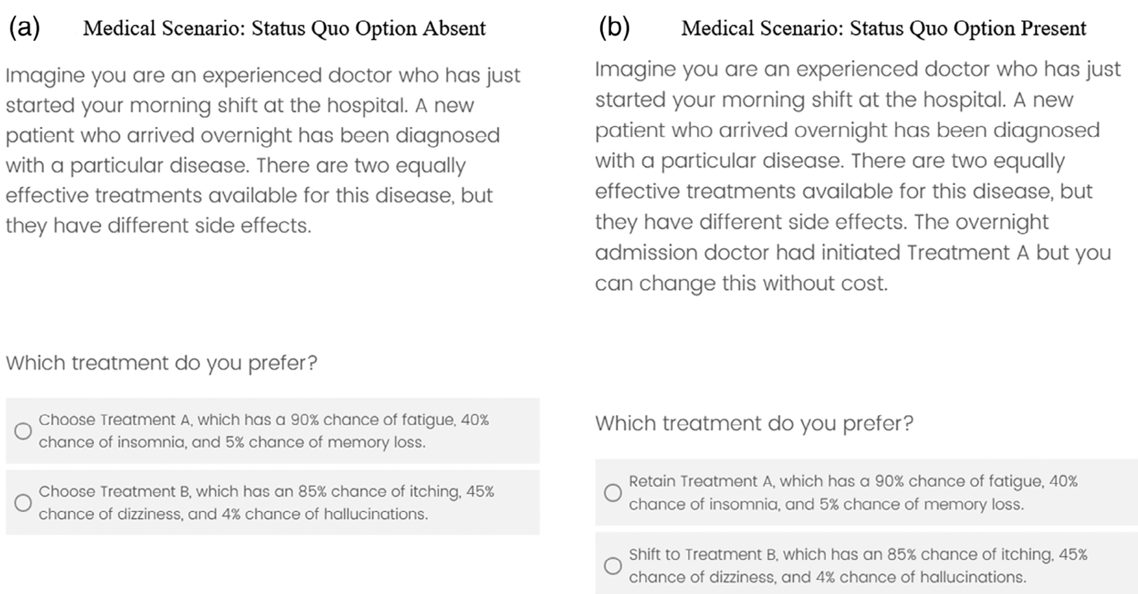

FIGURE 1 Stimuli for the medical scenario presented to participants when the status quo option was (a) absent and (b) present

not been presented earlier in the experiment ("Electrician" was the correct response). On the final page, participants were presented with an empty textbox in which they could optionally provide feedback.

2.2.2 | Sample size

The seminal status quo bias paper used a sample of 486 student participants (Samuelson & Zeckhauser, 1988). The results of that study suggest that the status quo bias has an effect size of approximately $w = 0.2$, where w is the square root of the standardized chi-square statistic. To achieve 95% power to detect an effect size of $w = 0.2$ for a single chi-square goodness of fit test with alpha set to 0.05, we required 325 participants. However, as we were interested in a three-way interaction, we required more participants than this. The academic literature has not yet settled on a reliable way to estimate power and sample size requirements for complex interactions such as the ones we are interested in (Lakens & Caldwell, 2021). Nevertheless, a generally agreed upon approach to increase power—particularly to detect interactions—is to use a large sample size (Maxwell et al., 2008). Given the available financial resources, we aimed to recruit at least 1000 participants. This is more than double the sample size used in the original Samuelson and Zeckhauser (1988) study. The marketing firm we worked with sent out invitations to potential participants based on expected response rates. In the end, we received 1035 responses.

2.3 | Statistical analysis

The main analyses consisted of two stages: (1) to examine whether participants displayed a status quo bias, and (2) to examine whether physicians, relative to the general population, displayed an amplification or an attenuation of the status quo bias in the medical scenario compared to the non-medical scenarios.

2.3.1 | Status quo bias analysis

To test for the status quo bias, we compared how frequently an option was selected when it was the status quo option (SQ), alternative to the status quo (ASQ), or there was no status quo (NSQ). Prior research has tested for a status quo bias in two ways: comparing how often an option is selected (1) when it is the SQ versus ASQ (Samuelson & Zeckhauser, 1988), and (2) when it is the SQ versus NSQ (Burmeister & Schade, 2007). We conducted both these tests of the status quo bias (SQ > ASQ and SQ > NSQ) through a series of Pearson chi-squares (adjusting for multiple comparisons using the Holm-Bonferroni approach [Holm, 1979]) and report comparative percentages. For each sample group, this resulted in 12 chi-square tests (i.e., 3 scenarios x 2 scenario options each x 2 types of test for the status quo option). Note that the Holm-Bonferroni approach controls the family-wise error rate by first sorting the obtained p-values from lowest to highest and then comparing each to a sequence of increasingly less strict alphas, with the final alpha in the sequence equaling .05.

2.3.2 | Amplification of the status quo bias analysis

An amplification (or attenuation) of the status quo bias occurs when one group of respondents (e.g., physicians) or one scenario (e.g., medical) shows a significantly larger (or smaller) status quo bias compared to another group of respondents (e.g., general population) or other scenarios (e.g., non-medical). To test for an amplification (or attenuation) of the status quo bias, we conducted generalized mixed effects models (GMMs) to take into account the fact that each participant made three decisions (one for each of the scenarios). The main dependent variable—choice—was binary, hence we assumed a binomial probability distribution with logit link function.

For the main effects model, we entered the participant's ID as a random effect. The independent variables were *Status Quo Option* (0 = present; 1 = absent), *Sample* (0 = general population; 1 = physicians), and *Scenario Type* (0 = medical; 1 = non-medical). Control variables were also added using dummy coding for the counterbalanced order of the scenarios (there were six orders) and the scenario option positioned first (0 = first option listed in Table 2 was presented as the first option, 1 = second option listed in Table 2 was presented as the first option). For the interactions model, we also included the interaction terms *Sample* x *Scenario Type*, *Status Quo Option* x *Scenario Type*, and *Status Quo Option* x *Sample*, and the three-way interaction *Status Quo Option* x *Sample* x *Scenario Type*. In both models, the dependent variable was whether or not the first option was chosen (0 = no, 1 = yes), which was appropriate because when there was a status quo option present it was always the first presented option.

