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## THE CARE SPAN

# Low Cognitive Ability And Poor Skill With Numbers May Prevent Many From Enrolling In Medicare Supplemental Coverage

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**ABSTRACT** Because traditional Medicare leaves substantial gaps in coverage, many people obtain supplemental coverage to limit their exposure to out-of-pocket costs. However, some Medicare beneficiaries may not be well equipped to navigate the complex supplemental coverage landscape successfully because of their lower cognitive ability or numeracy—that is, the ability to work with numbers. We found that people in the lower third of the cognitive ability and numeracy distributions were at least eleven percentage points less likely than those in the upper third to enroll in a supplemental Medicare insurance plan. This result means that many Medicare beneficiaries do not have the financial protections and other benefits that would be available to them if they were enrolled in a supplemental insurance plan. Our findings suggest that policy makers may want to consider alternatives tailored to these high-need groups, such as enhanced education and enrollment programs, simpler sets of plan choices, or even some type of automatic enrollment with an option to decline coverage.

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Individual choice is becoming an increasingly integral aspect of social policy in general, and of policies related to health care in particular. A prime example is Medicare, which requires beneficiaries to make a series of complicated coverage choices, especially when they first enroll in the program. In the Medicaid program, many states require participants to choose from a list of privately operated health plans. Increasingly, patients are being asked to play a more active role in choosing their medical treatment, particularly when the medical evidence is unclear or lacking.

Advocates of market-oriented approaches have been the most active in promoting public policies to increase both consumer choice and provider competition in the health sector. However, even those who generally advocate a

stronger role for government in the offering of public services have looked to choice as a means of determining how health care is delivered. The recent health care reform debate and resulting legislation gave a prominent role to the preservation of choice.

Given this emphasis on choice, an important consideration is whether people have the mental skills necessary to make complex health and financial choices that best serve their interests. There are pitfalls for consumers and society at large when consumer choice drives financial decision making. The recent financial crisis, which saw large numbers of people taking on ill-advised mortgages, points to an unpleasant fact: People often make poor financial decisions that have major consequences.

In this article, we examine the roles of cogni-

tive ability—the general capacity to understand and use information—as well as numeracy—the ability to work with numbers—in making decisions critical to the financial well-being of many Medicare enrollees, particularly whether to obtain Medicare supplemental coverage.

Traditional Medicare (Parts A and B) leaves substantial gaps in coverage because of deductibles and copayments. To fill these gaps, people usually first try to obtain additional coverage through their employers, unions, the Department of Veterans Affairs, or Medicaid. These sources of additional coverage offer the most generous benefits and have the lowest cost for the enrollee. But they are not available to everyone.

Medicare recipients may choose one of the following two types of Medicare supplemental coverage: a Medicare Advantage plan, which is a more comprehensive health plan; or a Medigap plan, which provides coverage that supplements Medicare.<sup>1</sup> These plans differ in terms of coverage and premiums. Medicare Advantage may also come with restrictions on where people can seek care and the type of care that is covered. However, both types of coverage generally offer substantial protection from additional financial risk by covering copayments and deductibles, extending the available inpatient and outpatient benefits, and occasionally capping out-of-pocket costs.

Dana Goldman and Nicole Maestas<sup>2</sup> showed that people without any supplemental insurance, especially those with the highest medical spending, had higher out-of-pocket expenses compared to those enrolled in a Medigap or Medicare Advantage plan. People who expect to become ill have a particular advantage in enrolling in a supplemental plan, because Medicare Advantage plans are not allowed to vary their premiums on the basis of age, illness, or any other factors at any time. Similarly, Medigap plans within the same category cannot price differentially, at least at the time when consumers initially enroll in Medicare.

Given the financial advantages of having supplemental coverage and the potential adverse health consequences if nonenrollment leads to forgone care, the influence of cognitive ability and numeracy in a Medicare participant's decision to enroll in a supplemental plan becomes important. Although some previous research has investigated the effect of cognitive ability on the responsiveness to the set of choices available in Medicare Advantage plans,<sup>3,4</sup> we addressed a more direct issue: whether people with weaker cognitive ability and numeracy elect any kind of supplemental insurance at all.

