CESifo WORKING PAPERS

9893
2022

August 2022

Age-Based Health Insurance Coverage Policies and Mental Health

Yiran Han, Barış K. Yörük

CESifo

Impressum:

CESifo Working Papers
ISSN 2364-1428 (electronic version)
Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH
The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
Editor: Clemens Fuest
https://www.cesifo.org/en/wp
An electronic version of the paper may be downloaded
· from the SSRN website: www.SSRN.com
· from the RePEc website: www.RePEc.org
· from the CESifo website: https://www.cesifo.org/en/wp

CESifo *Working Paper No. 9893*

Age-Based Health Insurance Coverage Policies and Mental Health

Abstract

More than 18 percent of U.S. adults met the diagnostic criteria for a mental illness. Yet, many who could benefit from mental health care do not receive any treatment, mostly due to the inability to pay for care or lack of health insurance coverage. How does a sudden change in health insurance coverage status affect psychological well-being and mental health? We explore this question using age-based health insurance coverage policies in the United States as natural experiments. We provide evidence that losing health insurance coverage at age 26 due to aging out from dependent coverage is associated with a statistically significant deterioration in certain indicators of mental health among young adults. On the other hand, we find no evidence of an improvement in mental health or psychological well-being among the elderly at age 65 due to becoming eligible for Medicare. These results are robust to potential changes in risk-taking behavior and physical health at the same age cutoffs.

JEL-Codes: I120, I130, I180.

Keywords: Affordable Care Act, dependent coverage, health insurance, medicare, mental health, psychological well-being.

Yiran Han
Department of Economics
University at Albany-SUNY
Albany / NY / USA
yhan7@albany.edu

*Barış K. Yörük**
Department of Economics
University at Albany-SUNY
Albany / NY / USA
byoruk@albany.edu

*corresponding author

August 10, 2022

1 Introduction

Studying factors related to mental and behavioral health is important for designing public policies that seek to improve both individual and social well-being. In 2017, 18.9% of U.S. adults met diagnostic criteria for a mental illness (Substance Abuse and Mental Health Services Administration, 2018). Total spending on mental health treatment and services in the U.S. was estimated at $225 billion in 2019. This estimate does not consider indirect costs, such as lower workforce participation rates and decreased productivity. Depression alone was estimated to account for $44 billion in losses to workplace productivity.[1] Despite the availability of effective treatment options, many individuals with mental illness do not receive care or may have a substantial delay in receiving care. In 2017, more than half of U.S. adults who could benefit from mental healthcare did not receive any treatment. Among individuals who seek care, but do not receive it, commonly reported barriers are inability to pay and lack of insurance coverage. There is also evidence that delays in receiving care, which could plausibly occur following an insurance loss, can have negative effects on mental health (Maclean, Tello-Trillo, and Weber, 2019). In this paper, we investigate the effects of gaining or losing health insurance on several indicators of mental health psychological well-being among the young adults and the elderly using two different age-based health insurance coverage policies in the United States as natural experiments. Our empirical strategy is an RD design that exploits sudden changes in health insurance coverage status at ages 26 (due to aging out of dependent coverage) and 65 (due to becoming eligible for Medicare). To the best of our knowledge, this is the first paper that uses an RD design to estimate the effects of losing or gaining health insurance coverage at different ages on mental health and psychological well-being.

Using data from the household component (HC) and self-administered questionnaire (SAQ) of the Medical Expenditure Panel Survey (MEPS), we first document that consistent with the existing literature, health insurance coverage rates among young adults who just turned 26 decrease significantly. We provide evidence that the sudden drop in health insurance coverage rates is associated with a statistically significant deterioration in self-reported mental health, emotional well-being, and social role functioning among young adults. For certain demographic groups, we also document statistically significant detrimental effects of losing health insurance coverage on other indicators of mental health and psychological well-being.

