Opportunity cost neglect in public policy

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\section*{A R T I C L E   I N F O}

\textbf{Article history:} 
Received 14 January 2019  
Revised 9 December 2019  
Accepted 13 December 2019  
Available online xxx

\textbf{JEL Classification:}  
C9  
D1  
H4  
H5

\textbf{Keywords:}  
Opportunity cost neglect  
Policymaking  
Experts  
Decision-making  
Bias  
Replication

\section*{A B S T R A C T}

Opportunity cost is the foregone benefit of options not chosen. If opportunity costs are neglected in decisions about public policy, there is a high risk that the best options are overlooked. We study opportunity cost neglect in public policy in experiments with members of the general public in Sweden and international experts on priority setting in health care (\(n = 957\)). We find strong evidence of opportunity cost neglect in public policy, where participants who acted in the role of policy makers were between six and ten percentage points less likely to invest in a public health program when reminded about opportunity costs (money could fund other health programs). To our surprise, we failed to confirm an effect consistent with opportunity cost neglect in private consumption; but exploratory analyses revealed a substantial age effect that reconciles our findings with previous literature. Young participants showed opportunity cost neglect, while the effect was reversed for old participants. The implications of opportunity cost neglect for public policy are substantial, including misallocation of public resources and an artificially high demand for public spending.

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\section{1. Introduction}

When the unlimited wants of individuals or society press against limited resources, some wants must go unsatisfied. In order to ensure that the best options are chosen, policy makers must carefully consider the opportunity costs of different policy options, i.e. the foregone benefits of options not chosen. From a normative perspective, this is a fundamental principle of choice (Thaler, 1980). However, both theoretical and empirical evidence suggest that opportunity costs are neglected in practice, because they are implicit at the point of decision-making (Frederick et al., 2009; Plantinga et al., 2018; Read et al., 2017; Spiller, 2011, 2019; Thaler, 1980). To date, this literature has focused on private consumption decisions, such as buying a new stereo or tablet, and there is no evidence yet of neglect of opportunity cost in other domains of decision-making.

In this paper, we investigate opportunity cost neglect in public policy by focusing on a specific behavioral bias that has previously only been documented in the context of private consumption. We design an online survey experiment building on an established choice paradigm (Frederick et al., 2009; Reckers-Droog et al., 2019). Using a large diverse sample from the Swedish general population (\(n = 809\)) together with an international sample of experts on priority setting in health care

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https://doi.org/10.1016/j.jebo.2019.12.012  
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We investigate opportunity cost neglect in public health care resource allocation, and benchmark it against the effect in the private domain. We predict that opportunity cost neglect will be stronger in public policy compared to private consumption. There are two main rationales for this: i) Opportunity costs prompted by public spending do not have the salience of opportunity cost prompted by own out-of-pocket spending because the former is passively rather than actively expended (Northcraft and Neale, 1986). Moreover, ii) research on health policy have shown that people often seek to avoid tradeoff thinking in the health domain (Baron and Spranca, 1997; Fiske and Tetlock, 1997; Tinghög and Västfjäll, 2018). Given that engaging in tradeoff thinking is a prerequisite for taking opportunity cost into account when making decisions this lends further support for our prediction.

Opportunity cost neglect arises primarily because individuals tend to be selective in their use of information, focusing on attributes that are salient at the point of decision-making (Frederick et al., 2009; Kahneman and Frederick, 2002; Legrenzi et al., 1993; Slovic, 1972). Because they are implicit by nature opportunity costs may be underweighted when making choices. Opportunity costs may also be viewed as foregone gains rather than to out-of-pocket spending. Following prospect theory, which suggests that the psychological value of losses loom larger than that incurred by equivalent gains, this may further give a reason for why people may underweight opportunity costs. Moreover, inattention to information can be an individual’s rational response aimed at conserving mental energy in the process of evaluating different choice options, for example by creating separate mental accounts for different categories of income and spending (Köszegi and Matejka, 2018). This is known as mental budgeting (Heath and Soll, 1996; Thaler, 1985), which could give rise to category-wise opportunity cost neglect.

Empirical studies have primarily investigated opportunity cost neglect using hypothetical choice scenarios. The main finding is that people are less willing to buy a suggested consumption good when they are reminded about the opportunity costs (money could be spent on other goods), compared to a control condition without a reminder. In Frederick et al. (2009), the proportion of subjects who were willing to purchase a special-priced DVD declined from 75% to 55% when they were reminded about opportunity costs at the point of purchase. Greenberg and Spiller (2016) found similar effects, but at smaller magnitudes, for a range of consumption goods, including magazine subscription and car rental. Read et al. (2017) investigated opportunity cost neglect in the context of intertemporal choice and found that people became more patient when reminded about the opportunity costs of earlier, smaller, rewards than when reminded about the opportunity costs of later, larger rewards. Zhang et al. (2017) and Plantinga et al. (2018) also found evidence for opportunity cost neglect using designs based on Frederick et al. (2009).

