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Health Information and Social Security Entitlements

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Abstract

This study examines whether new health information, obtained through medical screening, affects entitlements to Social Security benefits. Random assignment of information is derived from a unique feature of the Continuous National Health and Nutrition Examination Survey. To examine the effect of information on entitlements, the survey data are matched to administrative data from the Social Security Administration. The results suggest that new health information leads to delayed entitlements, particularly among workers near the early retirement age.

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I. Introduction

It is generally presumed that poor health hastens retirement from the labor market, particularly among older workers. This presumption is supported by numerous studies linking poor health to early retirement.[1] To contribute to this literature, this study examines whether new health knowledge – obtained through medical screening – affects entitlements to Social Security benefits. The study considers both Disability Insurance (DI) benefits, available to disabled workers, and Old-Age (OA) benefits, available to workers who are at least 62 years of age. In contrast to much of the literature, the results from this study suggest that health information delays, rather than hastens, retirement.

The main data for the study come from the National Health and Nutrition Examination Survey (NHANES). Unlike other health surveys, the NHANES is designed to measure the prevalence of both diagnosed and undiagnosed conditions. To do so, the survey first asks participants if they have ever been diagnosed with certain conditions, and then tests participants for these conditions by medical examination. Importantly, the results of the medical exam are revealed to participants. Participants who report that they had never been diagnosed with a particular condition, but who subsequently test positive for the condition through the survey's medical exam, are assumed to have gained new information of their health status.

Variation in new health information is obtained by exploiting a particular feature of the data collection process. More precisely, medical exams were scheduled in either the morning or afternoon, but only three laboratory tests – plasma glucose, LDL (bad) cholesterol, and triglycerides – were administered to morning examinees. This is because these three tests require fasting, which is best achieved overnight. As a result, participants assigned to a morning exam received information about their plasma glucose, LDL cholesterol, and triglycerides levels, whereas respondents assigned to an afternoon exam were not. To ensure the representativeness of morning examinees, exam time was assigned through sampling. Therefore, the effect of knowledge on benefit entitlements can be measured as the difference in entitlements between exam groups.

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[1] Such studies include Anderson and Burkhauser (1985), Bazzoli (1985), Bound (1991), Sammartino (1987), Rust (1989), Quinn, Burkhauser, and Meyers (1990); Rust and Phelan (1997); Coile et al. (2002); McGarry (2004); and Benitez-Silva and Dwyer (2005). For a discussion, see Lumsdaine and Mitchell (1999).

The sample is constructed by pooling NHANES data across survey years 1999/2000, 2001/2002, and 2003/2004. These surveys are merged to both restricted-use mortality files and Social Security administrative data. The administrative data come from the Master Beneficiary Record, which reports entitlement information for both DI and OA. (Unfortunately, the data do not contain information on Social Security covered earnings.) The analysis is limited to participants who are matched to administrative data, who are not entitled to Social Security benefits prior to the survey, and who are ages 40 to 62 at the time of survey. Entitlements are examined within two calendar years after the second calendar year of the survey.

The results suggest that new health knowledge leads to delays in benefit entitlements, particularly among older workers aged 59 to 62. Among these workers, entitlement delays are evident for both the DI and OA program, and among male and female workers. Delays are most pronounced among workers who are insured for DI benefits – an indicator of recent labor force attachment – and among workers who report having never been diagnosed with diabetes. The results also suggest that new health knowledge increases labor supply, measured by an indicator of any earnings covered by Social Security.

The results from this study contrast with those from related studies, which generally conclude that poor health hastens retirement. However, these studies raise a number of empirical concerns. One concern is that the association between poor health and early retirement may be attributable to other factors, such as discount rates or preferences for work. This is less of a concern in this study, as health information is randomly assigned. Another concern is that individuals may use poor health to justify early retirement. If so, studies that use subjective measures of health, such as self-reported health status or work limitations, may overstate the effects of health on retirement (Parsons, 1980, 1982; Bound, 1991). This is less of a concern in this study, as health is measured objectively by the detection of latent medical conditions.

This study is most related to studies by McGarry (2004) and Benitez-Silva and Dwyer (2005). They examine whether changes in health affect retirement expectations. McGarry concludes that a deterioration of subjective health hastens expected retirement, but that a new report of "any" health condition has no discernible effect. However, she does not examine changes in specific health conditions such as diabetes or high cholesterol, due to their rare occurrence in the sample. Benitez-Silva and Dwyer, in contrast, do examine specific health conditions. They find that a change in diabetes status delays expected retirement, which is consistent with results of this study. However, they do not address the potential endogeneity of changing diabetes status, which may lead to an omitted variables bias, and only examine retirement expectations, not retirement outcomes.

One possible mechanism for the results is that the detection of a latent medical condition increases demand for health insurance coverage, and this demand encourages employment to obtain or retain employer provided health insurance. This mechanism is especially apt for workers under the age of 65, who may not qualify for Medicare coverage. This mechanism is supported by a recent study by Edwards (2013), who finds that screening for diabetes among the previously undiagnosed population improves health behaviors, such as increased physical activity and medication usage.

This mechanism raises additional questions regarding when and how health information is collected over the life cycle. Several studies show that, in regards to the detection of latent medical conditions, incentives matter. Kubik (1999) shows that an expansion of Supplemental Security Income benefits for disabled children encouraged the detection and treatment of mental health conditions among children; Cullen (2003) finds that a change in supplement funding for schools to accommodate disabled children affected the percent of children defined as disabled; Thornton (2008) shows that monetary incentives affected the decision to learn about one's HIV status; and Singleton (2009) shows that an expansion of disability benefits for Vietnam veterans with diabetes increased the prevalence and treatment of diabetes. Understanding how health information is acquired over the life-cycle, and how this information affects economic outcomes, is an important area for further research.

II. Data

A. Continuous NHANES

The main source of data is the Continuous National Health and Nutrition Examination Survey (NHANES). The survey is representative of the US population, excluding persons in nursing homes, members of the armed forces, institutionalized persons, or US nationals living abroad, and oversamples blacks, Mexican Americans, adolescents, and older persons. The surveys are conducted annually, but the public-use data are pooled across two consecutive years. The first survey release covers years 1999 and 2000.