GMMs produce beta coefficients (i.e., β) predicting changes in log odds (i.e., the probability of choosing the first option relative to the probability of choosing the second option) for every one unit increase in the predictor variable (Sommet & Morselli, 2017). These coefficients can be more easily interpreted by their associated odds ratios (i.e., e^{β}), which refers to the multiplicative factor by which the predicted probability of choosing the first option rather than choosing the second option changes for every one unit increase in the predictor variable.

2.3.3 | Decision confidence and preference

We conducted a similar analysis using the GMM for participants' preference in their decision by combining their choice with their degree of confidence. Preference was calculated by weighting each choice response by the amount of confidence associated with that choice (Hamm & Yang, 2017; see Appendix B).

All tests were two-sided and $p < .05$ was considered statistically significant. Data were analyzed using SPSS software (version 27).

3 | RESULTS

The study took a median of 5.6 min to complete. Our sample comprised 302 physicians and 733 general population participants. Fifty-five participants (5% of the sample) failed the attention check question (i.e., unable to identify "Electrician" as the correct response) and were removed from all further analyses. The final sample consisted of 985 participants: 282 physicians and 703 members of the general population.

3.1 | Differences between samples

Demographic differences between general population and physicians are displayed in Table 1. The physicians were significantly older, more likely male, more educated, had more household income, and were more likely employed (all *p*'s ≤ .002). Controlling for age, gender, education, household income and employment status did not change our results and will not be discussed further.

TABLE 1 Participant characteristics split by sample

Characteristic	Percentage of sample: General population ($n = 703$)	Physician ($n = 282$)	*p*-Value[a]
Age (*SD*)	47.1 (13.6)	49.7 (11.4)	.002
Gender			<.001
Female	64.4%	35.8%	
Male	35.6%	64.2%	
Education			<.001
Less than a high school diploma	3.0%	0.0%	
High school graduate or equivalent	9.1%	0.0%	
Trade or vocational degree	11.7%	0.0%	
Some college/university	8.8%	0.0%	
Associates degree	1.8%	0.0%	
Bachelor's degree	42.4%	20.6%	
Master's degree	12.8%	4.6%	
Professional degree	8.1%	63.5%	
Doctorate	2.3%	11.3%	
Household income			<.001
Less than $20,000	1.4%	0.0%	
$20,000–$29,999	4.1%	0.0%	
$30,000–$39,999	3.4%	0.0%	
$40,000–$49,999	5.0%	1.1%	
$50,000–$69,999	7.4%	0.0%	
$70,000–$99,999	16.8%	5.0%	
$100,000–$199,999	35.8%	18.1%	
$200,000 or more	16.6%	47.9%	
Prefer not to say	9.4%	28.0%	
Employment status			<.001
Employed full time (38 or more hours per week)	42.0%	53.9%	
Employed part time (up to 38 hours per week)	31.2%	24.5%	
Unemployed and currently looking for work	0.7%	0.0%	
Unemployed and not currently looking for work	0.6%	0.0%	
Retired	9.4%	0.0%	
Student	1.0%	0.0%	
Homemaker	3.6%	0.0	
Self-employed	9.7%	21.6%	
Unable to work	2.0%	0.0%	

[a]Between-groups test by either analysis of variance for continuous variables or $\chi 2$ for categorical variables.

3.2 | Status quo bias

Table 2 displays the proportion of times each option in each scenario was chosen. The first analysis revealed that, across all three scenarios, there was evidence for a status quo bias among physicians: 10 out of 12 chi-square tests comparing the SQ condition against the NSQ and ASQ conditions were significant (adjusted to 6 out of 12 when applying the Holm-Bonferroni correction). There was also evidence for a status quo bias among the general population: 7 out of 12 chi-square tests were significant (remaining at 7 out of 12 when applying the Holm-Bonferroni correction).

3.3 | Amplification of the status quo bias

Figure 2 displays the proportion of times the first option was selected split by *Status Quo Option*, *Sample*, and *Scenario Type*. The main effects model of the second analysis, reported in Table 3, revealed significant main effects for *Status Quo Option*, *Sample*, *Scenario Type*, and the positioning of the option. The odds of choosing the first option (instead of the second) were 1.54 times more likely for those presented with a status quo option compared to those not presented with one and 1.23 times more likely for physicians than the general population.

TABLE 2 The proportion of times each option in each scenario was chosen

Scenario	Scenario option	Choice for this option when … … it was the status quo option (SQ)	… there was no status quo option (NSQ)	… it was the alternative to the status quo option (ASQ)	*p*-Values $p_{SQ\text{-}NSQ}$[a]	$p_{SQ\text{-}ASQ}$[a]
Sample: Physicians						
Medical	Fatigue side effect	74/100 = 74%	35/90 = 39%	14/92 = 15%	<.001*	<.001*
	Itching side effect	78/92 = 85%	55/90 = 61%	26/100 = 26%	<.001*	<.001*
Financial	Medium risk	80/95 = 84%	80/90 = 89%	66/97 = 68%	0.35	0.008*
	High risk	31/97 = 32%	10/90 = 11%	15/95 = 16%	<.001*	0.008*
Academic	Specialist journal	43/88 = 49%	27/90 = 30%	36/104 = 35%	0.01*	0.04*
	Multidisciplinary journal	68/104 = 65%	63/90 = 70%	45/88 = 51%	0.49	0.04*
Sample: General population						
Medical	Fatigue side effect	145/231 = 63%	109/240 = 45%	66/232 = 28%	<.001*	<.001*
	Itching side effect	166/232 = 72%	131/240 = 55%	86/231 = 37%	<.001*	<.001*
Financial	Medium risk	186/235 = 79%	199/240 = 83%	173/228 = 76%	0.29	0.91
	High risk	55/228 = 24%	41/240 = 17%	49/235 = 21%	0.06	0.94
Academic	Specialist journal	112/242 = 46%	70/240 = 29%	59/221 = 27%	<.001*	<.001*
	Multidisciplinary journal	162/221 = 73%	170/240 = 71%	130/242 = 54%	0.55	<.001*
Collapsing across samples						
Medical	Fatigue side effect	219/331 = 66%	144/330 = 44%	80/324 = 25%	<.001*	<.001*
	Itching side effect	244/324 = 75%	186/330 = 56%	112/331 = 34%	<.001*	<.001*
Financial	Medium risk	266/330 = 81%	279/330 = 85%	239/325 = 74%	0.18	0.03*
	High risk	86/325 = 26%	51/330 = 15%	64/330 = 19%	<.001*	0.03*
Academic	Specialist journal	155/330 = 47%	97/330 = 29%	95/325 = 29%	<.001*	<.001*
	Multidisciplinary journal	230/325 = 71%	233/330 = 71%	175/330 = 53%	0.79	<.001*
Collapsing across samples and scenarios						
		1200/1965 = 61%	990/1980 = 50%	765/1965 = 39%	<.001*	<.001*