Our study makes three important contributions to the literature on opportunity cost neglect. First, we document a robust pattern that is consistent with opportunity cost neglect in public policy. This indicates that needs and desires of the public are expressed with little concern for opportunity costs, which is problematic for public policy. Second, we replicate this effect in an international sample of priority setting experts. Thus, opportunity cost neglect exists also among actual decision-makers used to making tradeoffs in public policy. Third, our study is the first to conduct a conceptual replication of Frederick et al. (2009) using a preregistration protocol, with a prespecified analysis plan. Interestingly, in our main tests we failed to confirm an effect consistent with opportunity cost neglect in the domain of private consumption, but exploratory analyses revealed a substantial age effect that reconciles our findings with existing results in the literature, albeit at a smaller effect size than Frederick et al. (2009). In more detail, we found that young participants, in an age range corresponding to a normal student sample (which was used in Frederick et al.), became aware to ten percentage points less likely to buy a consumption good when reminded about opportunity costs; but for older participants the effect was zero or even reversed. This finding suggests that the effects found by Frederick et al. replicates in a non-student sample of the general adult population, but also that this effect is bounded by age.

2. Study 1 – general population

2.1. Method

The study and main analyses were preregistered at https://aspredicted.org/blind.php?x=3w87kw and the data is available at the project’s OSF repository (https://osf.io/gzrhd/).

2.1.1. Participants

Participants were recruited in collaboration with Origo Group and drawn from a sample of the general adult population previously included in their subject pool. Participants received a small monetary payment upon completion of the survey. Target sample size and ex-post exclusion criteria were determined before data collection begun, see the preregistration for details. The target sample size was chosen for 80% power to detect an effect that was one-fourth of the magnitude observed by Frederick et al. (2009, Study 1). All participants gave their informed consent to participate in the study. Eight hundred nine subjects completed all scenarios in the survey. Mean age was 51.2 years, 50.5% were women, and mean gross

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1 Origo Group (origogroup.com) is a Swedish research company that specializes in data collection for national and international surveys. We hired them to collect a representative sample (based on age and gender in the Swedish adult population) of participants for our online survey experiment.

2 An additional n = 408 subjects were randomized into a third condition, designed to investigate ‘cumulative cost neglect’ (see preregistration for details). These results will not be discussed in the current paper but a summary of the results is available at the project’s OSF repository (https://osf.io/gzrhd/).

income during 2017 was 299,294 Swedish kronor. Half of the respondents (49.6%) had university-level education and 16.1% had some form of educational experience or work experience from health care. There were no differences in background characteristics between conditions except for a small and weakly significant difference in income (Table 1). The sample is close to the Swedish population statistics for age and gender but there is an underrepresentation of individuals with low income and education.

| Table 1 |
| Background characteristics Study 1, by condition. |

<table>
<thead>
<tr>
<th></th>
<th>Opp. cost condition</th>
<th>Control condition</th>
<th>Test condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>406</td>
<td>397</td>
<td></td>
</tr>
<tr>
<td>Female, n (%)</td>
<td>205 (50.5%)</td>
<td>201 (50.6%)</td>
<td>$\chi^2(1) = .002, P = .97$</td>
</tr>
<tr>
<td>Age, mean (SD)</td>
<td>50.9 (17.0)</td>
<td>51.6 (16.7)</td>
<td>$t(801) = .60, P = .55$</td>
</tr>
<tr>
<td>Income, mean (SD)$^a$</td>
<td>286,361 (217,955)</td>
<td>312,521 (214,175)</td>
<td>$t(801) = 1.72, P = .09$</td>
</tr>
<tr>
<td>Education, n (%)</td>
<td>27 (6.7%)</td>
<td>28 (7.1%)</td>
<td>$\chi^2(2) = .06, P = .97$</td>
</tr>
<tr>
<td>- Primary</td>
<td>178 (43.8%)</td>
<td>172 (43.3%)</td>
<td></td>
</tr>
<tr>
<td>- High school</td>
<td>201 (49.5%)</td>
<td>197 (49.6%)</td>
<td></td>
</tr>
<tr>
<td>Work experience from health care, n (%)$^b$</td>
<td>66 (16.3%)</td>
<td>63 (15.9%)</td>
<td>$\chi^2(1) = 0.02, P = .88$</td>
</tr>
</tbody>
</table>

$^a$ Gross income from wage and capital during 2017, in Swedish kronor (SEK), $1$ is approximately 9.18 SEK.

$^b$ Experience from health care includes individuals with work experience or educational experience from any capacity in health care.

2.1.2. Design

Participants were randomly assigned to one of two conditions, either a Control condition where opportunity costs were implicit at the time of choice or an Opportunity cost condition where opportunity costs were explicit at the time of choice. All participants made choices in hypothetical scenarios that concerned either private decisions or public policy. In four of the scenarios participants stated whether they wanted to buy a particular good for private consumption (e.g., a smartphone), and in another four they decided whether to invest in a public health program, taking the role of a health care professional responsible for allocating public health funds. Two additional scenarios concerned the allocation of participants’ time (not part of the current paper). All ten scenarios were presented in random order for each participant.