A unique goal of the NHANES is to measure the prevalence of both diagnosed and undiagnosed medical conditions. This goal is achieved in two stages. In the first stage, survey participants answer questions regarding previous health diagnoses, as well as questions regarding their demographic characteristics, socioeconomic status, and dietary habits. This stage occurs in the participant's home. In the second stage, survey participants undergo a medical examination, which includes physical assessments, dental assessments, and laboratory tests. This stage occurs in a Mobile Examination Center (MEC), a medical clinic constructed from four mobile trailers and staffed by 17 medical personnel. Importantly, all medical exams are performed after the at-home interview, and 89.9 percent are performed within two months.[2] For research purposes, medical conditions that are not reported during the at-home survey, but are subsequently revealed during the medical examination, are deemed undiagnosed.

Importantly, survey participants are notified of their medical exam results. Results that are immediately available – such as physical measurements, blood pressure, and dental assessments – are provided, in printout form, upon exiting the MEC. Results that are not immediately available are reported to participants by mail, usually within 12 to 16 weeks after the medical exam. If the exam identifies a condition that requires medical attention, the MEC physician may offer to contact the participant's physician, or recommend a physician, for follow-up care. However, according to survey documentation, no clinical treatments or interventions are provided by MEC personnel.

The goal of this study is to determine whether new health information – obtained through medical screening – affects entitlements to Social Security benefits. To obtain variation in health information, the analysis exploits the fact that three laboratory tests – plasma glucose, LDL (bad) cholesterol, and triglycerides – were only administered to morning examinees. This is because these three tests require fasting, which is best achieved overnight. To ensure the representativeness of morning examinees, half of survey participants were randomly assigned, through sampling, to a morning examination.

Because of the three additional tests, morning examinees were offered more information about their health status than afternoon examinees. The test of plasma glucose measures sugar in the blood and is used to diagnose diabetes. The test of LDL cholesterol measures bad cholesterol

[2] This lag is determined from the public-use data by comparing the age in months at the interview to the age in months at the time of the exam.

in the blood, and the test of triglycerides measures fat in the blood. Both tests are used to determine risk factors for a heart attack or stroke.

It should be noted that, although tests of LDL cholesterol and triglycerides were only administered to morning examinees, both groups were tested for total cholesterol and HDL (good) cholesterol, as these tests do not require fasting. Moreover, high total cholesterol and low HDL cholesterol are correlated high LDL cholesterol and triglycerides. This means that, although afternoon examinees were not directly tested for LDL cholesterol or triglycerides, they may update their belief about LDL cholesterol and triglycerides based on other test results. Thus, the most salient difference in health information between morning and afternoon examinees is knowledge of diabetes.

B. Social Security Administration Files

The Continuous NHANES are matched to SSA administrative data. SSA data are available for survey years 1999/2000, 2001/2002, and 2003/2004. For this study, SSA information is limited to select variables from the Master Beneficiary Record (MBR), which contains information regarding Social Security's DI, OA, and Survivor programs. The variables include the type and date of initial entitlement and the type and date of current entitlement. Current entitlement is measured at the end of calendar year 2008, the last year for which SSA data are available.

B. Mortality Files

The Continuous NHANES is also matched to mortality information from death certificate records, provided by the National Center for Health Statistics. For this study, mortality information is limited to the date of death. This information is available through calendar year 2006.

III. Sample and Summary Characteristics

A. NHANES Sample

The sample is constructed by pooling NHANES data across survey years 1999/2000, 2001/2002, and 2003/2004, for which data on SSA entitlements and mortality are available. Before deriving the sample specific to the analysis, it is useful to show that treatment and comparison groups are similar among the full NHANES sample. For this purpose, the sample is restricted to respondents who are ages 20 and older (49.3 percent) and who have completed a

MEC exam (95.5 percent). This sample contains 14,213 observations, 48.9 of whom are assigned to a morning exam.

The left panel of Table 1 presents demographic characteristics. Estimates are presented separately for morning and afternoon examinees, and the differences between exam groups are reported in the third column. As shown, morning and afternoon examinees are similar in regards to age, race, educational attainment and marital status. All estimated differences are small and statistically insignificant.

The left panel of Table 2 presents various rates of self-reported health conditions collected during the at-home survey. Listed first are health conditions relevant to this study: diagnosed diabetes (including and excluding borderline diagnoses) and high cholesterol. As shown, the rates of previously diagnosed diabetes are similar between exam groups, but the rate of high cholesterol is 1.6 percentage points (standard error: 0.7) higher among morning examinees. While statistically significant, the difference is small relative to the overall average of 26.5 percent. In regards to the other health conditions – including high blood pressure, arthritis, and overweight – most differences are small and statistically insignificant. One notable exception is arthritis, which is 2.0 percentage points (standard error: 0.7) higher among morning examinees.

The left panel of Table 3 reports results from laboratory tests and examinations. The first set of results is from laboratory tests that were only administered to morning examinees: plasma glucose, LDL cholesterol, and triglycerides. The results from the laboratory tests were translated into diagnostic categories using the medical definitions given in Appendix Table 1. As shown, more than one third of the sample is diagnosed with at least borderline diabetes, borderline high cholesterol, and borderline high triglycerides. The other estimates in the table are from laboratory tests and examinations administered to both exam groups: total cholesterol, HDL cholesterol, high blood pressure, and body mass index. As shown, diagnostic rates from these tests are similar among both groups. One exception is at least borderline high cholesterol, which is 2.1 percentage points (standard error: 0.9) lower among morning examinees.

Overall, most of the estimated differences between examination groups are small and statistically insignificant, which supports the claim of random assignment. The few notable differences are likely attributable to sampling error.

B. Analysis Sample

The analysis sample is derived for the specific purposes of this study. First, by necessity, the sample is restricted to survey respondents who are matched to Social Security administrative records. This criterion depends on whether the respondent consented to the match. Among the NHANES sample described above, the match rate is 85.7 (standard error: 0.4) and 84.7 (standard error: 0.4) percent among morning and afternoon examinees, respectively.

Second, the sample is restricted to survey respondents who are not entitled to DI or OA benefits prior to the first calendar year of the survey. For example, respondents in the 1999/2000 survey are dropped from the sample if entitled to benefits on or before the end of 1998. Conditional on being matched to SSA data – the first sample criterion above – the percent of respondents who are not already entitled to benefits is 74.4 (standard error: 0.6) and 73.9 (standard error: 0.6) percent among morning and afternoon examinees, respectively.