Using Health and Retirement Study data, we

found that cognitive ability and numeracy were major predictors of Medicare supplemental coverage enrollment among those not covered through their employers, unions, the Department of Veterans Affairs, or Medicaid. After adjustment for race and ethnicity, sex, age, marital status, education, income, assets, and health, people in the lower third of the distribution with respect to both cognitive ability and numeracy were at least eleven percentage points less likely than those in the upper third to enroll in any sort of supplemental coverage. This difference became progressively larger for those with even weaker cognitive abilities. Moreover, the negative effects of low cognitive ability, low numeracy, or both were much more pronounced for the poor and the chronically ill, who would almost certainly benefit from enrollment.

The current structure of Medicare and Medicaid, in which people who stand to benefit must actively decide to enroll and then take steps to do so, may entail substantial societal costs that have not been previously considered. These costs may include higher health care costs because of delayed care and a risk pool that does not include all possible enrollees. Potential policy approaches for addressing the problems of limited cognitive ability and numeracy include establishing an optional enrollment process based on a narrowed set of choices tailored to individual beneficiaries' needs and instituting an opt-out provision through which certain people are automatically enrolled based on a predetermined set of criteria.

## Background

**COGNITIVE ABILITY** Cognitive ability refers to one's capacity to understand and use information. The ability is multifaceted and includes memory, verbal ability, and spatial ability. The literature on the causes and correlates of cognitive ability suggests that 40–50 percent of one's cognitive ability is genetically determined, although the proportion could be as high as 80 percent.<sup>5</sup>

Several socioeconomic factors are correlated with cognitive ability, including a person's income and education,<sup>6</sup> literacy,<sup>7</sup> occupation and social class,<sup>8,9</sup> and physical and mental health.<sup>10</sup> One study found that among older populations, 6–40 percent of the variance in difficulties with activities of daily living (such as dressing and bathing) was explained by cognitive ability.<sup>11</sup>

Other studies have found low cognitive ability correlated with increased frequency of hospitalization,<sup>12</sup> institutionalization,<sup>13</sup> and death.<sup>14</sup> Some of these correlations may in fact be causally related to cognitive ability, in that these events are more likely among those with lower cognitive

ability. Overall, cognitive ability is distinct from other measured factors and appears to be an important predictor of one's life course and individual choices. As such, it could play a prominent role in Medicare choices.

**NUMERACY** Numeracy refers to one's facility with understanding and calculating numbers and probabilities. It is a foundational skill for making choices that have a substantial financial component, and it is therefore important for understanding health plan choices. Numerical concepts are not always intuitive or easy to grasp,<sup>15</sup> and even highly educated individuals can struggle with them.

The variation in numeracy is not fully explained by education,<sup>16</sup> and the exact relationship between numeracy and health plan choice is not clear from the limited literature. Stacey Wood and coauthors found that numeracy was an important predictor of health plan choice.<sup>17</sup> Jessica Greene and coauthors found that although people with lower numeracy scores understood less about relatively complicated insurance products, such as consumer-driven health plans, they were actually more likely to indicate that they would enroll in such complex products.<sup>18</sup>

There is also evidence that people with lower mathematical ability, as measured by standardized test scores, have higher degrees of risk aversion, which could make them more likely to purchase insurance.<sup>19</sup> On the other hand, lower numeracy scores are associated with poorer financial decision making and planning, which might make people less likely to purchase insurance.<sup>20</sup>

## Study Data And Methods

**DATA** We used 1996–2008 data from the Health and Retirement Study, a nationally representative, biannual panel survey of older, noninstitutionalized adults in the United States.<sup>21</sup> The Medicare supplemental insurance choices made by all respondents age sixty-five or older in each survey wave are shown in Exhibit 1. About half of the respondents had supplemental insurance via Medicaid, the Department of Veterans Affairs, their own employment, or their spouse's employment. Of those who did not have access to these plans, 71 percent had a Medigap plan, a Medicare Advantage plan, or both, while 29 percent had no supplemental insurance at all.<sup>22</sup>

**STUDY SAMPLE** Although all Medicare recipients have the option of choosing a Medigap or Medicare Advantage plan to fill coverage gaps, we assumed that the decision to enroll in a plan that is more highly subsidized, when one is available, is much easier to make and not subject to

### EXHIBIT 1

#### Distribution Of Supplemental Insurance Choices, 1996–2008

Source of supplemental insurance	Percent of observations
Medicaid	8.3
Department of Veterans Affairs	4.8
Own employment	22.1
Spouse's employment	11.7
None of the above sources	54.8
Of those with none of the above:	
Medigap	42.9
Medicare Advantage	30.7
None	28.7

**SOURCE** Authors' analysis of survey data from the Health and Retirement Study. **NOTES** Each observation is a person-wave from biannual interview waves 3–9 (1996–2008). Number of observations is 58,192; number of "none of the above" observations is 31,907.

the same cognitive difficulties as the enrollment decision when such a plan is not available. Therefore, we dropped from our analysis people who had supplemental insurance via Medicaid, the Department of Veterans Affairs, their own employment, or their spouse's employment, as well as people who were offered insurance via their employer but did not take it. This last group accounted for 2 percent of the Health and Retirement Study respondents age sixty-five or older.