The prior literature has focused primarily on the effect of insurance gains due to available sources

[1] Source: Open Minds U.S. Mental Health Market Report (2020).

of exogenous variation, but it is possible that the effects of insurance gains and losses are not likely symmetric (Ghosh and Simon 2015; Maclean, Tello-Trillo, and Weber, 2019). Furthermore, behavioral responses to changes in health insurance coverage may differ over the life cycle. We investigate these possibilities by using the exogenous variation created by the Medicare eligibility age cutoff. Similar to previous literature (Card, Dobkin, and Maestas, 2008), our findings indicate an 8.9 to 12.8 percentage point increase in health insurance coverage rates at age 65. However, we find no evidence of the positive effect of gaining health insurance coverage on mental health and psychological well-being among the elderly.

Our results are observed at the relevant age cutoffs, robust under alternative models, and cannot be attributed to potential changes in risk-taking behavior and physical health at ages 26 or 65. We discuss the policy implications of our findings and offer policy suggestions to improve the insurance coverage rates and mental health among those who lost coverage due to aging out of the dependent coverage at age 26.

2 Background and review of the literature

There are two main age-based health insurance coverage policies in the United States. Since September 2010, the Affordable Care Act (ACA) requires plans and issuers that offer dependent coverage to make the coverage available until a child reaches the age of 26. Both married and unmarried children qualify for this coverage. On the other hand, Medicare provides insurance coverage for people aged 65 and older regardless of income and health status. Several papers used an RD design to exploit the discrete change in health insurance coverage rates at age 26 or 65 to investigate the impact of the dependent coverage mandate or Medicare on different outcomes such as health care utilization and expenses, labor market outcomes, financial health, and workers' compensation filing (Card, Dobkin, and Maestas, 2008 and 2009; Barcellos and Jacobson, 2015; Dillender, 2015; Nguyen and Yörük, 2020; Kim, 2021; Yörük and Xu, 2019; Yörük, 2018; Dahlen, 2015; Chatterji, Nguyen, and Yörük, 2021; Casswell and Goddeeris, 2020). In contrast to these papers, in this paper, we focus on the effects of the age-based eligibility rules of health insurance coverage on mental health and psychological well-being.

The literature on the effects of the ACA and Medicare on mental health outcomes is relatively limited. The majority of the existing papers focus on the expansion of dependent coverage after the introduction of the ACA. Saloner and Le Cook (2014) use a selected sample with symptoms of psy-

chological distress and find that mental health treatment increased among people below age 26 after ACA's dependent coverage mandate took effect. Golberstein et al. (2015) find that ACA dependent coverage provisions produced modest increases in general hospital psychiatric inpatient admissions nationally. They also find that the coverage expansion was associated with fewer behavioral health emergency department visits in California. Similarly, Antwi et al. (2015) find a nationwide 5.8% increase in inpatient visits for psychiatric conditions among adults ages $23-25$ in response to the introduction of the dependent coverage mandate compared to slightly older adults. Using data from the National Health Interview Survey (NHIS) from 2011 to 2013, Lee and Kim (2020) document the positive impact of the ACA's dependent coverage mandate on young adults' utilization of mental health care. Burns and Wolfe (2016) use the difference-in-differences (DD) framework to estimate the effects of the ACA young adult dependent coverage on mental health outcomes for adults ages $23-25$ relative to adults ages $27-29$ from $2007-2011$. They find modest improvements in a range of outcomes that captured both positive and negative mental health following the implementation of the dependent coverage mandate. The exception to this pattern is a 1.4 point relative increase in the mental component summary (MCS) score among young adults. Their study offers a credible estimation methodology but due to the limitations of the availability of the data, their sample size, especially for the post ACA period is relatively small. Using quantile regression within a DD framework, Shane and Wehby (2018) find significant improvements in self-reported mental health in the $23-25$-year-old group following the dependent coverage mandate. They argue that the gains were not equal across the risk distribution. For individuals at the 0.1 quantile (worse self-reported mental health), the improvement in MCS scores was significant, a 6.1% increase compared to the pre-mandate baseline at that quantile. Effects were smaller but still significant at the median but there was no apparent effect for those that were at higher levels of self-reported mental health.