It is important to note that the percent of respondents who are not already entitled to benefits varies by sex and survey age. This point is illustrated in Figure 1. As shown, the percent declines steadily from age 20 to 62, reflecting increasing rates of DI entitlement across these ages. The percent falls precipitously from 62 to 63, due largely to OA entitlements at the normal retirement age of 62. The percent drops again at age 66, but only among males, which reflects entitlements to OA benefits at the normal retirement age of 65.[3]

The reason the percent falls at 63, rather than 62 – and 66, rather than 65 – is due to the definition of entitlement and the timing of the survey. In particular, because the survey is conducted over two calendar years, a respondent's age at the end of a calendar year is not known precisely, and could be one of three possible ages. For example, a respondent who reports an age of 62 during the 1999/2000 survey could be 60, 61, or 62 by the end of calendar year 1998. Thus, only a fraction of respondents who are age 62 at the time of the survey are eligible for OA benefits prior to the survey.

Based on this Figure 1, the third and last sample criterion pertains to age: respondents are dropped from the sample if they are younger than 40 or older than 62. Below 40, entitlement rates are low, so estimated differences in entitlements would be precise. And above 62,

[3] The normal retirement age is 65 for individuals born in 1938 or earlier. The normal retirement age increases by 2 months for each annual birth cohort from 1939 to 1943, reaching 66 for birth cohorts 1943 to 1954.

entitlement rates are high, which would raise concerns for both small samples and sample selection. The percent of the sample ages 40 to 62 is 43.0 (standard error: 0.8) and 44.0 (standard error: 0.7) percent among morning and afternoon examinees, respectively. The final sample contains 1925 morning examinees and 1977 afternoon examinees.

Because the analysis sample is a subset of the full sample, it is again necessary to establish that treatment and comparison groups are comparable. Summary statistics for the analysis sample are presented in the right panels of Tables 1, 2, and 3. As shown, most of the estimated differences between morning and afternoon examinees are comparable. Notable exceptions are survey age (Table 1), previously diagnosed arthritis (Table 2), previously diagnosed emphysema (Table 2), and at least borderline high cholesterol, determined by the medical exam (Table 3). These differences are likely attributable to sampling error.

The extent of additional health information conveyed to morning examinees is given by **Table 3**. Roughly forty percent of morning examinees are diagnosed with at least borderline diabetes, borderline high LDL cholesterol, and borderline high triglycerides. Excluding borderline cases, 11.0 percent are diagnosed with diabetes, 15.8 percent are diagnosed with high LDL cholesterol, and 21.3 percent are diagnosed with high triglycerides. Some examinees are diagnosed with two or more of these conditions, so that, excluding borderline cases, 36.5 percent of morning examinees are diagnosed with diabetes, high LDL cholesterol, or high triglycerides.

Mentioned above, afternoon examinees were not directly tested for diabetes, LDL cholesterol, or triglycerides, but they may update their beliefs about these conditions based on information on total cholesterol and HDL cholesterol. To determine whether this is possible, rates of diabetes and high LDL cholesterol were calculated across three categories of total cholesterol – normal, borderline high, and high – using only morning examinees. As expected, total cholesterol appears to be a strong predictor of high LDL cholesterol: across the three categories, the prevalence of high LDL cholesterol is 0.0, 7.0, and 72.9 percent, respectively. However, total cholesterol does not appear to be a strong predictor of diabetes: across the three categories, the prevalence of diabetes is 11.0, 7.4, and 10.5 percent, respectively. Thus, LDL cholesterol can be somewhat inferred from total cholesterol, but plasma glucose and diabetes risk cannot.

III. Results

The empirical objective is to estimate whether new health information affects entitlement to DI or OA benefits. Assuming random assignment, the effect is measured by the difference in entitlements between treatment and comparison groups after the survey. To examine entitlements, entitlement rates are calculated by period years, defined as calendar years relative to the first calendar year of the survey. For example, for the 1999/2000 survey, the first period year corresponds with calendar year 1999, and the second corresponds with calendar year 2000. Thus, the third period year is the first full calendar year after all survey respondents had participated in the survey. The analysis is limited to four period years, since this period year for the 2003/2004 survey corresponds with calendar year 2006, the last year for which mortality data are available.

A. Mortality

Before examining entitlements, it is necessary to examine whether subsequent rates of mortality differ between morning and afternoon examinees. One reason is that health information may have a direct effect on mortality; another is that benefit entitlements are only defined for the non-deceased.

Figure 2 plots the percent deceased in by each period year, up to period year four, separately for morning and afternoon examinees. As shown, the percent increases slightly across period years among both exam groups, but there is no apparent difference between groups. By period four, the percent reaches 1.4 (standard error: 0.3) and 1.4 (standard error: 0.3) among morning and afternoon examinees, respectively. The difference is not statistically significant. There is also no systematic difference in mortality outcomes between exam groups when examined across survey ages (not shown). These results suggest that health information does not immediately affect mortality. Thus, to simplify the analysis of entitlements, respondents who become deceased by period year four are omitted from the sample, removing 54 observations.

B. Entitlements

The next step of the analysis is to examine different rates of benefit entitlement. When rates of entitlement are plotted by period year, similar to Figure 2, there is no large difference in entitlement rates between exam groups (not shown). However, noticeable differences in entitlement rates do arise when examined by survey age. To illustrate these differences, Figure 3 plots entitlement rates by period four separately by examination time and survey age. As shown, there is no consistent difference in entitlement rates at younger ages; however, at ages 59 to 62, entitlement rates are consistently lower among morning examinees. While preliminary, these results suggest that new health information delays entitlements, particularly among older workers.

C. Regression Framework

Although assignment to a morning examination is assumed random, differences in observable characteristics may arise between morning and afternoon examinees due to sampling. One concern is that these observable characteristics may account for the differences in subsequent entitlement rates between examination groups.

To address this concern, differences in entitlement rates are estimated using a regression framework. This framework allows for estimating differences in entitlement rates between exam groups, while simultaneously controlling for observable differences between them. The regression takes the following form:

(1) $$y_i = \alpha + \beta m_i + \gamma x_i + \varepsilon_i.$$

The outcome variable y_i indicates entitlement to either DI or OA benefits by period year four, equaling one if entitled and zero otherwise. The variable m_i is an indicator of exam time, equaling one if the respondent is assigned to a morning examination and zero otherwise. The vector x_i controls for observable characteristics between treatment and comparison groups, and may include demographic characteristics (Table 1), self-reported health characteristics (Table 2), and results from laboratory tests and examinations shared by morning and afternoon examinees (Table 3). The error term is ε_i, which is specified to account for heteroskedasticity. The coefficient of interest is β, which represents the difference in entitlement rates between morning and afternoon examinees by period year four.

The regression estimates for the analysis sample are presented in panel A of Table 4. The panel contains three columns corresponding with different sets of control variables. The first column contains no control variables. As shown, the estimate of β is negative, but small and statistically insignificant: -0.009 (standard error: 0.010). This implies that new health information provided to morning examines decreased entitlements by period year four by 0.9 percentage points.