2.1.3. Materials

Each scenario that concerned private decision-making described an attractive consumption good and the respondent decided whether to buy the good at the stated price. These scenarios where adapted from Frederick et al. (2009). For example, one of the scenarios read:

*Imagine that your local electronics store has a special offer on a new smartphone. You have been thinking about buying a new smartphone for a long time and now you have come across a special offer on a smartphone that you like. It is available at a price of 4200 SEK.*

In scenarios that concerned public policy, participants took the role of a health care decision-maker and decided whether funds should be allocated to a particular health program that was described in attractive terms. For example, one of these scenarios read:

*Imagine that you are a health care decision maker and have been given funds to invest in health-improving interventions. One alternative is to invest in a new cancer-screening program, at an increased cost of 48 million SEK per year. This cancer-screening program will ensure that some cases of cancer are detected at an early stage. Consequently, cancer treatment will be more effective, lives will be saved and human suffering will be avoided.*

A transcript of all scenarios can be found in the online Supplementary Material. At the end of each scenario, participants stated whether they would like to buy the good (or invest in the health program) that was presented in the scenario, selecting either “yes” or “no.” To manipulate opportunity cost consideration, participants in the opp. cost condition were reminded about opportunity costs at the point of decision-making: they chose between “yes” and “no [saving the money for other purchases].” On the contrary, participants in the control condition choose between “yes” and “no.” Everything else was identical across conditions. The manipulation was similar for scenarios that concerned public policy, where participants in the opp. cost condition chose between “yes” and “no [saving the money for other health-improving interventions].” When participants had completed all ten scenarios they answered some additional questions, including a four item mental budgeting scale adapted from Antonides et al. (2011). At the end of the survey, participants were asked about age, gender, education, gross individual income, and whether they had previous work or educational experience from health care.

2.1.4. Statistical analysis

The main analysis plan was specified before data collection begun, see the preregistration for details. We coded participants’ responses as 0 = do not invest in health program, 1 = invest for public policy scenarios; and 0 = do not buy, 1 = buy for private consumption scenarios. The key dependent variable Rate invest in health program is the average (for each participant)
response from the four public policy scenarios, and Rate buy consumption good is constructed in a similar manner based on the four private consumption scenarios. In our main, confirmatory analysis we compared (i) Rate invest in health program and (ii) Rate buy consumption good across the two conditions, using two-sided t-tests. For illustrative purposes we also conducted similar comparisons at the level of each scenario, using chi-squared tests. We then moved on to data-contingent exploratory analyses, investigating the robustness of our main results by (i) including background characteristics as control variables using a regression framework and (ii) testing for order effects (presentation of scenarios). We also illustrate an age effect in private consumption by estimating the mean difference between conditions for Rate buy consumption good at different age levels, controlling for other background characteristics. Finally, to assess the potential effect of mental budgeting propensity as a mediator for opportunity cost neglect, we estimated the correlation between participants’ average response on the mental budgeting scale and Rate invest in health program and Rate buy consumption good in each condition. We then estimated the mean difference between conditions for each of these two dependent variables at different levels of participants’ mental budgeting score.

2.2. Results

2.2.1. Public policy scenarios

Fig. 1 summarizes the result from our main confirmatory test of opportunity cost neglect in public policy. The rate of investment was 79.61% in the control condition and 73.59% in the opp. cost condition, meaning that there was a significant 6.02 percentage point difference between conditions in the expected direction (t(807) = −4.24, P < .001, d = −.30). Subjects were thus on average six percentage points less likely to invest when reminded about opportunity costs in the public policy domain.

We follow up with data-contingent secondary analyses to assess the robustness of this result. The main effect was stable across all background characteristics, including age, gender, education, income, and health care experience. For example, the difference between conditions was of the same sign and significant in subsamples including only men (t(391) = −3.70, P < .001), only women (t(400) = −2.47, P = .01), only subjects below median age (t(394) = −3.63, P < .001), only subjects at or above median age (t(397) = −2.18, P = .03), and for subjects with health care experience (t(123) = −2.09, P = .04). The level of income did not affect the result. See Supplementary Material Tables S1–S2 for underlying regressions and more information. The main effect was also robust to the order in which the scenarios were presented to subjects, meaning that the effect of condition on the probability to invest in a health program was not significantly influenced by the number of scenarios (in the public policy domain) that a subject had already answered (Supplementary Material Fig. S2).