Note: SQ = the option was the status quo option. NSQ = there was no status quo option. ASQ = the option was the *alternative* to the status quo option. For example, in the medical scenario, there were two options: one with a fatigue side effect and one with an itching side effect. When the fatigue side effect option was the status quo option (and thus the itching side effect option was the alternative to the status quo), the fatigue side effect option was selected 74% of the time (and the itching option selected 26% of the time). When there was no status quo option designated the fatigue side effect option was selected 39% of the time (and the itching option selected 61% of the time). When the fatigue side effect option was the alternative to the status quo (and thus the itching side effect option was the status quo), the fatigue side effect option was selected 15% of the time (and the itching option selected 85% of the time).

[a]Analysis by Pearson chi-square two-tailed tests. The unit of analysis was the percentage of participants choosing an option when it was the status quo versus when there was no status quo option (sixth column) or versus when it was the alternative to the status quo option (seventh column). For example, the first chi-square analysis compares the 74% of choices for the fatigue side effect option when it was the status quo option with 39% of choices for it when there was no status quo option. The analysis revealed a significant difference, $\chi^2 = 23.62$, $p < .001$.

[*]Indicates that the *p*-value was less than .05.

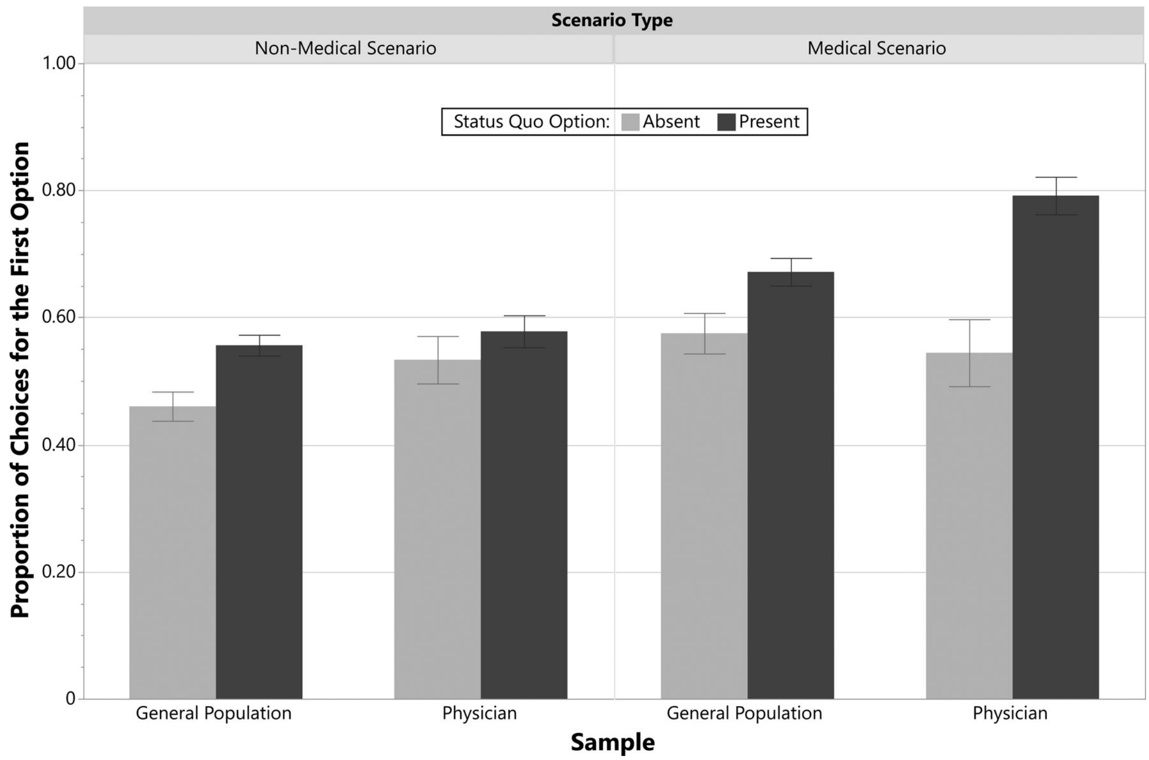

FIGURE 2 Proportion of choices for the first option by presence or absence of status quo option, sample, and scenario type. Error bars represent the standard error

TABLE 3 Results of generalized linear models examining main effects and interactions on first option chosen