The second and third columns controls for observable characteristics that may differ between exam groups. The second column contains controls for demographic characteristics and self-reported health conditions; and the third column contains additional controls for laboratory test results. As shown, these controls both increase the estimate of β and decrease its standard error, resulting in statistically significant estimates. The estimate in the third column suggests that additional health information provided to morning examinees decreased entitlements by 2.1 percentage points.

According to Figure 3, the effect of health knowledge may vary by survey age. To examine this possibility, the model is estimated using two mutually-exclusive age groups: 40 to 58 and 59 to 62. The estimates for the former group are presented in panel B of Table 4, and the estimates for the latter are presented in panel C of Table 4. Similar to panel A, the three columns within each panel correspond to different sets of control variables.

As expected, the estimate of β is small and statistically insignificant among younger workers, with or without control variables. However, the estimate is large and statistically significant among older workers. The estimate in column one panel C, which does not include control variable, suggests that new health information decreased entitlements by 9.8 percentage points. This estimate increases to 11.4 percentage points in column three, which contains the full set of controls. Thus, it appears that new health information leads to delays in benefit entitlements, particularly among older workers.

It is important to note that, within each panel, the size of the sample decreases from column one to three. This is because some control variables are missing for some observations. To ensure that the different estimates of β are not due to sample selection, β is estimated with no control variables, but using only observations with non-missing values. The estimates of β are similar to those presented in column one of Table 4. Among ages 40 to 62, the estimate is -0.007 (standard error: 0.011); among ages 40 to 58, the estimate is -0.001 (standard error: 0.007); and among ages 59 to 62, the estimate is -0.130 (standard error: 0.043).

IV. Additional Considerations

This section considers whether the delay in benefit entitlements varies across Social Security programs or across subgroups of the population. This is accomplished by either replacing the outcome variable in equation (1), or by splitting the sample into subgroups. In all regression specifications that follow, equation (1) contains the full set of control variables.

Additionally, the sample is limited to older workers who are ages 59 to 62 at the time of the survey.

A. Type of Entitlement

Workers who are ages 59 to 62 at the time of the survey reach ages 62 to 66 by the end of period year four, when benefit entitlements are measured, and thus are eligible for OA benefits. An important consideration, then, is whether the delay in entitlements is due to DI benefits, OA benefits, or both. To address this question, the outcome variable in equation (1) is replaced with program-specific indicators of entitlement. The equation is estimated first using an indicator of DI entitlement by period year four and then again using an indicator of OA entitlement by period year four. These indicators are based on initial entitlement, rather than the current entitlement at the end of period year four.[4]

The regression estimates are presented in panel A of Table 5. The first column corresponds to DI entitlement, and the second column corresponds to OA entitlement. As shown, additional health information decreases entitlements to both programs. For DI, the estimated decrease is 3.8 percentage points, which is statistically significant at the 5 percent level. For OA, the estimated decrease is 7.7 percentage points, which is not statistically significant at the 5 percent level (p-value: 0.064). Thus, it appears that the delay in entitlements is greater for OA benefits, but the effect is less precisely estimated.

B. Sex

According to Figure 1, rates entitlement increase near the early retirement age among both males and females. Thus, another important consideration is whether the effect of new health information on benefit entitlements varies by sex. To address this question, equation (1) is estimated separately for males and females.

The results are presented in panel B of **Table 5**. As shown, new health information appears to decrease claims among both males and females. For males, the estimated decrease is 13.1 percentage points, which is statistically significant at the five percent level. For females, the estimated decrease is 10.8 percentage points, which is not statistically significant at the five percent level (p-value: 0.078). Thus, the results suggest that the delay in entitlements is greater, and more precisely estimated, among males.

[4] Current entitlement differs from initial entitlement if a DI beneficiary reaches the normal retirement age, at which point the beneficiary is transferred to the OA program.

C. DI Insured Status

The next consideration is whether the effect of new health information varies by DI insured status. To be insured, an individual must have accumulated 20 quarters of coverage during the past ten years. Quarters of coverage are determined by a worker's earnings that are covered by Social Security. In 2013, one quarter of coverage is earned for every $1,160 in covered earnings, up to four quarters of coverage per calendar year. DI insured status is determined for each survey respondent using longitudinal data on quarters of coverage contained in the SSA data.[5] Of course, DI insured status determines whether a worker is eligible for DI benefits, but is also an indicator for recent labor force attachment. To address this question, equation (1) is estimated separately by DI insured status.

The results are presented in panel C of Table 5. As shown, the effect of new health information on benefit entitlements is only evident among worker who are DI insured. Among these workers, the estimated decrease in entitlements is 13.5 percentage points, which is statistically significant at the five percent level. Among workers who are not DI insured, the estimated decline is only 1.5 percentage points, which is not statistically significant. Thus, it appears that the results are driven primarily by workers with recent attachment to the labor force.

D. Previous Diagnosis of Diabetes

Mentioned above, diabetes status is the most salient difference in health information between exam groups. An important consideration is whether the effect of health information depends on whether a respondent had been previously diagnosed with diabetes. Ostensibly, a diabetes test – and a positive test result, in particular – provides more information to respondents who have not been previously diagnosed with diabetes. To address this question, equation (1) is estimated for separately by whether the respondent had been previously diagnosed with diabetes according to the at-home survey.

The estimates are presented in panel D of Table 5. As shown, the effect of health information on delayed entitlements is greater among workers who have not been previously diagnosed. Among these workers, the estimated decline in benefit entitlements is 12.7 percentage points. Among workers who had already been diagnosed with diabetes, the estimated decline in benefit entitlements is only 5.8 percentage points. These results are consistent with a

[5] The administrative data do not contain annual Social Security covered earnings.

study by Edwards (2013), who finds that the effect of medical screening on health behaviors is greatest among the previously undiagnosed population.

E. Quarters of Coverage

The final consideration is whether new health information affects labor supply. Labor supply is measured using longitudinal data on quarters of coverage, which are available in the SSA administrative data. To examine quarters of coverage, the outcome variable in equation (1) is replaced with two different measures of quarters of coverage. The first measure is any quarters of coverage in period four; the second measure is the number of quarters of coverage in period year four.