Because our focus was on the role of individual cognitive ability and numeracy, we also restricted our analysis to include only "financial respondents," people who reported themselves to be most knowledgeable about their household's finances. Our study sample therefore consisted of financial respondents without Medicaid, Department of Veterans Affairs, or employment plans.

**MEASURE OF COGNITIVE ABILITY** The Health and Retirement Study collects data on distinct, separate measures of cognitive ability. These include measures of overall orientation, the ability to recall words from a list, and the ability to hold numbers in one's mind. Several studies using these data have added the individual measures together to create an overall cognitive ability score that ranges from 0 to 35 for each respondent.<sup>11</sup> We used this approach as well.

Although age, education, income, and health-related variables are all predictive of this cognitive ability measure, they explain only about one-third of the variance in individual cognitive ability seen in the Health and Retirement Study data.<sup>23</sup> There are currently no well-accepted cut-offs in these data for a formal diagnosis of dementia or even mild cognitive impairment. So very low scores, such as below the fifth percentile, are likely to be consistent with a formal diagnosis of some cognitive compromise.<sup>24–27</sup>

Exhibit 2 presents distributions of the cognitive ability measure in the Health and Retirement Study by person-wave for the study sample.<sup>28</sup> Overall, the mean cognitive ability score was 22.5 out of a possible 35. Approximately one-third of the sample had a score of 25 or above, and approximately one-third had a score of 20 or below.

Before statistically controlling for other variables, those with supplemental insurance had greater cognitive ability than those without it. Of those with supplemental coverage, only 25 percent had a score of 20 or below, as compared to 43 percent of those without supplemental coverage.

**MEASURE OF NUMERACY SKILLS** In the Health and Retirement Study, numeracy is measured by a respondent's ability to correctly perform three relatively straightforward numerical problems (see the online Appendix for details).<sup>29</sup> As can be seen from the data in Exhibit 2, our study population found these numeracy questions challenging.

Only a third of the respondents answered two or more questions correctly, while over a quarter had no correct answers. Among those without supplemental coverage, only 24 percent got two or more correct, compared with 38 percent of those with supplemental coverage.

**ANALYSES** To isolate the effect of cognitive ability on supplemental coverage enrollment, we estimated a series of linear probability models using our study sample with an extensive

set of other controls. We also estimated the same set of models restricting the sample to the poor and chronically ill, groups that would probably have larger benefits from enrollment. Finally, we explored a number of extensions and specification tests, which are further described in the Appendix.<sup>29</sup>

**LIMITATIONS** We examined whether people were enrolled in any type of Medicare supplemental coverage plan, but we did not attempt to determine whether they chose the "best" plan or even an adequate one.<sup>30,31</sup> It is worth noting that the evidence suggests that Medicare recipients choosing Medicare prescription drug plans often do not choose plans that are in their best interests. Selecting a Part D plan typically also requires a self-initiated consumer choice from several plan options. The research has found that many enrollees are likely to be losing large amounts of money each year because of poor decision making when choosing a plan.<sup>32</sup>

The data we utilized also limited our ability to determine why people did not enroll.

## Study Results

**FULL STUDY SAMPLE** The effects of numeracy and cognitive ability on supplemental coverage enrollment are summarized in Exhibit 3. A numeracy score of 0 was associated with a five-percentage-point lower probability of enrolling in supplemental coverage, compared to a score of 2–3. Similarly, having a lower cognitive ability score decreased the likelihood of choosing supplemental insurance, and the effect diminished as cognitive ability increased.

At the lower end of cognitive ability, the effects were very large. People with cognitive ability scores of 11 or below were twenty-one percentage points less likely to enroll in a supplemental insurance plan than people with cognitive ability scores of 25 or above. The difference was smaller for those with scores of 17–20: They were six percentage points less likely to enroll in a supplemental insurance plan than people with cognitive ability scores of 25 or above.