Dependent variable: First option chosen				
Model	**#1: Main effects**		**#2: Interactions**	
Predictor	*β (SE)*	e^{β}	*β (SE)*	e^{β}
Constant	0.71 (0.17)***	2.03	0.66 (0.19)**	1.94
Status quo option	0.43 (0.08)***	1.54	0.43 (0.17)**	1.54
Sample	0.21 (0.08)*	1.23	−0.11 (0.25)	0.89
Scenario type	−0.53 (0.08)***	0.59	−0.46 (0.16)**	0.63
Scenario type x Sample			0.39 (0.31)	1.48
Status quo option x Scenario type			−0.04 (0.20)	0.96
Status quo option x Sample			0.72 (0.32)*	2.06
Status quo option x Sample x Scenario type			−0.91 (0.39)*	0.40
Option order	−0.28 (0.08)***	0.76	−0.27 (0.08)***	0.76
Scenario order = 6	0.08 (0.14)	1.09	0.08 (0.14)	1.09
Scenario order = 5	0.06 (0.13)	1.06	0.06 (0.13)	1.06
Scenario Order = 4	0.21 (0.13)	1.24	0.22 (0.13)	1.24
Scenario order = 3	0.10 (0.13)	1.10	0.10 (0.13)	1.11
Scenario order = 2	−0.18 (0.13)	0.84	−0.17 (0.13)	0.84
Scenario order = 1[a]				
N	2955		2955	

[a]This coefficient is set to zero because it is redundant. Note that, in Model #2, the main effect and two-way interaction terms are not overall effects but, rather, effects for when the other predictors are 0.
*Corresponds to $p < .05$, **corresponds to $p < .01$, and ***corresponds to $p < .001$.

The interaction model revealed a significant three-way interaction between *Status Quo Option*, *Sample*, and *Scenario Type* ($p = .02$). This interaction indicates that the status quo bias was different for physicians (vs. general population) when making decisions in the medical (vs. non-medical) scenario. Inspection of Figure 2 suggests that this interaction is due to an amplification of the status quo bias among physicians since their tendency to show the status quo bias in the medical scenario (i.e., the difference between the seventh and eight bars) was much larger than the status quo bias in any of the other sample/scenario combinations. This observation is supported by the significant two-way interaction between *Status Quo Option* and *Sample* reported for Model 2, which reflects the interaction when the other predictors are 0. Since *Scenario Type* was coded 0 = medical, the significant two-way interaction between *Status Quo Option* and *Sample* indicates that, for the medical scenario, the status quo bias was stronger for physicians than the general population (also see Table 3).

The analysis of participant's strength of preference revealed the same pattern and significance of results, including the three-way interaction ($p = .02$). Not only was there an amplification of the status quo bias for physicians in the medical scenario but the strength of this preference was also stronger for physicians. This analysis is reported in full in Appendix B.

4 | DISCUSSION

Experts often review a decision made by a prior expert. This previous decision becomes the status quo option. Our study reveals that physicians show an *amplification* of the status quo bias compared to non-physicians making a decision in the medical domain. This amplification is not present when making decisions in non-expert domains. The amplification of the status quo bias was reflected in both physicians' choice of treatment and their higher degree of confidence in that decision.

4.1 | Theoretical contributions

We investigated the proposition that the strength of the status quo bias might depend on the expertise the decision-maker has in the choice domain. This is important because it suggests that research conducted with the general population in non-expert domains could misestimate the strength of the status quo bias. Prior research investigating reactions of advisors to conflict of interest disclosures has revealed that lay advisors and expert advisors may react differently to the same scenario (Sah, 2019). Similarly, we show that lay and expert samples respond differently to status quo options. By recruiting actual physicians and applying a medical scenario, we employed what Harrison and List (Harrison & List, 2004) call a "framed field experiment" in which the nature of the subject pool and task are relevant to the field context. Framed field experiments are more helpful in understanding how experts behave than generalizing from the behavior of lay participants.

At least three potential (non-exclusive) explanations for the amplification of the status quo bias for physicians in the medical scenario exist. One explanation is loss aversion (Kahneman & Tversky, 2000). According to this explanation, the potential losses (versus gains) caused by moving from the status quo reference point are evaluated as psychologically worse. It may be that physicians confronted with the medical scenario are much better equipped than those less familiar with the context to anticipate and imagine the potential losses from moving away from the status quo option. For example, a poor patient outcome could result both in an upset patient as well as disgruntled colleague from whom they might fear retribution or other consequences for overriding (Broom et al., 2016).

A second explanation for the amplified status quo bias is regret aversion (Loomes & Sugden, 1982). According to this explanation, potential feelings of regret are minimized by inaction and maintaining the status quo. It may be that physicians and members of the general population differ in their anticipated regret from moving from the status quo. One relevant variable is the degree to which a decision-maker is more sensitive to potential losses such as negative side effects ("prevention focused") versus more sensitive to potential gains such as improvements in wellbeing ("promotion-focused"; Chernev, 2004). Although physicians' decision-making styles vary (Eisenberg, 1979) it may be that this group—mandated to "first, do no harm"—are overall more prevention-focused, which may relate to less risk taking and a higher tendency to maintain the status quo (Veazie et al., 2014).

A third explanation for the amplified status quo bias is omission bias (Ritov & Baron, 1992). According to this explanation, people have a tendency to prefer harmful omissions over equally harmful commissions. The status quo bias requires inaction to maintain the status quo whereas changing the status quo requires action. People are more likely to engage in acts of omission to avoid moral responsibility to others for negative outcomes because of a (false) belief that omission is not a causal act (Spranca et al., 1991). Physicians may simply not wish to dismiss a prior colleague's decision, trusting that their prior colleague did their due diligence for the patient and thus relying on them. Indeed, a common practice of experts is to rely on others to assist them in making decisions (Shanteau, 1988).

4.2 | Practical implications

The existence of an amplification of the status quo bias among physicians implies that the treatment patients receive may be suboptimal, which would have negative ramifications for their wellbeing. Prior research reveals that primary advisors often give lower quality advice when they are aware that a second advisor may be reviewing their decision (Sah & Loewenstein, 2015). Thus, it is important that physicians not fall prey to the status quo bias just because their colleague has reviewed the patient themselves and decided on a treatment.