The results are presented in Table 6. Similar to Table 4, the results are presented for the entire analysis sample, and then separately for younger and older workers. As shown, new health information appears to increase employment, but the effects are most pronounced among older workers. Among these workers, the estimated increase in the likelihood of any quarters of coverage is 11.8 percentage points. Among younger workers, the estimated increase is just 4.5 percentage points. These results suggest that health knowledge not only delays benefits entitlements, but increases labor supply as well.[6]

V. Discussion and Conclusion

This study examines whether new health knowledge – obtained through medical screening – affect entitlements to Social Security benefits. The results suggest that new health information increases labor supply and delays entitlements to benefits. These results contrast with the general presumption that poor health hastens early retirement.

One possible mechanism is that the detection of a latent medical condition increases demand for health insurance coverage. This increase in demand may encourage employment to obtain or retain employer provided health insurance coverage. This mechanism is especially apt for workers who are not offered retiree health insurance, which is shown to significantly affect retirement behavior (Gruber and Madrian 1995). The mechanism is also apt for workers under the age of 65, who may not qualify for Medicare.

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[6] Coile et al. (2002) show that retirement does not perfectly coincide with timing of benefit entitlement.

Support for this mechanism – and for the role of Medicare, specifically – is evident in Figure 3. As mentioned, the effect of new health information on benefit delays is most apparent among older workers who are 59 to 62 years of age at the time of the survey. However, among workers who are 62 years of age, the difference in entitlements is just 3.7 percentage points. By the end of period year four, when entitlements are measured, these workers have reached ages 64, 65, and 66, and thus a majority are eligible for Medicare. Although this observation is by no means decisive – the sample sizes at a single age are too small to draw definitive conclusions – the figure suggests that new health information delays retirement specifically to age 65, when individuals become eligible for Medicare.

Appendix Table 1: Diagnostic Criteria

Condition	Criteria	Morning	Afternoon
Diabetes, including borderline (plasma glucose)	>100 mg/dL	Yes	No
Diabetes (plasma glucose)	>160 mg/dL	Yes	No
High LDL cholesterol, including borderline	>130 mg/dL	Yes	No
High LDL cholesterol	>160 mg/dL	Yes	No
Triglycerides, including borderline	>150	Yes	No
Triglycerides	>200	Yes	No
High total cholesterol, including borderline	>200 mg/dL	Yes	No
High total cholesterol	>240 mg/dL	Yes	Yes
Low HDL cholesterol	<59 mg/dL	Yes	Yes
High blood pressure	>140/90 mmHg	Yes	Yes

Notes: The criteria for diabetes come from the National Institute of Diabetes, Digestive, and Kidney Diseases. The criteria for cholesterol come from the National Heart, Blood, and Lung Institute. In regards to the criteria for blood pressure, the numerator refers to systolic, and the denominator refers to diastolic.

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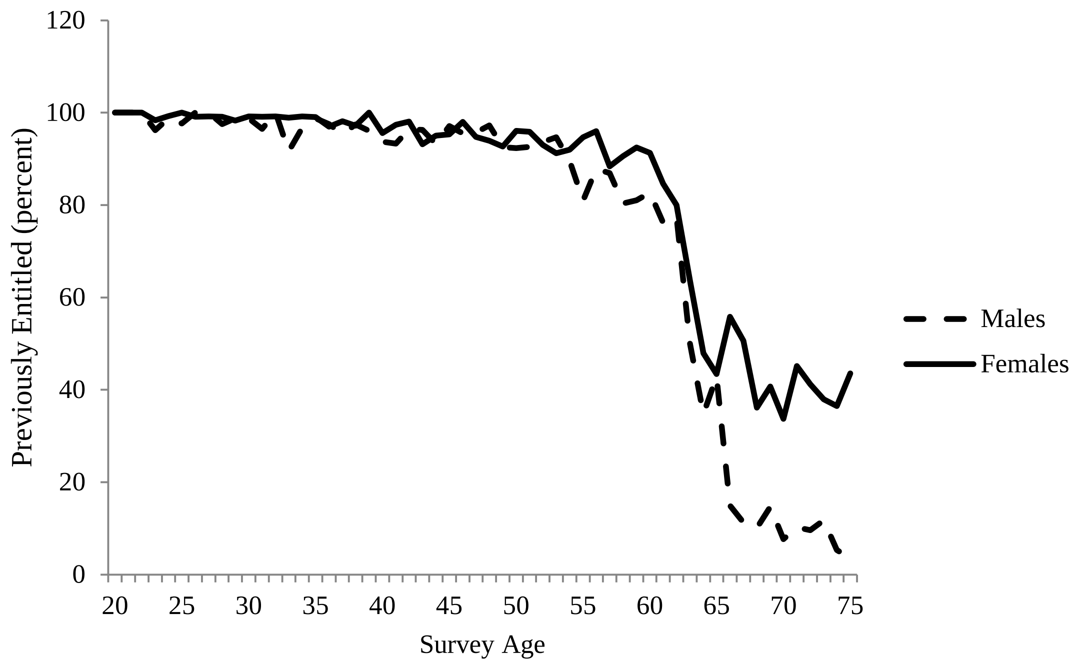

Figure 1: Percent of Survey Respondents Entitled to DI or OA Benefits Prior to the Survey

Notes: The data come from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The sample is limited to respondents who are matched to SSA data.