Taken together, these results implied that people in the lower third of the distribution with respect to both numeracy and cognitive ability (scores of 0 and of 20 or below, respectively) were at least eleven percentage points less likely than those in the upper third of these distributions (scores of 2 or above and of 25 or above) to enroll in any sort of supplemental coverage.

The Appendix gives the details of the coefficients in Exhibit 3, as well as unadjusted versions of these models and summary statistics for the other control variables.<sup>29</sup> The Appendix also describes the results from a series of robustness

### EXHIBIT 2

Distribution Of Cognitive Ability And Numeracy Scores, 1996–2008

Score	Percent of observations		
	Whole sample (N = 20,639)	People without supplemental insurance (n = 5,865)	People with supplemental insurance (n = 14,774)
<b>COGNITIVE ABILITY</b>			
0–8	0.3	0.8	0.2
9–11	1.1	2.3	0.6
12–16	8.3	15.0	5.6
17–20	20.7	25.4	18.9
21–22	16.5	15.5	16.9
23–24	19.0	16.3	20.1
25–35	34.1	24.8	37.7
<b>NUMERACY</b>			
0	28.0	41.9	23.0
1	37.7	33.8	39.1
2–3	34.3	24.3	37.9

**SOURCE** Authors' analysis of survey data from the Health and Retirement Study. **NOTES** Each observation is a person-wave from biannual interview waves 3–9 (1996–2008). Only financial respondents who do not have supplemental insurance from Medicaid, the Department of Veterans Affairs, or their own or their spouses' employment are included.



checks and extensions.<sup>29</sup> Overall, our basic findings appear very robust.

**POOR AND CHRONICALLY ILL SAMPLE** Results for the poor and the chronically ill are summarized in Exhibit 4. The individual effects of both cognitive ability and numeracy are larger for this vulnerable group than for the population as a whole. Those with poor numeracy are thirteen percentage points less likely to enroll in supplemental coverage. And the poor and chronically ill in the lower third of the overall cognitive ability distribution (a score of 20 or below) are between thirteen and forty percentage points less likely to enroll in any sort of supplemental coverage, compared with those in the upper third of the distribution.

### Conclusion

Many public policies focus on individual choice as a means of determining exactly how benefits should be distributed or of assuring that a policy has maximal effectiveness. Inherent in all of these policies is the assumption that all or most people have the mental capacity to make the choices that are in their best interest. We have shown that many people do not have this capacity and that this deficiency can affect their choices in adverse ways.

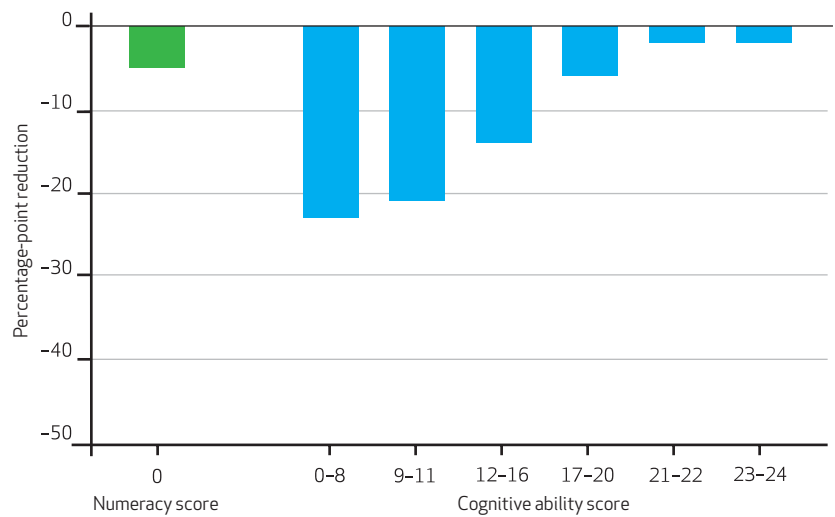
Overall, people in the lower third of the cognitive ability distribution were six to twenty-three percentage points less likely to enroll in a supplemental Medicare insurance plan than those in the upper third of the cognitive ability distribution, even after controlling for a host of other variables. Furthermore, the chance of enrolling in a supplemental Medicare insurance plan was approximately five percentage points lower for those in the lower third of the numeracy distribution than for those in the upper third.