Table 2 shows an exploratory analysis where we disaggregated the results by comparing the proportion who chose to invest in health programs across conditions for each scenario. There is a systematic effect that is consistent with opportunity

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Table 2

<table>
<thead>
<tr>
<th>Scenario</th>
<th>N</th>
<th>Percentage choosing to invest (opp. cost condition)</th>
<th>Percentage choosing to invest (control condition)</th>
<th>χ²(1)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer screening</td>
<td>809</td>
<td>92.2%</td>
<td>93.0%</td>
<td>0.21</td>
<td>.64</td>
</tr>
<tr>
<td>Bariatric surgery</td>
<td>809</td>
<td>31.6%</td>
<td>44.4%</td>
<td>14.0</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Efficient journal system</td>
<td>809</td>
<td>84.1%</td>
<td>87.3%</td>
<td>1.70</td>
<td>.19</td>
</tr>
<tr>
<td>Emergency room waiting</td>
<td>809</td>
<td>86.5%</td>
<td>93.8%</td>
<td>11.9</td>
<td>.001</td>
</tr>
</tbody>
</table>

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cost neglect in public policy, with differences between conditions in the expected direction in all scenarios. The effect ranges from .8 percentage points in the Cancer screening scenario to 12.8 percentage points in the Bariatric surgery scenario. We can see that the base rates of investment (in the control condition) are very high except for the Bariatric surgery scenario, where we also have the largest effect.

We assessed potential order effects by estimating the probability to invest in a given scenario as a function of condition, the order (1–10) in which the scenario appeared for each subject, and the interaction between condition and order. Results for the Cancer screening scenarios and Bariatric scenario were stable across the different orders and the remaining two scenarios varied somewhat, but in different directions; the difference between conditions increased with order for the Journal system scenario, but decreased with order for the Waiting time scenario. Taken together, order effects appear to be small, and they should be interpreted with caution due to the small number of observations for each order × scenario configuration. We also found a similar pattern for private consumption scenarios, see discussion below and Supplementary Material Figs. S4–S5 for details.

2.2.2. Private consumption scenarios

We conducted a similar type of analysis for private consumption decisions. Fig. 2 summarizes the result from our main confirmatory test of opportunity cost neglect in this domain. In contrast to results for the public policy domain, we found no pattern consistent with opportunity cost neglect in the domain of private consumption. The estimated difference between conditions was insignificant and close to zero (diff = .46 ppts, \( t(807) = .24, P = .82, \sigma = .02 \) and the 95% Confidence Interval (ppts, \(-3.33, 4.26\)) is bounded at an effect about half the size of the corresponding effect for the public domain. The difference between the private and public domain was significant and amounted to 6.48 percentage points (see Supplementary Material Table S3).

Data-contingent robustness checks revealed that the effect for private consumption was unstable and varied with both experience and age, despite being close to zero on average. The level of income did however not affect the result, and there were no order effects (Supplementary Tables S1, S4 and Fig. S3). The interaction effect between opportunity cost neglect and age (\( t(795) = 3.10, P = .002 \)) was substantial and is illustrated in Fig. 3. The figure shows the estimated treatment effect (difference between conditions) at different ages in a regression controlling for other covariates. We can see that young participants reacted in accordance with our hypothesis, becoming less likely to purchase the consumption good when reminded about opportunity costs; but the effect was reversed for old participants. For example, the estimated difference between conditions was −4.75 percentage points (\( t(795) = -1.86, P = .06 \)) at the 25th age percentile (36 years old) and +5.36 percentage points (\( t(795) = 2.19, P = .03 \)) at the 75th age percentile (65 years old). For an age range corresponding to a standard student sample, 20–25 years old, the estimated effect was close to ten percentage points. There was no corresponding age effect in the public policy domain. See Fig. 3 and Supplementary Material Table S5 and Fig. S1 for more details.

Table 3 shows the disaggregated results where we compare the proportion who chose to buy the consumption good across conditions in the private consumption scenarios. We can see a stable null effect across all four scenarios, including the Smartphone and Laptop scenarios, which are similar to scenarios used in previous studies on opportunity cost neglect in private consumption decisions (Frederick et al., 2009; Plantinga et al., 2018). We tested for scenario-specific order effects using the same method as for public policy scenarios. Similar to the public policy domain some of the scenarios showed results that varied with order (in opposite directions), but the effects were small and not significant (see Supplementary Material Fig. S5 for details).

Finally, we explored whether opportunity cost neglect was mediated by subjects’ mental budgeting propensity, calculated as the average score on the four-item mental budgeting scale. For public policy scenarios, we found that the difference in subjects’ investment rates between conditions, which we interpret as the magnitude of opportunity cost neglect, was smaller among subjects with a low mental budgeting score (below the median) compared to subjects with a higher score (coef. = −.063, SE = .030, t(805) = −2.13, P = .033), but the linear interaction was insignificant (coef. = .028, SE = .023, t(805) = 1.22, P = .22). There was no correlation between opportunity cost neglect and mental budgeting propensity in private consumption scenarios. Taken together, these results indicate that opportunity cost neglect in public policy was partially mediated by participants’ propensity to conduct mental budgeting.