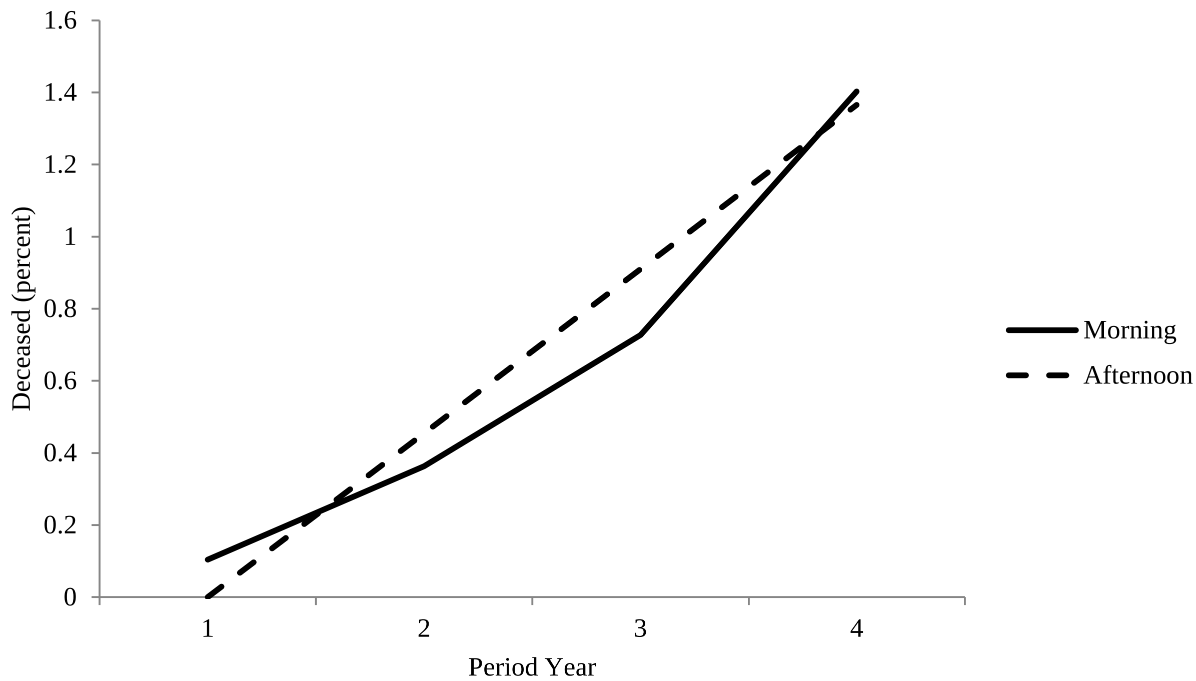

Figure 2: Mortality by Period Year, Analysis Sample

Notes: Notes: The data come from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The sample is limited to respondents who are matched to SSA data, who are not entitled to DI or OA benefits prior to the survey, and who are ages 40 to 62.

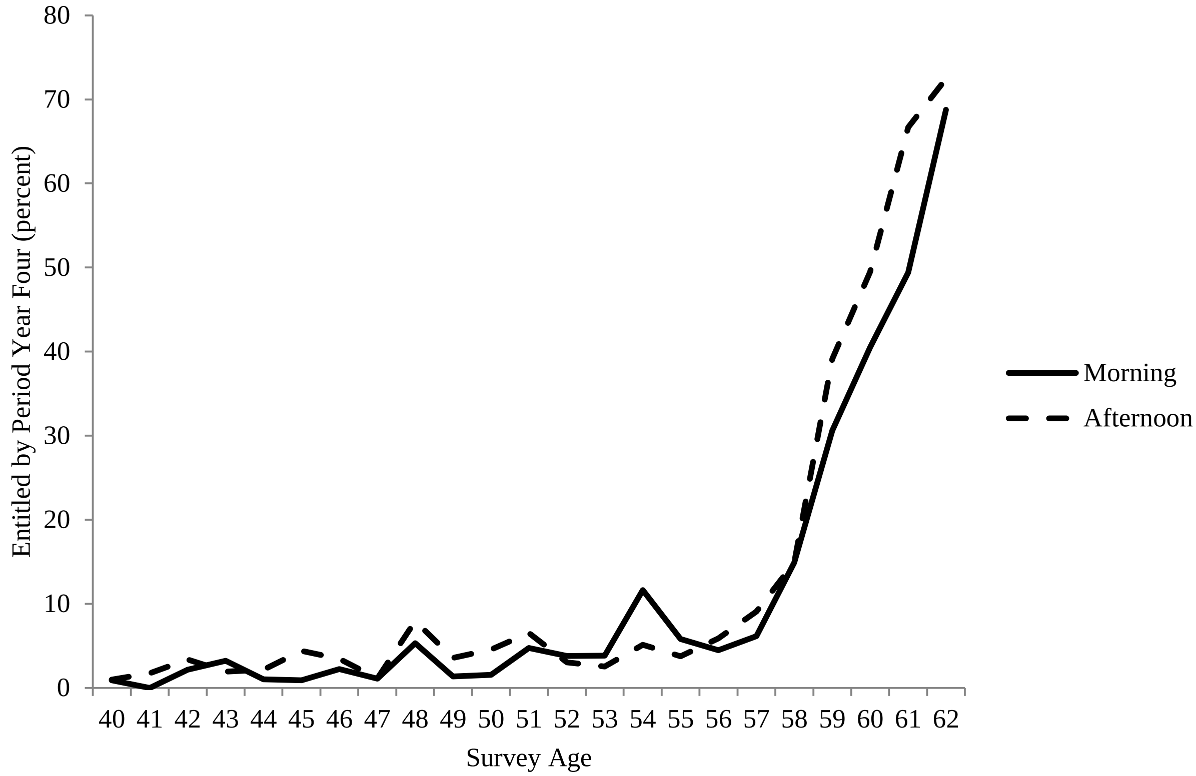

Figure 3: DI or OA Entitlement by Period Year Four, Analysis Sample

Notes: Notes: The data come from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The sample is limited to respondents who are matched to SSA data, who are not entitled to DI or OA benefits prior to the survey, and who are ages 40 to 62.

Table 1: Demographic Characteristics

	Full Sample			Analysis Sample		
	Morning	Afternoon	Difference	Morning	Afternoon	Difference
Age (years)	50.0	49.5	0.534	50.3	49.9	0.445
	(0.228)	(0.226)	(0.321)	(0.155)	(0.149)	(0.216)*
Male	0.473	0.475	-0.003	0.491	0.493	-0.002
	(0.006)	(0.006)	(0.008)	(0.011)	(0.011)	(0.016)
White	0.499	0.500	-0.002	0.509	0.491	0.018
	(0.006)	(0.006)	(0.008)	(0.011)	(0.011)	(0.02)
Other	0.195	0.192	0.003	0.202	0.213	-0.012
	(0.005)	(0.005)	(0.007)	(0.009)	(0.009)	(0.013)
Black	0.306	0.308	-0.001	0.289	0.295	-0.006
	(0.006)	(0.005)	(0.008)	(0.010)	(0.010)	(0.015)
Less than High School	0.329	0.326	0.003	0.282	0.268	0.014
	(0.006)	(0.006)	(0.008)	(0.010)	(0.010)	(0.014)
High School	0.235	0.240	-0.006	0.221	0.232	-0.011
	(0.005)	(0.005)	(0.007)	(0.009)	(0.010)	(0.013)
Some College or More	0.436	0.433	0.003	0.497	0.500	-0.003
	(0.006)	(0.006)	(0.008)	(0.011)	(0.011)	(0.016)
Married	0.567	0.553	0.014	0.662	0.651	0.011
	(0.006)	(0.006)	(0.008)	(0.011)	(0.011)	(0.015)
Widowed	0.104	0.101	0.002	0.037	0.031	0.006
	(0.004)	(0.004)	(0.006)	(0.004)	(0.004)	(0.006)
Divorced	0.119	0.124	-0.005	0.177	0.184	-0.007
	(0.004)	(0.004)	(0.006)	(0.009)	(0.009)	(0.013)
Single	0.210	0.222	-0.012	0.124	0.134	-0.010
	(0.005)	(0.005)	(0.007)	(0.008)	(0.008)	(0.011)
Observations	7270	6943		1925	1977	

Notes: The data come from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The full sample is limited to respondents who are ages 20 and older; the analysis sample is limited to respondents who are matched to SSA data, who are not entitled to DI or OA benefits prior to the survey, and who are ages 40 to 62. Observations refer to the sample, and do not account for missing values for some variables. Standard errors are in parentheses. In the differences column, * indicates significance at the 5 percent level.