Few papers focus on different provisions of Medicare and Medicaid on mental health. Wells et al. (2002) find that the likelihood of alcohol, drug abuse, and mental health care is highest under Medicaid and lowest for the uninsured and those under Medicare. Baik et al. (2012) document that Medicare was associated with a modest reduction in the number of prescriptions filled for depression and heart failure. Ayyagari and Shane (2015) use a DD framework to identify the causal effect of Medicare part D on mental health. They find that Medicare part D resulted in a 14.8% decline in depressive symptoms and a 21.2% decline in the likelihood of experiencing three or more depressive symptoms. These results are in line with the finding that depressive symptoms were associated with cost-related medication nonadherence in elderly Medicare beneficiaries and Medicare enrollees with

disabilities (Bambauer et al., 2007). Donohue (2006) shows that antidepressant use and adherence also get improved by Medicare part D. Maclean, Tello-Trillo, and Weber (2019) study the effects of losing insurance on mental health and substance use disorder (SUD) by leveraging the variation in public insurance eligibility offered by a large-scale Medicaid disenrollment. They find that losing insurance decreased SUD-related hospitalizations but mental illness hospitalizations were unchanged.

This paper contributes to the existing literature on the effects of the ACA and Medicare on mental health and psychological well-being in several ways. First, to the best of our knowledge, this paper is the first to use an RD design to estimate the causal impact of losing or gaining health insurance on several different indicators of psychological well-being and mental health. The RD design not only enables us to compare our results with previous studies that either rely on simple pre-post comparisons or a more credible DD framework; but also provides the local treatment effects of the relevant health insurance policies in the short run. Estimating the short-run effects of these policies is important because losing health insurance often causes a sudden disruption in healthcare delivery, which may also have a long-run effect on health. In contrast to previous papers, we also provide a detailed analysis of the impacts of losing or gaining health insurance coverage on different populations that differ by employment and marital status, eligibility for public insurance plans, gender, race, and income. The existing literature ignores the fact that a change in health insurance coverage status may have an impact on risk-taking behavior. If this is the case, changes in different indicators of mental health in psychological well-being may be attributed to the changes in risk-taking behavior rather than the policy itself. A unique question in the Medical Expenditure Survey (MEPS) that provides a measure of risk-taking behavior enables us to formally test this hypothesis.

3 Data

The Medical Expenditure Panel Survey (MEPS) is a nationally representative survey of families and individuals, their medical providers (doctors, hospitals, pharmacies, etc.), and employers across the United States. In the MEPS, each individual is interviewed for up to five rounds over two full calendar years. Individuals who leave their original family unit are followed and remain in the survey. Every year, a new panel of approximately $15,000$ individuals is added to the survey. Therefore, two panels overlap at any given point in time, resulting in roughly $30,000$ individuals being interviewed each year. Since the ACA's dependent coverage mandate was enforced after September 2010, we use data

from the $2011-2016$ waves of the MEPS.[2] To maximize sample size, we restrict our sample to those who are at most 8 years younger or older than age 26 or 65 cutoffs ($18-34$-year olds or $57-73$-year olds) but also consider an alternative age bandwidth of 6 years as a robustness check.[3]

For the insurance coverage outcome, we use data from the household component (HC) of the MEPS. In the HC, each respondent is asked about her insurance coverage status and the type of insurance that she held for each month during the two years that she remained in the survey. Therefore, for each respondent, there are up to 24 observations for the insurance coverage outcome. To investigate the potential change in the insurance coverage status of individuals upon turning 26 or 65, we create a binary variable representing health insurance coverage of any type (public or private) in a given month. In Table 1, we provide the summary statistics for this variable. Those who are older than 26 are slightly less likely to have insurance compared to those who are younger than this cutoff age. On the other hand, those who are older than 65 are considerably more likely to have insurance compared to those who are younger than 65 (99.4% vs. 86.6%).