3. Study 2 – experts on priority setting

3.1. Method

The study and main analyses were preregistered at https://osf.io/gzrhd/registrations and the data is available at the project’s OSF repository (https://osf.io/gzrhd/).

3.1.1. Participants

Participants were recruited via email from the International Society on Priorities in Health (ISPH) mailing list. ISPH is an international forum for health researchers, clinicians and managers involved in priority setting.3 Our final sample size (n = 148) yielded 44% power to detect an effect of the same magnitude as the main effect observed in Study 1 (d = .30, for public policy scenarios), and 75% power to detect an effect size corresponding to the upper bound of the 95% Confidence Interval.

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3 https://www.isph-care.org/.

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Table 4
Background characteristics Study 2, by condition.

<table>
<thead>
<tr>
<th></th>
<th>Opp. cost condition</th>
<th>Control condition</th>
<th>Test condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female, n (%)</td>
<td>32 (50.0%)</td>
<td>34 (56.7%)</td>
<td>$\chi^2(1)=.55$, P=.46</td>
</tr>
<tr>
<td>Age, mean (SD)</td>
<td>52.2 (12.6)</td>
<td>51.0 (14.3)</td>
<td>t(122)=.48, P=.63</td>
</tr>
<tr>
<td>Finished all ten scenarios in part one, n (%)</td>
<td>75 (81.5%)</td>
<td>73 (80.2%)</td>
<td>$\chi^2(1)=0.5$, P=.82</td>
</tr>
<tr>
<td>Finished the full survey, n (%)</td>
<td>64 (69.6%)</td>
<td>60 (65.9%)</td>
<td>$\chi^2(1)=.27$, P=.60</td>
</tr>
<tr>
<td>Experience from healthcare priority setting, n (%)</td>
<td>55 (85.9%)</td>
<td>47 (78.3%)</td>
<td>$\chi^2(1)=1.23$, P=.27</td>
</tr>
<tr>
<td>- Clinical practice, n (%)</td>
<td>8 (14.5%)</td>
<td>6 (12.8%)</td>
<td>$\chi^2(1)=.07$, P=.80</td>
</tr>
<tr>
<td>- Research, n (%)</td>
<td>35 (63.6%)</td>
<td>36 (76.6%)</td>
<td>$\chi^2(1)=2.01$, P=.16</td>
</tr>
<tr>
<td>- Policymaking, n (%)</td>
<td>18 (32.7%)</td>
<td>7 (14.9%)</td>
<td>$\chi^2(1)=4.36$, P=.04</td>
</tr>
<tr>
<td>- Other, n (%)</td>
<td>9 (16.4%)</td>
<td>6 (12.8%)</td>
<td>$\chi^2(1)=.26$, P=.61</td>
</tr>
<tr>
<td>University education, n (%)</td>
<td>64 (100%)</td>
<td>60 (100%)</td>
<td>–</td>
</tr>
<tr>
<td>- Health Economics, n (%)</td>
<td>15 (23.4%)</td>
<td>18 (30.0%)</td>
<td>–</td>
</tr>
<tr>
<td>- Public Health, n (%)</td>
<td>11 (17.2%)</td>
<td>14 (23.3%)</td>
<td>–</td>
</tr>
<tr>
<td>- Medical Ethics, n (%)</td>
<td>7 (10.9%)</td>
<td>4 (6.7%)</td>
<td>–</td>
</tr>
<tr>
<td>- Other, n (%)</td>
<td>31 (48.4%)</td>
<td>25 (40.0%)</td>
<td>–</td>
</tr>
</tbody>
</table>

* In percent of the number of participants who finished the full survey (background questions were answered at the end of the survey).
* In percent of the number of participants who began the survey.
* In percent of the number of participants with experience from healthcare priority setting. Multiple answers were allowed.
* In percent of the number of participants with university-level education.

Interval of that effect. We still had 86% power to detect an effect approximately half of the effect size in Frederick et al. (2009, Study 1). All participants gave their informed consent to participate in the study. One hundred and eighty-three subjects took up the survey, 148 (80.9%) completed the first part containing the public and private decision-making scenarios and 124 (67.8%) completed the full survey. Attrition during the first part of the survey was thus non-negligible but it did not differ between the two conditions (18.5% in the opp. cost condition and 19.8% in the control condition; $\chi^2(1)=.05$, P=.82).

We followed our pre-specified inclusion criteria (see preregistration for details) and included everyone who finished the first part of the survey in the final sample, which yielded n = 75 in the opp. cost condition and n = 73 in the control condition. One hundred and twenty-four subjects provided complete responses to all background questions at the end of the survey. Mean (SD) age was 51.6 (13.4) years and 53.2% were women. A clear majority of participants (n = 102, 82.3%) had current or past experience from working with healthcare priority setting, as a clinician (11.3%), researcher (56.8%), and/or policymaker (20.2%). Fifty-six percent had an academic background in Health Economics, Medical Ethics or Public Health. See Table 4 for summary statistics separated by condition. Differences between conditions were small and generally insignificant (Table 4).