Table 2: Self-Reported Health Characteristics

	Full Sample			Analysis Sample		
	Morning	Afternoon	Difference	Morning	Afternoon	Difference
Diabetes, including borderline	0.109	0.117	-0.008	0.109	0.119	-0.010
	(0.004)	(0.004)	(0.006)	(0.007)	(0.007)	(0.010)
Diabetes	0.097	0.102	-0.004	0.095	0.105	-0.010
	(0.004)	(0.004)	(0.006)	(0.007)	(0.007)	(0.010)
High cholesterol	0.273	0.257	0.016	0.330	0.306	0.024
	(0.005)	(0.005)	(0.007)*	(0.011)	(0.010)	(0.0149)
High blood pressure	0.319	0.316	0.003	0.328	0.323	0.004
	(0.006)	(0.005)	(0.008)	(0.011)	(0.011)	(0.015)
Arthritis	0.266	0.245	0.020	0.255	0.225	0.029
	(0.005)	(0.005)	(0.007)*	(0.010)	(0.009)	(0.014)*
Heart failure	0.034	0.031	0.003	0.018	0.015	0.004
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
Heart disease	0.042	0.047	-0.005	0.029	0.026	0.003
	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.005)
Angina	0.036	0.039	-0.003	0.020	0.025	-0.005
	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)	(0.005)
Heart attack	0.045	0.047	-0.002	0.033	0.027	0.006
	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.005)
Stroke	0.037	0.035	0.003	0.018	0.015	0.004
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
Emphysema	0.021	0.018	0.003	0.015	0.008	0.007
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)*
Overweight	0.290	0.291	-0.001	0.354	0.352	0.002
	(0.005)	(0.005)	(0.008)	(0.011)	(0.011)	(0.015)
Chronic bronchitis	0.061	0.059	0.002	0.062	0.064	-0.001
	(0.003)	(0.003)	(0.004)	(0.006)	(0.006)	(0.008)
Liver condition	0.033	0.031	0.002	0.045	0.046	0.000
	(0.002)	(0.002)	(0.003)	(0.005)	(0.005)	(0.007)
Observations	7270	6943		1925	1977	

Notes: The data come from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The full sample is limited to respondents who are ages 20 and older; the analysis sample is limited to respondents who are matched to SSA data, who are not entitled to DI or OA benefits prior to the survey, and who are ages 40 to 62. Observations refer to the sample, and do not account for values for some variables. Standard errors are in parentheses. In the differences column, * indicates significance at the 5 percent level.

Table 3: Laboratory and Examination Results

	Full Sample			Analysis Sample		
	Morning	Afternoon	Difference	Morning	Afternoon	Difference
Diabetes, including borderline	0.382	-	-	0.439	-	-
	(0.006)			(0.012)		
Diabetes	0.099	-	-	0.110	-	-
	(0.004)			(0.007)		
High LDL cholesterol,	0.375	-	-	0.432	-	-
including borderline	(0.006)			(0.012)		
High LDL cholesterol	0.134	-	-	0.158	-	-
	(0.004)			(0.009)		
Triglycerides, including	0.363	-	-	0.376	-	-
borderline	(0.006)			(0.011)		
Triglycerides	0.203	-	-	0.213	-	-
	(0.005)			(0.010)		
High total cholesterol,	0.496	0.517	-0.021	0.556	0.603	-0.046
including borderline	(0.006)	(0.006)	(0.009)*	(0.012)	(0.011)	(0.016)*
High total cholesterol	0.173	0.184	-0.011	0.198	0.218	-0.019
	(0.005)	(0.005)	(0.007)	(0.009)	(0.010)	(0.013)
Low HDL cholesterol	0.746	0.730	0.015	0.755	0.734	0.020
	(0.007)	(0.007)	(0.009)	(0.012)	(0.012)	(0.017)
High blood pressure	0.224	0.215	0.009	0.202	0.206	-0.004
	(0.005)	(0.005)	(0.007)	(0.009)	(0.009)	(0.013)
BMI (index)	28.3	28.4	-0.074	29.1	29.2	-0.125
	(0.075)	(0.075)	(0.106)	(0.147)	(0.147)	(0.208)
Observations	7270	6943		1925	1977	

Notes: The data come from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The full sample is limited to respondents who are ages 20 and older; the analysis sample is limited to respondents who are matched to SSA data, who are not entitled to DI or OA benefits prior to the survey, and who are ages 40 to 62. Observations refers to the sample, and do not account missing values for some variables. Standard errors are in parentheses. In the differences column, * indicates significance at the 5 percent level.

Table 4: Linear Probability Model of DI or OA Entitlement by Period Year, Analysis Sample

	A. Ages 40 to 62			B. Ages 40 to 58			C. Ages 59 to 62		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Morning	-0.009	-0.020	-0.021	-0.005	-0.007	-0.005	-0.098	-0.105	-0.114
	(0.010)	(0.010)*	(0.010)*	(0.007)	(0.007)	(0.007)	(0.040)*	(0.039)*	(0.042)*
Age		0.020	0.021		0.003	0.003		0.136	0.148
		(0.001)*	(0.001)*		(0.001)*	(0.001)*		(0.019)*	(0.020)*
Male		0.020	0.017		0.012	0.013		0.049	0.048
		(0.010)*	(0.010)		(0.007)	(0.007)		(0.044)	(0.045)
Black		0.019	0.024		0.007	0.011		0.007	0.005
		(0.013)	(0.014)		(0.010)	(0.011)		(0.058)	(0.063)
Other		0.014	0.018		0.001	-0.001		-0.024	-0.014
		(0.012)	(0.013)		(0.009)	(0.009)		(0.051)	(0.053)
Less than High School		0.014	0.014		0.003	0.008		0.017	0.032
		(0.015)	(0.015)		(0.011)	(0.011)		(0.059)	(0.063)
Some College or More		-0.027	-0.025		-0.010	-0.005		-0.075	-0.069
		(0.012)*	(0.012)		(0.009)	(0.009)		(0.051)	(0.054)
Widowed		-0.068	-0.061		0.018	0.029		-0.302	-0.303
		(0.032)*	(0.036)		(0.027)	(0.031)		(0.073)*	(0.085)*
Divorced		-0.003	-0.004		0.011	0.014		-0.024	-0.038
		(0.013)	(0.014)		(0.010)	(0.010)		(0.057)	(0.061)
Single		0.004	-0.005		0.018	0.013		-0.102	-0.126
		(0.014)	(0.015)		(0.012)	(0.012)		(0.080)	(0.085)
Self-Reported Health	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Laboratory Results	No	No	Yes	No	No	Yes	No	No	Yes
Observations	3848	3656	3282	3223	3063	2750	625	593	532