How could this amplification of the status quo bias be reduced or eliminated? One approach is to effectively "blind" physicians to prior treatment decisions in order to produce an independent second opinion (Rader et al., 2015). Prior research has revealed that offering an initial tentative diagnosis to medical students who are examining patient scenarios strongly influences their accuracy (Graber et al., 2005). Blinding of initial diagnoses or treatment decisions (at least on first history and examination of a new patient) would effectively limit physicians' tendency to seek out evidence that only confirms the initial diagnosis (Kahneman & Tversky, 2000). Extending the benefits of blinding further, if primary physicians are unaware that their first treatment decision will be reviewed by another, it may increase the quality of their decision (Sah & Loewenstein, 2015).

Another intervention is to ask physicians to "consider the opposite" when they finalize their treatment plans (see Graber et al., 2012 for a review). Basically, to consider reasons why the preferred option may be wrong. This reasoning has been successful in other contexts; for example, experienced car mechanics' price estimate of a car was more accurate when first asked to provide reasons for why an initially presented anchor value might be inappropriate (Mussweiler et al., 2000). Admittedly, these suggestions all take more time to do, which is hard for physicians who already feel overburdened.

4.3 | Constraints on generality

Our sample was drawn from an Australian population. We believe that our findings would replicate with samples drawn from other countries so long as those populations were similarly susceptible to loss aversion, regret aversion, and omission bias. Research suggests that loss aversion is associated with a culture's degree of individualism, power distance, and masculinity (Wang et al., 2017). Therefore, the present findings are most likely to be replicated in Anglo-American cultures.

Our sample of "experts" focused specifically on physicians who are expert in the context of medical diagnosis and treatment. We ignored other physician-related factors (e.g., specialty) that could influence physician decision-making (Hajjaj et al., 2010). Our theoretical explanation for the results suggests that our observations should also extend to other experts, such as financial investors and professors, making decisions in their own domains of expertise. However, it could be the case that physicians are different from other experts. For example, in Western medical practice, treatment decisions are often the product of joint decision-making processes between the medical team and patient (Stiggelbout et al., 2012). There was some evidence of this in the comments left by physicians at the end of our study. For example, one palliative care physician with 15 years of experience wrote: "Decision-making in health care is always made in consultation with patients, families and other health professionals and seeks to reflect a balance between patient values and preferences, and accurate medical information of likely outcomes." This shared decision-making approach may make physicians more likely to go with the status quo than other experts.

The key manipulation in our studies was to clearly make one option the status quo. As in prior research, in our scenarios the status quo option was always presented first. One could argue that the status quo or a default option is naturally described first but this ordering may also have contributed to our observations. We emphasized in the scenarios that there were no costs for switching including monetary losses, regrets, or relationship consequences. In real world replications, loss aversion, regret aversion, omission bias, as well as other additional costs and effort may lead to an even greater amplification of the status quo bias.

Our scenarios were selected to be generally representative of a typical decision an expert would face in a medical, financial, and academic domain. However, given that we used just one scenario for each domain, it is possible that our results are due to specific aspects of the scenarios used (Wells & Windschitl, 1999). Moreover, our study relied on relatively simple hypothetical scenarios with binary options and no objectively correct option. The status quo bias may potentially have been *amplified* had there been greater cognitive complexity and decisions with more than two options (Kempf & Ruenzi, 2006). Conversely, the status quo bias may potentially have been *attenuated* had the status quo option been an objectively incorrect option or presented second.

We have no reason to believe that the results depend on other characteristics of the participants, materials, or context.

4.4 | Future research

Our findings need to be replicated in other expert settings with a broader sampling of decision situations and options to allow us to better understand how the amplification of the status quo bias affects professional decision-making, and why. For example, it may be that experts use their domain-specific knowledge to choose in anticipation of future possibilities unforeseen by non-experts. Other potentially interesting moderators include the number of advisors, features of the advisor(s), and the amount of interaction between the decision-maker and the advisor(s) (Bonaccio & Dalal, 2006).

5 | CONCLUSION

Any type of decision-making bias in professional decision-making domains alters recommendations and practice. In medicine, it may result in potential suboptimal patient care and greater healthcare costs. The status quo bias is one of several cognitive biases. Importantly, our study highlights that physicians not only fall prey to this bias across multiple domains, but they have an *amplification* of the status quo bias when they make decisions in the medical domain, their area of expertise.

ACKNOWLEDGMENTS

Financial support for this study was provided entirely by Hummingbird Insight (https://hummingbirdinsight.com.au/). The funding agreement ensured the authors' independence in designing the study, interpreting the data, writing, and publishing the report.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ENDNOTE

[1] In this paper, we use the word "bias" in the same vein as it has been used in the judgment and decision making literature with reference to cognitive biases. Bias does not imply that the choice is correct or incorrect, but rather that another factor—such as the presence of a default option—has a systematic and predictable effect on behavior.

DATA AVAILABILITY STATEMENT

Data and analysis output can be found at https://osf.io/8rch5/

ORCID

Adrian R. Camilleri https://orcid.org/0000-0002-9795-9597
Sunita Sah https://orcid.org/0000-0003-1671-4414

REFERENCES

Blumenthal-Barby, J. S., & Krieger, H. (2015). Cognitive biases and heuristics in medical decision making: A critical review using a systematic search strategy. *Medical Decision Making*, *35*(4), 539–557.

Bonaccio, S., & Dalal, R. S. (2006). Advice taking and decision-making: An integrative literature review, and implications for the organizational sciences. *Organizational Behavior and Human Decision Processes*, *101*(2), 127–151.

Broom, A., Broom, J., Kirby, E., & Adams, J. (2016). The social dynamics of antibiotic use in an Australian hospital. *Journal of Sociology*, *52*(4), 824–839.

Burmeister, K., & Schade, C. (2007). Are entrepreneurs' decisions more biased? An experimental investigation of the susceptibility to status quo bias. *Journal of Business Venturing*, *22*(3), 340–362.

Chernev, A. (2004). Goal orientation and consumer preference for the status quo. *Journal of Consumer Research*, *31*(3), 557–565.