3.1.2. Design & materials
Survey design and content as well as randomization into an opportunity cost condition or a control condition were identical to Study 1, except that the survey was translated to English and background questions about income and work experience in health care were replaced with more detailed questions about academic background and experience from working with healthcare priority setting.

3.1.3. Statistical analyses
The main analysis plan was identical to Study 1 and it was specified in the preregistration. Our two key dependent variables were Rate invest in health program (each participant’s average response to the four public policy scenarios) and Rate buy consumption good (each participant’s average response to the four private consumption scenarios). In our main, confirmatory, analyses we compared (i) Rate invest in health program and (ii) Rate buy consumption good across the two conditions, using two-sided t-tests. For illustrative purposes we also conducted similar comparisons at the level of each scenario, using chi-squared tests, and we compared baseline rates of each dependent variable (for the control condition) across the two studies, using two-sided t-tests that allowed for unequal variance in the two samples. Our data-contingent exploratory analyses focused on re-estimating the main effects using a regression framework with background characteristics included as control variables. We also tested for an interaction effect between opportunity cost neglect and age in both public policy and private consumption. In these analyses we restricted the sample to participants who completed the full survey. We tested for general order effects within each domain by comparing the mean difference between conditions when subjects had seen 0, 1, 2, or 3 policy scenarios, and vice versa for private consumption scenarios; but due to the limited sample size we did not look for order effects in the presentation of each single scenario.

3.2. Results
3.2.1. Public policy scenarios
We found an effect consistent with opportunity cost neglect in public policy. The estimated difference between conditions was substantial, and marginally significant in a two-sided t-test (mean (se) diff = –10.3 (5.40)ppts, t(146) = –1.91, $P = .058$, $d = –.31$). The estimated difference between conditions means that subjects were on average ten percentage

points less likely to invest in a suggested health program when reminded about opportunity costs. In absolute terms this point estimate is larger than the corresponding estimate from Study 1, where we found a six percentage points difference between conditions. Of course, the effect in Study 2 was estimated with less precision, since the sample size is smaller; the resulting 95% Confidence Interval (−20.98, .36) is wider in the current sample. We can also see that the base rate (61.64%) is considerably lower in this sample compared to our general population sample in Study 1, where we found a baseline investment rate of 79.61% (mean (se) diff = −17.97 (3.78) ppts, t = −4.75, Welch’s df = 83.05, P < .001). The priority setting experts are thus more restrictive when it comes to investing in any given health program described in the survey. Our main results on opportunity cost neglect in public policy for priority setting experts are illustrated in Fig. 4.

Data-contingent secondary analyses provided further evidence in favor or opportunity cost neglect. A linear regression that included all relevant background characteristics yielded an estimated difference of 13.6 percentage points between conditions (coef. = −.136, SE = .060, t(116) = −2.26, P = .026). See Supplementary Material Table S6 for full regression output. This effect is both economically large and statistically significant at the 5%-level. There was no interaction between opportunity cost neglect and age and there were no obvious order effects in the presentation of public policy scenarios; point estimates seemed to vary a bit with the number of scenarios previously seen by subjects, but these differences from experience were far from significant (see Supplementary Material Table S7 and Fig. S6).

Table 5 shows the disaggregated results by comparing the proportion of subjects who chose to invest in health programs across conditions for each scenario. We can see a systematic effect that is consistent with opportunity cost neglect in public policy, with differences between conditions in the expected direction in all scenarios. The effect ranges from 4.9 percentage points in the Efficient journal system scenario to 17.7 percentage points in the Cancer screening scenario.

3.2.2. Private consumption scenarios

In contrast to our results from the public policy domain, the base rate of spending in private consumption was similar across the two studies; in our first study, the base rate of spending was 41.02%, and the corresponding rate in our second study was 46.23% (mean (se) diff = 5.21 (4.01) ppts, t = 1.30, Welch’s df = 92.77, P = .20). Still, we could not confirm an effect consistent with opportunity cost neglect in the domain of private consumption. The point estimate of 6.57 percentage points difference between conditions is reasonably large and goes in the expected direction, but it was not significant in a two-sided t-test (mean (se) diff = −6.57 (5.06) ppts, t(146) = −1.30, P = .20, d = .21). The 95% Confidence Interval (−16.57, 3.44) includes some large values consistent with opportunity cost neglect but there is also a substantial proportion of values close to zero or in the wrong direction. These results are illustrated in Fig. 5 and further explored in secondary analyses below. The estimated mean difference between conditions was 3.74 (SE = 6.49) percentage points larger in the public domain compared to the private domain, but this estimate was not significant (see Supplementary Table S8 for details).
Data-contingent secondary analyses did not provide support for opportunity cost neglect. The estimated difference between conditions was 5.19 percentage points in the expected direction using a linear regression that included all relevant background characteristics, but again the effect was insignificant (coef. = −0.052, SE = 0.057, t(116) = −0.91, P = .366). See Supplementary Material Table S6 for full regression output. There was no interaction between opportunity cost neglect and age and there were no obvious order effects in the presentation of private consumption scenarios; point estimates seemed to vary a bit with the number of scenarios previously seen by subjects, but these differences from experience were far from significant (see Supplementary Material Table S7 and Fig. S7). Table 6 shows the disaggregated results by comparing the proportion of subjects in either condition who chose to buy the suggested consumption good for each scenario. All differences go in the expected direction but most of them are small; the effect ranges from 3.0 percentage points in the Holiday trip scenario to 10.3 percentage points in the New kitchen scenario.