These problems were most pronounced for those with low incomes, low wealth, and multiple chronic illnesses, where the likelihood of enrollment was forty percentage points lower for the least cognitively able, and an additional thirteen percentage points lower for those with weak numeracy skills. People who are chronically ill and those who do not have the financial ability to self-insure against substantial out-of-pocket costs would almost certainly be better off enrolling in supplemental insurance plans.

The magnitude of our findings on cognitive ability and numeracy was sizable, particularly compared to the influence of health on enrollment decisions. By way of comparison, if we add together the estimated effect on enrollment for people who were hospitalized in the past year and those with three or more chronic illnesses,

#### EXHIBIT 3

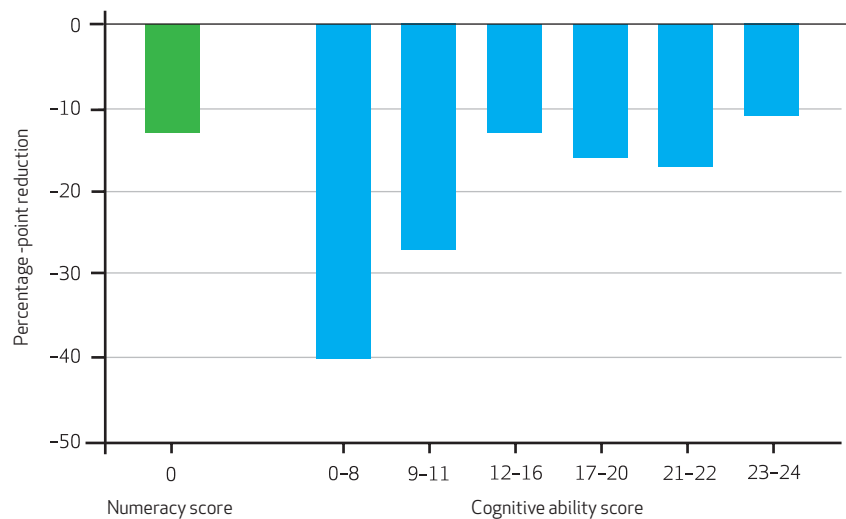
**Full Sample Percentage-Point Reduction In Supplemental Coverage Enrollment Relative To Individuals With The Highest Numeracy And Cognitive Ability Scores, 1996–2008**



**SOURCE** Authors' analysis of survey data from the Health and Retirement Study. **NOTES** Each bar shows the reduction in enrollment probability for a person with the stated score, relative to a person in the upper third of the numeracy score distribution (2–3) and the upper third of the cognitive ability distribution (25 or above). Estimates are adjusted for race and ethnicity, sex, age, marital status, education, income, assets, and health. All differences are significant at the 5 percent level.

#### EXHIBIT 4

**Poor And Chronically Ill Sample Percentage-Point Reduction In Supplemental Coverage Enrollment Relative To Individuals With The Highest Numeracy And Cognitive Ability Scores, 1996–2008**



**SOURCE** Authors' analysis of survey data from the Health and Retirement Study. **NOTES** Sample includes only people in the lowest income quartile and the lowest wealth quartile who have been diagnosed with three or more chronic illnesses. Each bar shows the reduction in enrollment probability for a person with the stated score, relative to a person in the upper third of the numeracy score distribution (2–3) and the upper third of the cognitive ability distribution (25 or above). Estimates are adjusted for race and ethnicity, sex, age, marital status, education, income, assets, and health. All differences are significant at the 5 percent level.

the sum is still considerably less than the negative effect of being in the bottom third of the cognitive ability distribution.

Limitations in our data made it difficult to determine why Medicare enrollees with lesser cognitive ability, poorer numeracy, or both were less likely to enroll in a supplemental plan. Several possibilities exist, and each suggests distinct potential policy solutions.

Perhaps people with low cognitive ability, low numeracy, or both never actively consider whether to enroll. Or perhaps seniors are aware of having the option to enroll but, because they are not fully aware of the consequences, do not feel that they have to or should make a decision. Both of these explanations seem somewhat unlikely, given the prominence that the Medicare program and health care in general have in older people's lives.

However, if these explanations have merit, one approach to addressing the problem would be to extend educational efforts already undertaken by the Medicare program, taking into account the skills of these potentially high-need groups. Another option would be to reconsider the roles of State Health Insurance Assistance Programs, and how they might target their efforts to these groups.