The data for mental health and psychological well-being comes from the HC and self-administered questionnaire (SAQ), which was completed by a subsample of respondents of the HC only once in a survey year.[4] We consider four indicators of mental health, each of which measures different aspects of mental health and psychological well-being. The first indicator comes from the HC and measures overall mental health based on self-reported mental health status. In each round of the MEPS (typically three times a year), each respondent was asked to assess their mental health. We create a binary variable using responses to this question, which takes the value of one if the respondent reported very good or excellent mental health. The remaining outcomes come from the SAQ. These include mental component summary (MCS) score, Kessler index, and patient health questionnaire (PHQ) score, which are measures of mental health and psychological well-being. These measures are widely used in the literature and were found to be reliable and valid to assess the physical and

[2] We were not able to use data from the recent waves of the MEPS because the most recent (2017-2020) waves of the SAQ component of the MEPS do not contain information on the exact interview date of the respondents and most of the mental health outcomes.

[3] Since information on the exact birth date is not available, it is not possible to determine the exact date of turning 26 or 65 for each respondent. Therefore, it is impossible to determine the treatment status of a respondent for the month that she turns 26 or 65. In order to address this problem, we exclude the month that each respondent turns 26 or 65 from the sample (when the running variable, i.e., the number of months before or after the 26th or 65th birth months, is equal to 0).

[4] A person was considered eligible to receive an SAQ if that person did not have a status of deceased or institutionalized, did not move out of the U.S. or to a military facility, was not a non-response at the time of the Round 2 or Round 4 interview date, and was 18 years of age or older. New respondents added in Round 3 or Round 5 were not asked to complete an SAQ questionnaire.

mental health of different age groups (Ware, Kosinski, and Keller, 1996; Kessler, et al., 2002; Kroenke, Spitzer, and Williams, 2003). The MCS are calculated using the items from Short-Form 12 Version 2 Health Survey (SF-12v2) and normalized to a range of $0 - 100$ with a population mean of 50 and a standard deviation of 10. It is used to assess emotional well-being and social role functioning. The Kessler index is comprised of various questions that assess mental health during the past 30 days. This index was developed to distinguish cases of mental illness from non-cases in a community sample that reflect severity regardless of the particular diagnosis. The Kessler index scores range from 0 to 24. A score of 13 or higher is a suggested threshold as an indicator of serious psychological distress. Finally, the PHQ score is a depression screening tool for which a summary score of 3 or higher indicates a positive screen. Appendix A provides a detailed discussion of these variables. In general, a higher MCS score indicates better mental health. On the other hand, higher scores from Kessler index and PHQ indicate a tendency towards mental and psychological problems. We provide the summary statistics for these variables in Table 1.

In the HC, respondents were asked about their insurance coverage status for each month although they were interviewed up to five rounds during a two-year period. It is plausible that respondents are less likely to remember or misreport their insurance coverage status for the months that they were not interviewed. This recall bias may create a measurement error. Chatterji, Nguyen, and Yörük (2021) provide evidence that potential recall bias in the MEPS is not severe and unlikely to affect the results from the empirical analysis. Furthermore, the main analysis for the effects of the policy on mental health and psychological well-being uses data mainly from the SAQ, which contains information only for the month that it was administered. Therefore, the potential effects of the recall bias on the empirical analysis should be minimal.

4 Methodology

To estimate the change in health insurance coverage status and different indicators of mental health and psychological well-being at age 26 or 65, we use an RD design. The identification strategy of this approach relies on the assumption that those who are slightly younger or older than these cutoff ages have similar observable and unobservable characteristics. However, due to the ACA's dependent care mandate or Medicare, these two groups will have significantly different insurance coverage rates. Since individuals have no control over their age, one can use these cutoff ages as a natural experiment to estimate the effect of losing or gaining health insurance on psychological well-being and mental

health.[5] In particular, we estimate the following RD model:

$$Y_{it} = \beta_1' \mathbf{X}_{it} + \alpha_1 treat_{it} + f(age_{it}) + \varepsilon_{it}. \tag{1}$$