4. Discussion

We found a robust effect consistent with opportunity cost neglect in public policy in a large diverse sample of the Swedish adult population (n = 809), and we replicated this effect in an international sample of priority setting experts (n = 148). However, we found little or no support for a corresponding effect in decisions concerning private consumption. It seems plausible that opportunity cost neglect is stronger in the domain of public policy than in private consumption, because opportunity costs of common public resources are arguably less salient as individuals themselves do not feel connected to the actual spending of the money. Moreover, people will not experience the opportunity costs of public spending since politicians rarely explicate what they do not spend public resources on. Rather they focus on what they do spend resources on, further harnessing opportunity cost neglect in public policy. In our exploratory analyses in Study 1 we also found a link between mental budgeting and opportunity cost neglect in public policy, where subjects with a high propensity to conduct mental budgeting seemed to be more likely to neglect opportunity costs, although the result was not robust to different specifications. An interpretation of this finding is that subjects who reported that they conduct mental budgeting are more prone to thinking about spending in terms of specific categories, and will therefore be less likely to consider alternative uses of money outside each specific category, unless specifically reminded about this possibility, as they were in the opp. cost condition.

We found that priority setting experts were much more likely to engage in rationing of health care than the public. This is perhaps not surprising, yet the magnitude of this difference is surprising. It is possible that members of the public experience resource allocation dilemmas as more abstract moral dilemmas, whereas experts with previous experience have a more instrumental approach, acknowledging that perfect solutions where everyone gets everything are not possible. Prior studies surveying general attitudes towards health care priority setting have found that the public generally emphasizes

the importance of equal access and the right to health care, but often are unwilling to recognize the scarcity of health care resources (van Exel et al., 2015). However, following panel participation, where participants discuss issues surrounding priority setting, people become more likely to accept the inevitable need to ration care and to consider cost and cost-effectiveness as relevant criteria for priority setting (Reckers-Droog et al., 2019). Our findings suggest that having experience with matters concerning health care priority setting makes people more likely to engage in ration of care. Importantly, however, it does not make people less susceptible to opportunity cost neglect when allocating resources.

Our study has several strengths, including a unique sample of priority setting experts combined with a large diverse sample of the general population, and a preregistration protocol. It should thus be emphasized that the main conclusion regarding our conceptual replication of Frederick et al. (2009) regarding opportunity cost neglect in private consumption is a failure to confirm their findings, our data showing no difference overall between the opportunity cost condition and the control condition. Whereas our exploratory analyses revealed an age effect that is plausible and reconciles our results with previous literature, this finding should be considered suggestive until replicated in other large-scale studies (Munafò et al., 2017; Nosek et al., 2018). Taken at face value, this finding also suggests that older people may exhibit something like inverted opportunity cost neglect in private consumption. One possible explanation is that the reminder nudged them to thinking about the opportunity cost of saving, thus increasing their desired spending in the opp. cost condition. This effect was only present in our first, larger, study, and not in our second study, which is not surprising since our second study was not powered to detect interaction effects. Taken together, a cautious interpretation is that we still do not know whether private-consumption opportunity cost neglect extends to the general adult population, since previous findings are based mainly on student samples (Frederick et al., 2009; Zhang et al., 2017) or on samples from Amazon's Mechanical Turk (Greenberg and Spiller, 2016; Plantinga et al., 2018).

We used an experimental approach in order to facilitate exogenous variation in the salience of opportunity costs and then study the potential impact on individuals' choice behavior. It was natural to choose the paradigm developed by Frederick et al. (2009), because it has been the workhorse method for investigating opportunity cost considerations in the domain of private consumption for the past ten years. Of course, all methods have their limitations, and the most severe limitation with an experimental approach is probably the simplifications that have to be made in order to ensure controlled variation – in our case both within individuals (e.g., public vs private scenarios) and across conditions (opp. cost condition vs control condition).