Alternatively, people of low cognitive ability, low numeracy, or both may understand at some level, if not fully, the consequences of their decisions but may nevertheless be unable to make a choice. If so, the policy solution becomes more complicated. It could be that these people are simply cognitively overloaded, cannot make sense of the scenarios, and therefore defer a choice. Or they may be uncertain of their preferences and defer their choice for that reason.<sup>30</sup>

Other studies have found limits in computational capacity<sup>33</sup> or attention<sup>34</sup> available to process information; this probably relates to or stems from cognitive ability and numeracy. At the most basic level, we need to pay even more attention to the manner in which the information necessary for making supplemental coverage choices is presented,<sup>35–37</sup> despite already considerable efforts by Medicare to present this information in an understandable fashion. Given the inherent complexity of the plans, however, it may be that no level of simplification or presentation in the traditional sense will suffice for people with low cognitive ability and numeracy skills.

Another set of solutions rely on a behavioral approach that recognizes that people often do not have the capacity to consistently make decisions that are in their long-term best interest.<sup>38,39</sup> This type of behavioral approach is often referred to as asymmetric paternalism.

One possible solution under this approach

is to institute a more active default option. Although the current default is to go without supplemental coverage, the default could become, for example, a plan chosen on the basis of random assignment. People could always opt out of the default plan and choose any of the available coverage options or no coverage at all.

A more sophisticated solution would be one in which a default coverage plan was assigned, or a smaller subset of the full choice set presented, based on a person's responses to a simple set of questions gauging preferences. Such approaches have been used commercially—for example, to predict which movies consumers might like (Netflix DVD rentals) or what music they might enjoy (Pandora online streaming music service).

Assuming that predictive models could be established, this method could incorporate individual preferences in a way that is less taxing of a person's capabilities. The limited set of choices could also include subsidized forms of coverage, such as Medicaid, that the person might be eligible for but was unaware of. Choice would not be constrained, because people would always be free to look at all of the possible options.

Of course, such systems would have to be designed with great care, so that people would not by default be enrolled into plans that they clearly could not afford, or that were otherwise ill suited for them.

Although largely undeveloped in health or social policy, these default-based approaches hold great promise. They are widely used by employers to automatically enroll their employees into a private retirement savings plan with a default contribution rate and investment portfolio that can be based on the employee's age, unless the employee explicitly chooses another option. The impetus for their implementation has been led by private-sector interest, from both employers and the financial services industry.

The government has also played a clear role in allowing and regulating these default retirement plans. We believe that these approaches should be further explored for their applicability in social programs like Medicare.

Given the difficulty associated with making good choices, addressing the problem of low cognitive ability and numeracy is important, and not only for Medicare. Health care reform is likely to increase the set of decisions to be made, particularly for the newly insured. Unless there is comprehensive insurance coverage in which all services are covered and the issue of coverage choices is redundant, understanding the role of cognitive ability and numeracy in making these decisions is essential. ■

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## NOTES

- 1 Strictly speaking, Medicare Advantage plans replace rather than supplement traditional Medicare—that is, they also cover the same ground as Parts A and B. However, we follow convention and use “supplemental coverage” to refer to both Medicare Advantage and Medigap. Our use of “Medicare Advantage plan” also includes previous incarnations of such plans.
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In this month's *Health Affairs*, Sewin Chan and Brian Elbel search for reasons why many Medicare recipients do not obtain supplemental insurance to limit the large out-of-pocket expenses they can incur under Medicare. Using 1996–2008 data from the Health and Retirement Study, a large biannual survey of older noninstitutionalized people in the United States, the authors found that some people lack the cognitive ability or skill with numbers to navigate the complex terrain of supplemental coverage. They suggest such potential remedies as

educational programs to familiarize beneficiaries with insurance choices, or even automatic enrollment with an opt-out option.

Chan is an associate professor of public policy at the New York University (NYU) Robert F. Wagner Graduate School of Public Service, where she studies how economic behavior, market institutions, and public policy shape people's well-being. She is currently examining the health impacts of dramatic losses of personal wealth. Chan served on the Department of Labor's Advisory Council on Employee Welfare and Pension Benefit Plans between 2009 and 2011. She holds a doctorate in economics from Columbia University.



**Brian Elbel** is an assistant professor of population health and health policy at New York University.

Elbel is an assistant professor of population health and health policy at the NYU School of Medicine and at the NYU Wagner Graduate School. He studies consumer and patient decision making in health care, largely from the perspective of behavioral economics. In addition to research on decisions about health plans, Elbel examines dietary choices in the context of public policies relating to food and obesity. He received his master's degree in public health and his doctorate in health policy and health economics from Yale University.



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