In this equation, Y_{it} is the outcome variable representing either insurance coverage status or one of the indicators of mental health and psychological well-being for individual i at time t. The individual-specific control variables are denoted by $\mathbf{X}_{it}$ and include family size, log of household income, and a set of binary variables controlling for gender, race, and marital status of the respondent. The binary treatment variable is denoted by $treat_{it}$ and is equal to 1 for those who are older than the cutoff age. The coefficient of interest, α_1, is the estimated effect of turning 26 or 65 on outcome variables. Information on the birth month and year of each respondent is available in the MEPS, thus it is possible to calculate the difference between the date of the actual outcome and the respondent's 26th or 65th birthday in months. For each respondent, the variable age_{it} (forcing variable) represents the number of months before or after the relevant birthday. Modeling the smooth function of the forcing variable correctly is one of the main problems in implementing the RD design. We use a parametric model that contains a quadratic polynomial of age_{it} that is fully interacted with the treatment variable as our preferred specification. However, we also test the robustness of the results under alternative model specifications, In particular, we also estimate parametric models that contain the third-order polynomial of age_{it} and non-parametric models that do not rely on any functional form assumptions. The complete age profile for alternative parametric models with different degrees of polynomials can be expressed as:

$$f(age_{it}) = \sum_{j=1}^{k} \delta_j age_{it}^j + \sum_{j=1}^{k} \lambda_j (treat_{it} \times age_{it}^j) \text{ for } k = \{2, 3\}. \tag{2}$$

We restrict the data from the MEPS to all observations in which the respondent is up to 96 months (8 years) younger or older than the cutoff age. Since the RD estimates may be sensitive to the selection of this bandwidth, we also report results for an alternative choice of bandwidth, i.e., $|age_i| \leq 72$ (6 years). To control for birthday celebration effects and different treatment of age across insurance providers, in all models, we exclude the month that each respondent turns 26 or 65 from the sample ($age_i = 0$). We use the sample weights as reported in the MEPS and report standard errors, that are clustered by the forcing variable.[6] We also estimate separate models for different demographic

[5] Imbens and Lemieux (2008), Porter (2003), and Lee and Lemieux (2010) present a detailed discussion of the RD design and related issues.

[6] We use two different sample weights as reported in the MEPS. For insurance coverage and self-reported mental health outcomes, we use the sample weights as reported in the HC of the MEPS. For the remaining mental health and psychological well-being outcomes, we use the sample weights as reported in the SAQ of the MEPS.

groups.

We also estimate equation (1) using non-parametric estimators. For these models, we follow Hahn, Todd, and van der Klaauw (2001) and Porter (2003), and use local linear regressions to estimate the left and right limits of discontinuity at age 26 or 65. In all non-parametric models, we use mean squared error (MSE) optimal bandwidth selection procedure to determine the optimal bandwidth as discussed in Calonico, et al. (2017). Following Cattaneo, Titiunik, and Vazquez-Bare (2019), we conduct a formal power analysis to test whether our sample is large enough to detect meaningful changes in outcome variables as a response to a change in health insurance coverage status at age 26 or 65. We find that for all outcomes and under alternative bandwidth selections, we have sufficient number of observations to detect more than 0.1 standard deviation change from the mean with a 90% power.

The underlying assumption of an RD design in our context is that except for the health insurance coverage status, the observable and unobservable characteristics of individuals that may have an impact on outcome variables should not exhibit a discrete and statistically significant change at the cutoff age. In appendix Figures B1 and B2, we plot the 30-day averages of selected control variables around the 26th and 65th birthdays. These figures show that control variables vary smoothly around the cutoff age. Therefore, they should have very little effect on the estimates of the discontinuity and serve mainly to increase the precision of our estimates. The main results that are presented in the next section also show that the inclusion of control variables to the parametric models has no considerable impact on main estimates. Another possible threat to the identification strategy comes from the possibility of non-random sorting of respondents to either side of the age cutoffs. Appendix Figure B3 shows the distribution of observations around the relevant age cutoffs. Overall, the distribution of the frequency of observations is smooth across the cutoff ages and there is no evidence of nonrandom sorting around the 26th or 65th birthdays in the sample.