Dawson, N. V., & Arkes, H. R. (1987). Systematic errors in medical decision making: Judgment limitations. *Journal of General Internal Medicine*, *2*, 183–187.

Eidelman, S., & Crandall, C. S. (2012). Bias in favor of the status quo. *Social and Personality Psychology Compass*, *6*(3), 270–281.

Eisenberg, J. M. (1979). Sociologic influences on decision-making by clinicians. *Annals of Internal Medicine*, *90*(6), 957–964.

Graber, M. L., Franklin, N., & Gordon, R. (2005). Diagnostic error in internal medicine. *Archives of Internal Medicine*, *165*, 1493–1499.

Graber, M. L., Kissam, S., Payne, V. L., Meyer, A. N., Sorensen, A., Lenfestey, N., Tant, E., Henriksen, K., Labresh, K., & Singh, H. (2012). Cognitive interventions to reduce diagnostic error: A narrative review. *BMJ Quality & Safety*, *21*(7), 535–557.

Gubaydullina, Z., Hein, O., & Spiwoks, M. (2011). The status quo bias of bond market analysts. *Journal of Applied Finance & Banking*, *1*(1), 31–51.

Hajjaj, F. M., Salek, M. S., Basra, M. K., & Finlay, A. Y. (2010). Non-clinical influences on clinical decision-making: A major challenge to evidence-based practice. *Journal of the Royal Society of Medicine*, *103*(5), 178–187.

Hamm, R. M., & Yang, H. (2017). Alternative lens model equations for dichotomous judgments about dichotomous criteria. *Journal of Behavioral Decision Making*, *30*(2), 527–532.

Harrison, G. W., & List, J. A. (2004). Field experiments. *Journal of Economic Literature*, *42*(4), 1009–1055.

Holm, S. (1979). A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics*, *6*(2), 65–70.

Hutton, R. J., & Klein, G. (1999). Expert decision making. *Systems Engineering: The Journal of The International Council on Systems Engineering*, *2*(1), 32–45.

Itzkowitz, J., & Itzkowitz, J. (2017). Name-based behavioral biases: Are expert investors immune? *Journal of Behavioral Finance*, *18*(2), 180–188.

Johnson, E. J., & Goldstein, D. G. (2003). Do defaults save lives? *Science*, *302*(5649), 1338–1339.

Johnson, E. J., Hershey, J., Meszaros, S., & Kunreuther, H. (1993). Framing, probability distorsions, and insurance decisions. *Journal of Risk and Uncertainty*, *7*, 15–36.

Kahneman, D., Slovic, S. P., Slovic, P., & Tversky, A. (1982). *Judgment under uncertainty: Heuristics and biases*. Cambridge University Press.

Kahneman, D., & Tversky, A. (2000). *Choices, values, and frames*. Cambridge University Press.

Kempf, A., & Ruenzi, S. (2006). Status quo bias and the number of alternatives: An empirical illustration from the mutual fund industry. *Journal of Behavioral Finance*, *7*(4), 204–213.

Kim, H. W., & Kankanhalli, A. (2009). Investigating user resistance to information systems implementation: A status quo bias perspective. *MIS Quarterly*, *33*(3), 567–582.

Klein, G. (2008). Naturalistic decision making. *Human Factors*, *50*(3), 456–460.

Klein, J. G. (2005). Five pitfalls in decisions about diagnosis and prescribing. *BMJ*, *330*, 781–783.

Lakens, D., & Caldwell, A. R. (2021). Simulation-based power analysis for factorial analysis of variance designs. *Advances in Methods and Practices in Psychological Science*, *4*(1), 2515245920951503.

LeBlanc, V. R., Norman, G. R., & Brooks, L. R. (2001). Effect of a diagnostic suggestion on diagnostic accuracy and identification of clinical features. *Academic Medicine*, *76*(10), S18–S20.

Loomes, G., & Sugden, R. (1982). Regret theory: An alternative theory of rational choice under uncertainty. *The Economic Journal*, *92*(368), 805–824.

Maxwell, S. E., Kelley, K., & Rausch, J. R. (2008). Sample size planning for statistical power and accuracy in parameter estimation. *Annual Review of Psychology*, *59*, 537–563.

MemorialCare. (2021). *A Second Opinion That Saved One Nurse From Life-Altering Surgery*. Retrieved from https://www.memorialcare.org/blog/second-opinion-saved-one-nurse-life-altering-surgery

Mussweiler, T., Strack, F., & Pfeiffer, T. (2000). Overcoming the inevitable anchoring effect: Considering the opposite compensates for selective accessibility. *Personality and Social Psychology Bulletin*, *26*(9), 1142–1150.

Rader, C. A., Soll, J. B., & Larrick, R. P. (2015). Pushing away from representative advice: Advice taking, anchoring, and adjustment. *Organizational Behavior and Human Decision Processes*, *130*, 26–43.

Redelmeier, D. A., & Shafir, E. (1995). Medical decision making in situations that offer multiple alternatives. *JAMA*, *273*(4), 302–305.

Ritov, I., & Baron, J. (1992). Status-quo and omission biases. *Journal of Risk and Uncertainty*, *5*(1), 49–61.

Sah, S. (2019). Conflict of interest disclosure as a reminder of professional norms: Clients first! *Organizational Behavior and Human Decision Processes*, *154*, 62–79.

Sah, S., & Loewenstein, G. (2015). Conflicted advice and second opinions: Benefits, but unintended consequences. *Organizational Behavior and Human Decision Processes*, *130*, 89–107.

Salas, E., Rosen, M. A., & Diaz Granados, D. (2010). Expertise-based intuition and decision making in organizations. *Journal of Management*, *36*(4), 941–973.

Samuelson, W., & Zeckhauser, R. (1988). Status quo bias in decision making. *Journal of Risk and Uncertainty*, *1*(1), 7–59.