Notes: The results are derived from the analysis sample. The left-out categories are white, for race; high school diploma, for education; and married, for marital status. Controls for self-reported health status refer to conditions listed in Table 2; controls for laboratory results refer to conditions listed in Table 3, excluding high HDL cholesterol, which is missing for a substantial number of observations. Robust standard errors are in parentheses. * and ** indicate significant at the five and one percent level, respectively.

Table 5: Linear Probability of Benefit Entitlements, Analysis Sample

	A. Type of Entitlement		B. Sex		C. DI Insured Status		D. Previous Diabetes Diagnosis	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	DI	OA	Male	Female	Insured	Not Insured	No	Yes
Morning	-0.038	-0.077	-0.131	-0.108	-0.135	-0.015	-0.127	-0.058
	(0.015)*	(0.041)	(0.059)*	(0.061)	(0.047)*	(0.084)	(0.046)*	(0.108)
Age	-0.015	0.163	0.193	0.132	0.184	0.080	0.155	0.095
	(0.008)	(0.020)*	(0.028)*	(0.029)*	(0.022)*	(0.048)	(0.023)*	(0.063)
Male	0.023	0.025			-0.052	0.119	0.062	-0.135
	(0.017)	(0.045)			(0.050)	(0.101)	(0.050)	(0.140)
Black	-0.016	0.020	-0.016	0.027	0.041	0.044	0.062	0.068
	(0.020)	(0.063)	(0.085)	(0.098)	(0.074)	(0.139)	(0.071)	(0.194)
Other	-0.012	-0.001	-0.063	0.042	-0.032	0.034	-0.031	0.149
	(0.016)	(0.053)	(0.071)	(0.082)	(0.058)	(0.122)	(0.060)	(0.140)
Less than High School	0.011	0.021	0.198	-0.124	0.106	-0.130	0.041	-0.214
	(0.022)	(0.063)	(0.084)*	(0.093)	(0.073)	(0.130)	(0.071)	(0.167)
Some College or More	-0.021	-0.048	-0.032	-0.063	-0.084	-0.164	-0.068	-0.252
	(0.020)	(0.054)	(0.079)	(0.077)	(0.059)	(0.129)	(0.059)	(0.167)
Widowed	-0.010	-0.293	-0.123	-0.410	-0.412	-0.160	-0.304	-0.289
	(0.010)	(0.084)*	(0.194)	(0.096)*	(0.098)*	(0.175)	(0.089)*	(0.248)
Divorced	0.019	-0.056	0.089	-0.155	-0.149	0.065	-0.065	-0.030
	(0.026)	(0.062)	(0.095)	(0.080)	(0.073)*	(0.117)	(0.065)	(0.148)
Single	-0.006	-0.120	-0.120	-0.186	-0.157	-0.066	-0.129	-0.253
	(0.029)	(0.084)	(0.138)	(0.116)	(0.096)	(0.176)	(0.102)	(0.215)
Observations	532	532	267	265	380	152	432	100

Notes: The results are derived from the analysis sample. The left-out categories are white, for race; high school diploma, for education; and married, for marital status. All regressions include controls for self-reported health status (Table 2) and laboratory results (Table 3), excluding high HDL cholesterol, which is missing for a substantial number of observations. Robust standard errors are in parentheses. * and ** indicate significant at the five and one percent level, respectively.

Table 6: Linear Models of Quarters of Coverage, Analysis Sample

	A. Any Quarters of Coverage			B. Number of Quarters of Coverage		
	(1)	(2)	(3)	(1)	(2)	(3)
	Ages 40 to 62	Ages 40 to 58	Ages 59 to 62	Ages 40 to 62	Ages 40 to 58	Ages 59 to 62
Morning	0.055	0.045	0.118	0.215	0.159	0.557
	(0.015)*	(0.016)*	(0.042)*	(0.061)*	(0.066)*	(0.165)*
Age	-0.014	-0.011	-0.081	-0.055	-0.045	-0.302
	(0.001)*	(0.002)*	(0.021)*	(0.005)*	(0.007)*	(0.085)*
Male	0.096	0.090	0.102	0.423	0.410	0.378
	(0.016)*	(0.017)*	(0.046)*	(0.064)*	(0.069)*	(0.181)*
Black	-0.051	-0.055	0.034	-0.216	-0.236	0.149
	(0.022)*	(0.023)*	(0.065)	(0.088)*	(0.093)*	(0.257)
Other	0.001	-0.007	0.077	0.011	-0.015	0.294
	(0.020)	(0.022)	(0.055)	(0.080)	(0.086)	(0.216)
Less than High School	-0.134	-0.134	-0.143	-0.506	-0.501	-0.557
	(0.024)*	(0.026)*	(0.064)*	(0.096)*	(0.104)*	(0.249)*
Some College or More	0.034	0.020	0.083	0.133	0.073	0.370
	(0.019)	(0.020)	(0.056)	(0.076)	(0.080)	(0.223)
Widowed	0.013	0.008	0.082	0.074	0.062	0.301
	(0.047)	(0.056)	(0.090)	(0.187)	(0.225)	(0.351)
Divorced	0.012	-0.006	0.098	0.059	-0.014	0.429
	(0.022)	(0.023)	(0.062)	(0.086)	(0.092)	(0.246)
Single	-0.004	-0.019	0.075	-0.021	-0.071	0.251
	(0.024)	(0.025)	(0.079)	(0.096)	(0.101)	(0.321)
Observations	3282	2750	532	3282	2750	532

Notes: The results are derived from the analysis sample. The left-out categories are white, for race; high school diploma, for education; and married, for marital status. All regressions include controls for self-reported health status (Table 2) and laboratory results (Table 3), excluding high HDL cholesterol, which is missing for a substantial number of observations. Robust standard errors are in parentheses. * and ** indicate significant at the five and one percent level, respectively.