5 Results

5.1 Health insurance coverage

In Table 2, we report the RD estimates of the change in health insurance coverage status at age 26 and 65 under alternative parametric and non-parametric models. The estimates suggest that the probability of being covered under any health insurance plan goes up by 4.4 to 6.4 percentage points at the 26th birthday. This effect is highly significant and comparable to that estimated by previous

studies (Yörük, 2018). Similarly, our RD results for the change in health insurance take-up at age 65 due to Medicare are comparable with Card, Dobkin, and Maestas (2008) and Chatterji, Nguyen, and Yörük (2021) and indicate an 8.9 to 12.8 percentage point increase in health insurance coverage due to Medicare eligibility. Panel A in Figures 1 and 2 illustrate these findings. In each figure, we plot the mean of the probability of being covered under any insurance plan for one-month intervals 96 months before and after the 26th or 65th birthday. The solid lines are second-order polynomials fitted on individual observations on both sides of the age 26 and 65 cutoffs. These figures clearly show the discrete changes in health insurance coverage rates at these cutoff ages.

5.2 Mental health and psychological well-being

In Table 2 and the corresponding panels in Figures 1 and 2, we present the impact of age-based health insurance coverage policies on several indicators of mental health and psychological well-being for the full sample. We find that the probability of reporting very good or excellent mental health among young adults decreases by up to 4.9 percentage points at age 26 (6.4% of the pre-age-26 mean). Our results also provide evidence of a deterioration in emotional well-being and social role functioning among young adults upon losing health insurance coverage and indicate an up to 0.92 point decrease in the MCS at the age-26 cutoff. This corresponds to a 1.76% decrease compared to the pre-age-26 mean of this variable. These effects remain statistically significant under the majority of the alternative model specifications. Panels B and C of Figure 1 also illustrate this finding and show a sudden drop in self-reported mental health and the MCS at age 26.

Table 2 shows that Kessler index score increases up to 0.22 points (7.37% of the pre-age-26 mean) at age 26. This indicates an increase in non-specific psychological distress among young adults due to losing health insurance coverage. Similarly, PHQ score, which measures the frequency of the person's depressed mood and decreased interest in usual activities, increases by 0.037 points (6.89% of the pre-age-26 mean) at the same age cutoff. Panels D and E of Figure 1 also show a relatively small increase in these variables at the age-26 cutoff. However, the estimates for both variables are statistically insignificant under all model specifications, which indicates the limited impact of the ACA's dependent coverage mandate on these specific measures of mental health among young adults.

Compared to the impact of losing health insurance at age 26, the impact of gaining health insurance at age 65 on mental health is quite limited. The magnitude of the estimated coefficients on the self-reported mental health status, MCS, Kessler index score, and PHQ score are relatively small. Furthermore, they are statistically insignificant under all model specifications. Panels B to E of

Figure 2 show virtually no change in these variables at the age-65 cutoff. Therefore, we find no evidence of an improvement in mental health and psychological well-being due to gaining eligibility for Medicare at age 65.

5.3 Subsample analysis

Soss and Schram (2001) and Kotsadam and Jakobsson (2011) argue that policies may affect people differently depending on the context in which they are introduced. The impact is more likely to be observed among the individuals who notice and are directly affected by the policy the most. For example, ACA's dependent coverage mandate did not have an impact on the entire 26-year-old population in the United States. It mainly affected the health insurance coverage rates among those who are not employed full-time and therefore, not eligible for coverage under employer-sponsored plans and those who are not covered by a public health insurance plan such as Medicaid. Table 3 shows the detrimental impact of losing health insurance on self-reported mental health status for those who are not eligible for a public insurance plan. For this group, compared to the full sample, the change in the MCS score at the age 26 cutoff is also larger (1.04 vs. 0.92 points). We also find a statistically significant, 0.29 point increase in the Kessler index for those who are not covered by a public insurance plan, which implies an increase in non-specific psychological distress due to losing coverage at age 26. Surprisingly, the effect of turning 26 and losing coverage on mental health and psychological well-being among those who are not employed is not significant at conventional levels.