Saposnik, G., Redelmeier, D., Ruff, C. C., & Tobler, P. N. (2016). Cognitive biases associated with medical decisions: A systematic review. *BMC Medical Informatics and Decision Making*, *16*(1), 138.

Shanteau, J. (1988). Psychological characteristics and strategies of expert decision makers. *Acta Psychologica*, *68*(1–3), 203–215.

Shanteau, J. (1992a). Competence in experts: The role of task characteristics. *Organizational Behavior and Human Decision Processes*, *53*(2), 252–266.

Shanteau, J. (1992b). How much information does an expert use? Is it relevant? *Acta Psychologica*, *81*(1), 75–86.

Sommet, N., & Morselli, D. (2017). Keep calm and learn multilevel logistic modeling: A simplified three-step procedure using stata, R, Mplus, and SPSS. *International Review of Social Psychology*, *30*, 203–218.

Spranca, M., Minsk, E., & Baron, J. (1991). Omission and commission in judgment and choice. *Journal of Experimental Social Psychology*, *27*(1), 76–105.

Stiggelbout, A. M., Van der Weijden, T., De Wit, M. P., Frosch, D., Légaré, F., Montori, V. M., Trevena, L., & Elwyn, G. (2012). Shared decision making: Really putting patients at the centre of healthcare. *BMJ*, *344*, e256.

Veazie, P. J., McIntosh, S., Chapman, B. P., & Dolan, J. G. (2014). Regulatory focus affects physician risk tolerance. *Health Psychology Research*, *2*(2), 85–88.

Wang, M., Rieger, M. O., & Hens, T. (2017). The impact of culture on loss aversion. *Journal of Behavioral Decision Making*, *30*(2), 270–281.

Wells, G. L., & Windschitl, P. D. (1999). Stimulus sampling and social psychological experimentation. *Personality and Social Psychology Bulletin*, *25*(9), 1115–1125.

How to cite this article: Camilleri, A. R., & Sah, S. (2021). Amplification of the status quo bias among physicians making medical decisions. *Applied Cognitive Psychology*, *35*(6), 1374–1386. https://doi.org/10.1002/acp.3868

APPENDIX A: SCENARIOS

Medical scenario: Status quo option absent

Imagine you are an experienced doctor who has just started your morning shift at the hospital. A new patient who arrived overnight has been diagnosed with a particular disease. There are two equally effective treatments available for this disease, but they have different side effects.

Which treatment do you prefer?

- Choose Treatment A, which has a 90% chance of fatigue, 40% chance of insomnia, and 5% chance of memory loss.
- Choose Treatment B, which has an 85% chance of itching, 45% chance of dizziness, and 4% chance of hallucinations.

Medical scenario: Status quo option present

Imagine you are an experienced doctor who has just started your morning shift at the hospital. A new patient who arrived overnight has been diagnosed with a particular disease. There are two equally effective treatments available for this disease, but they have different side effects. The overnight admission doctor had initiated Treatment A but you can change this without cost.

Which treatment do you prefer?

- Retain Treatment A, which has a 90% chance of fatigue, 40% chance of insomnia, and 5% chance of memory loss.
- Shift to Treatment B, which has an 85% chance of itching, 45% chance of dizziness, and 4% chance of hallucinations.

Financial scenario: Status quo option absent

Imagine you are an experienced financial analyst working at a firm responsible for investing other people's money. A new client comes in with a significant amount of funds to invest. You are considering two different portfolios.

Which portfolio do you prefer?

- Choose Portfolio A, which is moderate risk: Over a year's time, the portfolio has a 0.5 chance of increasing 30% in value, a 0.2 chance of being unchanged, and a 0.3 chance of declining 20% in value.
- Choose Portfolio B, which is high risk: Over a year's time, the portfolio has a 0.4 chance of doubling in value, a 0.3 chance of being unchanged, and a 0.3 chance of declining 40% in value.

Financial scenario: Status quo option present

Imagine you are an experienced financial analyst working at a firm responsible for investing other people's money. A new client comes in with a significant amount of funds to invest. A significant portion of this portfolio is currently invested in moderate risk Portfolio A. You are deliberating whether to leave the portfolio intact or to change it to high risk Portfolio B. The tax and commission consequences of any change are insignificant.

Which portfolio do you prefer?

- Retain Portfolio A, which is moderate risk: Over a year's time, the portfolio has a 0.5 chance of increasing 30% in value, a 0.2 chance of being unchanged, and a 0.3 chance of declining 20% in value.
- Shift to Portfolio B, which is high risk: Over a year's time, the portfolio has a 0.4 chance of doubling in value, a 0.3 chance of being unchanged, and a 0.3 chance of declining 40% in value.

Academic scenario: Status quo option absent

Imagine that you are a well-respected university professor who is at the top of your field. You are working closely with a PhD student on a topic in your area of expertise. After nearly 2 years of work, your student sends you the final draft of your joint research, which is now ready for submission to an academic journal. There are two journals you have been considering.

Which journal will you send the manuscript to for publication?

- Submit the manuscript to Journal A, which is a specialist journal that publishes only the best research in your field. This highly selective journal publishes only 5% of the manuscripts it receives. The journal's "impact factor," which reflects the prestige of the journal, is among the top two in your specific field. Publishing in this journal would be noticed by several people within your university department.

- Submit the manuscript to Journal B, which is a multidisciplinary journal that publishes excellent research in a broad range of different fields. This selective journal publishes only 10% of the manuscripts it receives. The journal's "impact factor," which reflects the prestige of the journal within its particular field, is among the top five in the broader field. Publishing in this journal would be noticed by many people across multiple departments at your university.

Academic scenario: Status quo option present

Imagine that you are a well-respected university professor who is at the top of your field. You are working closely with a PhD student on a topic in your area of expertise. After nearly 2 years of work, your student sends you the final draft of your joint research, which is now ready for submission to an academic journal. There are two journals you have been considering. In the email, your student notes that they have already formatted the manuscript to fit the formatting style of Journal A and created the online account required to submit to Journal A. However, modern software means you can change the formatting and this decision with minimal effort.