One particular challenge we faced with the public policy scenarios was how to communicate the exact circumstances under which subjects were allegedly making their decisions as health policy makers, without explicitly outlining all details about the opportunity costs of investment. This was necessary because the experimental paradigm of Frederick et al. operates under the assumptions that (i) opportunity costs to some extent are implicit at the point of decision-making, and (ii) we can manipulate their implicitness by reminding people about opportunity costs when making their decisions. For this reason, we were also intentionally vague about the exact benefits of the suggested investments. Moreover, in the control condition, money not spent would be saved for any other type of public spending. Since this was never explicitly stated in the instructions to participants, we cannot rule out that some of them made a narrower interpretation, thinking that money could only be saved for other investments within the health sector. In the opp. cost condition, the reminder instead made it clear to subjects that the alternative use of money was restricted to the health sector. A cautious interpretation of our results would thus be that we are underestimating opportunity cost neglect, since by definition opportunity costs would be lower if money has to stay within the health sector, thus making the suggested investments in the opp. cost condition more attractive to participants.

An extensive literature in health economics and public health focuses on what type of opportunity costs that should be considered in public policy decision, both from a theoretical and practical point of view (Bobinac et al., 2013; Brouwer et al., 2019; Claxton et al., 2010; Johannesson and Meltzer, 1998; Siverskog and Henriksson, 2019). Much less attention has been given to the closely related question on what costs people actually do consider in these decisions. This neglect is puzzling, and problematic, keeping in mind converging evidence on the malleability of human preferences in health care resource allocation (see e.g., Colby et al., 2015; Persson et al., 2018; Wiss et al., 2017). Our findings add new insights to this literature by explicating that opportunity costs are often neglected in public policy decisions. Moreover, opportunity cost neglect in public policy is likely to be present both among the general public and experts with experience from priority setting.

On a general level, opportunity costs neglect undoubtedly has far-reaching consequences for public policy. Ignoring the sacrifices associated with public spending such as public health programs makes them more attractive, thus artificially increasing the demand for public spending. Opportunity costs neglect may also explain why government’s budget typically gets overspent, since it causes members of the public to demand a higher level of public spending than they are willing to pay for (Lucas Jr., 2015; Lucas Jr. and Tasic, 2015). Moreover, opportunity cost neglect in public policy will almost by definition create inefficiencies, meaning that resources are not allocated in a way that maximizes social welfare. Taken to its limits, in a health context this means that patients will suffer and lives will be lost, because money will not always be channeled toward the most effective treatments. Our findings therefore highlight that behavioral policy interventions should not only target biases that affect everyday choices of private citizens, but also be attentive to the role of these biases at the policy level. At this level the problem is twofold, since (i) the “ordinary judgments” of private citizens create a demand for bad policies (Dal Bó et al., 2018; Lee and Clark, 2018; Sausgruber and Tyran, 2005; Sunstein, 2000), and (ii) policymakers conceivably suffer from the same biases and cognitive limitations as private citizens (Bellé et al., 2018; Sheffer et al., 2018). Both of these aspects should be given more consideration in future policy discussions.

A straightforward solution in the case of opportunity cost neglect is of course to make public opportunity costs more salient to people by explicitly highlighting what is not funded due to public spending. However, from the perspective of politicians, reminding people about opportunity costs seems like a sure path to not get re-elected. In this respect, a stronger mandate for economic evaluations such as cost benefit analysis (CBA) and cost-effectiveness analysis (CEA) could be important, since their role is to explicate necessary tradeoffs in public policy. Although there has been an increase in the use of economic evaluation among guideline-producing agencies over time, especially in the UK, the use of economic evaluations in actual decisions at the local level is still rare (Eddama and Coast, 2009). In the United States and most non-western countries there still appear to exist a deep rooted disfavor of the approach (see e.g. Eddama and Coast, 2008; Iglesias et al., 2005; Lafi et al., 2012; Silva et al., 2012; Tinghög, 2016; Williams and Bryan, 2016; Yothasamut et al., 2009). This is unfortunate because the usage of economic evaluations in public policy should not be motivated only on economic grounds, but also on cognitive grounds. Economic evaluations like CBA and CEA should be understood as a way of ensuring better priority setting by highlighting important social facts that otherwise might be neglected. Whatever the conception of what constitutes a good normative value for setting priorities. Similar arguments have been made by Sunstein (2018) who propose cost benefit thinking as a procedure for counteracting problems with selective attention. The existence of opportunity cost neglect in public policy is thus a clear empirical example that forcefully strengthens this argument.

Acknowledgement

We are grateful to Daniel Västfjäll, Paul Slovic, Kinga Barrafrem, two anonymous reviewers, and participants at the Priorities 2018 Conference for valuable comments and suggestions. We are also grateful to Kjell Arne Johansson and Michael Laurer, and to several respondents in Study 2 who provided valuable feedback on the survey.

Funding

This work was supported by the Marianne and Marcus Wallenberg Foundation [grant number: MMW 2014:0187] and the Swedish Research Council [grant number: 2018:0175]. Funders had no role in study design, data collection, analysis, decision to publish, or preparation of the manuscript. All authors declare no competing interests that could have appeared to influence the submitted work.

Supplementary material


References


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