One would expect a greater impact of the dependent coverage mandate and Medicare on those who are not married since they cannot be covered under their spouse's plan upon losing coverage at age 26 or before gaining coverage at age 65. Compared to the full sample, Table 3 shows a slightly larger (0.98 points) impact of the dependent coverage mandate on the MCS among those who are not married. The changes in Kessler index and PHQ score at age 26 remain statistically insignificant for this group.

The MEPS has detailed information on income and categorizes individuals into one of the five income groups: the poor (100% or less of the federal poverty level, i.e., FPL), the near-poor ($100-124\%$ of the FPL), low income ($125-199\%$ of the FPL), middle income ($200-399\%$ of FPL), and high income (400% or more of FPL). Table 3 shows that ACA's dependent coverage mandate does not have a significant impact on the mental health or psychological well-being of those who belong to the high-income group. This is not surprising since high-income individuals are more likely to afford health care even after losing health insurance coverage.

The remaining specifications in Table 3 show that females and blacks are more sensitive to the change in health insurance coverage at age 26. Losing health insurance coverage is associated with deterioration in mental health for both groups. For females, the MCS decreases by 1.04 points while Kessler index score increases by 0.29 points at age 26. For blacks, Kessler index and PHQ scores increase by 0.78 and 0.3 points, respectively indicating an increase in non-specific psychological distress and a greater tendency towards depression due to loss of health insurance coverage.

Since Medicare is a public insurance plan, we cannot estimate separate models for those who are not covered by a public insurance plan around the age 65 cutoff. However, our estimates for other subsamples around this age cutoff are similar to those from the full sample and remain to be statistically insignificant. The only exception is the estimates for females. For females, marginally significant estimates suggest that Medicare eligibility is associated with a 0.97 point increase in the MCS and a 0.13 point decrease in the PHQ score, which indicates an improvement in mental health due to gaining coverage at age 65.

5.4 Robustness checks

Our results for the full sample and alternative subsamples show that the changes in mental health and psychological well-being are mainly observed around the age 26 cutoff. We investigate whether these results are robust under several sensitivity tests and report our results in Tables 4 and 5. For the main analysis, we restrict our sample to those who are at most 8 years (96 months) younger or older than the age 26 cutoff (18-34-year-olds). Table 4 shows that for the full sample, the results remain robust under a relatively shorter bandwidth of 72 months.

Another possible concern for the validity of our results is that young adults who are about to turn 26 and lose dependent coverage, may anticipate this beforehand and increase their health care consumption and spending just before their 26th birthday. This could potentially bias our estimates and generate a discrete change in self-reported mental health and psychological well-being at age 26 even if there is no true change in actual outcomes. We investigate this potential problem using a donut RD design, in which we exclude observations for three months before and after the cutoff age of 26 from our sample. The results reported in Table 4 show that the estimates from the donut RD analysis for the MCS, Kessler index, and PHQ score are similar to those from the full sample analysis. However, statistically significant change in the probability of reporting very good or excellent mental health disappears under this specification.

Change in attitudes towards health insurance at age 26 may be due to potential mood changes

during the birthday and short period following it. If this is the case, our estimates around age 26 may reflect the birthday effect rather than the true effect of the policy change. The last two specifications in Table 4 show that this is not the case. Estimating RD models for alternative age cutoffs (25th and 27th birthdays) yield statistically insignificant coefficients for the treatment effect for mental health outcomes, which implies that the discrete changes in the MCS at age 26 is due to the ACA's dependent coverage mandate. The exception is the marginally significant effect of turning 27 on self-reported mental health.