Which journal will you send the manuscript to for publication?

- Proceed with submitting the manuscript to Journal A, which is a specialist journal that publishes only the best research in your field. This highly selective journal publishes only 5% of the manuscripts it receives. The journal's "impact factor," which reflects the prestige of the journal, is among the top two in your specific field. Publishing in this journal would be noticed by several people within your university department.
- Submit the manuscript instead to Journal B, which is a multidisciplinary journal that publishes excellent research in a broad range of different fields. This selective journal publishes only 10% of the manuscripts it receives. The journal's "impact factor," which reflects the prestige of the journal within its particular field, is among the top five in the broader field. Publishing in this journal would be noticed by many people across multiple departments at your university.

APPENDIX: DECISION CONFIDENCE

We created a 10-point preference score from the choice and confidence data as follows:

Choice	Confidence	Preference
Second option	Extremely confident	1
Second option	Very confident	2
Second option	Moderately confident	3
Second option	Slightly confident	4
Second option	Not at all confident	5
First option	Not at all confident	6
First option	Slightly confident	7
First option	Moderately confident	8
First option	Very confident	9
First option	Extremely confident	10

Figure B1 Displays average preference split by *Status Quo Option*, *Sample*, and *Scenario Type*. The pattern of results is very similar to that from the choice dependent variable reported in the manuscript (c.f. Figure 2). In order to statistically analyze this data, we conducted generalized mixed effects models (GMMs). Given that we were treating the preference data as continuous, we assumed a normal probability distribution with identity link function. The results of the GMMs are presented in Table A1. The analysis revealed main effects for *Status Quo Option*, *Sample*, *Scenario Type*, *Option Order*, and the three-way interaction between *Status Quo Option*, *Sample*, and *Scenario type*. The same pattern and significance of results remained when we controlled for age, gender, education, household income, and employment status.

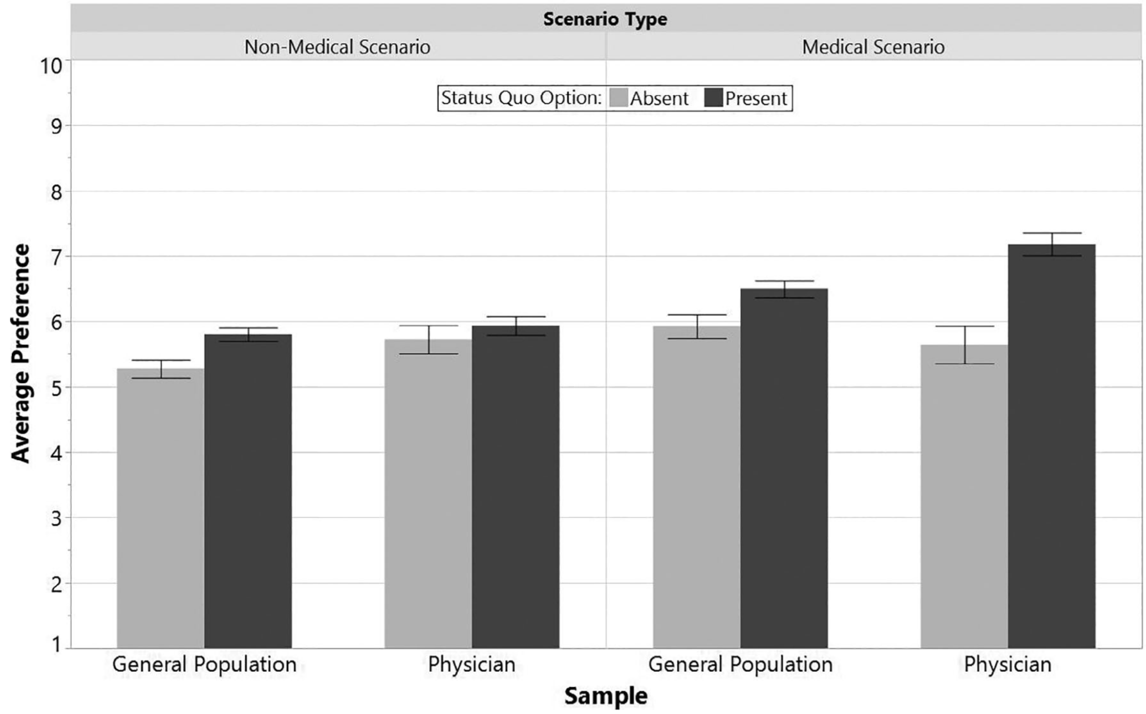

FIGURE B1 Average preference by presence or absence of status quo option, sample, and scenario type. Error bars represent the standard error

TABLE B1 Results of generalized linear models examining main effects and interactions on preference

Dependent variable: Preference		
Model	**#1: Main effects**	**#2: Interactions**
Predictor	β (*SE*)	β (*SE*)
Constant	6.41 (0.23)***	6.36 (0.27)***
Status quo option	0.58 (0.11)***	0.59 (0.23)*
Sample	0.27 (0.12)*	−0.27 (0.36)
Scenario type	−0.72 (0.11)***	−0.64 (0.23)**
Scenario type x Sample		0.69 (0.44)
Status quo option x Scenario type		−0.06 (0.28)
Status quo option x Sample		0.94 (0.43)*
Status quo option x Sample x Scenario type		−1.22 (0.54)*
Option order	−0.37 (0.11)**	−0.36 (0.11)**
Scenario order = 6	0.11 (0.19)	0.10 (0.19)
Scenario order = 5	0.09 (0.18)	0.09 (0.18)
Scenario order = 4	0.34 (0.18)	0.35 (0.18)
Scenario order = 3	0.18 (0.19)	0.15 (0.19)
Scenario order = 2	−0.16 (0.18)	−0.15 (0.18)
Scenario order = 1[a]		
N	2955	2955

[a]This coefficient is set to zero because it is redundant.
*Corresponds to $p < .05$, **corresponds to $p < .01$, and ***corresponds to $p < .001$.