Table 5 presents the results from similar robustness checks for the selected subsamples for which we reported a statistically significant change in at least one of the mental health outcomes in Table 3. For the majority of subsamples and mental health outcomes, the coefficients on placebo treatments at the age 25 and 27 cutoffs are statistically insignificant. For those who are not covered by a public insurance plan, the impact of losing health insurance at age 26 on the MCS remains robust under alternative model specifications. For females and those who are not married, the negative impact of the policy on the MCS is robust to estimating models with a donut RD design, but not to the selection of a shorter bandwidth. Similarly, the increase in the Kessler index score at age 26 that we observed for females is sensitive to the selection of a shorter bandwidth. This suggests that relatively small sample sizes for alternative demographic groups coupled with a smaller sample size due to the selection of a shorter bandwidth may generate imprecise estimates. Our results in Table 3 show that in contrast to other demographic groups, blacks tend to report a higher PHQ score upon turning 26, implying a greater tendency towards depression due to loss of insurance coverage. Table 5 shows that this result is not sensitive to model or bandwidth selection.

Another concern for the validity of our results is the potential change in physical health and risk-taking behavior at the policy age cutoffs. This is possible because young adults may be less likely to take risks to avoid costly health care when they lose coverage at age 26. Similarly, gaining health insurance at age 65 may have an impact on the risk-taking behavior among the elderly. Physical health may be a compliment for mental health. Thus, a potential change in physical health may also have an impact on mental health at the policy age cutoffs. The SAQ has specific questions that measure physical health and the risk-taking behavior of the respondents. The physical component score (PCS) is derived from the items from Short-Form 12 Version 2 Health Survey (SF-12v2). Similar to the MCS, a higher score implies better physical health. Appendix A provides a detailed description of this variable. On the other hand, each respondent that filled out the SAQ of the MEPS is asked whether she is more likely to take risks than the average person. The responses to this question range

from disagree strongly =1 to agree strongly = 5. We generate a binary variable (risk) which is equal to one if the respondent reported that she either agrees somewhat or agrees strongly that she is more likely to take risks than the average person. We provide the summary statistics for the PCS and risk variable in Table 1. Using these outcomes, we investigate the potential changes in physical health and risk-taking behavior at ages 26 and 65. Table 6 and Figure 3 show that there is no evidence of a discrete change in the PCS or risk taking behavior at the policy cutoff ages. Therefore, changes in mental health and psychological well-being due to gaining or losing health insurance cannot be attributed to the changes in physical health or risk-taking behavior.

6 Discussion of results and conclusion

More than 18 percent of U.S. adults met diagnostic criteria for a mental illness. Yet, many who could benefit from mental health care do not receive any treatment, mostly due to the inability to pay for care or lack of health insurance coverage. How does a sudden change in health insurance coverage status affect psychological well-being and mental health among young adults and the elderly? We explore this question using age-based health insurance coverage policies in the United States as natural experiments. Our results indicate that losing health insurance coverage at age 26 due to aging out from the dependent coverage is associated with a statistically significant deterioration in certain indicators of mental health among young adults. These effects are mostly concentrated on selected demographic groups. However, we find no evidence of an improvement in mental health or psychological well-being among the elderly at age 65 due to becoming eligible for Medicare and gaining coverage. Our results provide the first RD evidence of age-based health insurance policies in the United States on mental health and psychological well-being. To the best of our knowledge, our paper is also the first to study the impact of the change in Medicare eligibility status on several indicators of mental health among the elderly.

Our results from the RD analysis for the effects of losing health insurance at age 26 (0.9 point decrease in the MCS for the full sample at the cutoff age) are comparable to those from Burns and Wolfe (2016), who used a DD framework and find that the ACA's dependent coverage mandate is associated with a 1.4 point increase in the MCS among $23-25$-year-olds relative to those ages $27-29$ after the policy change. In our analysis, we observe changes up to 1.4 points in the MCS for certain demographic groups (females). The MCS reflects emotional well-being, positive or negative mental health symptoms, and social role functioning. Placing this effect size in context, randomized clinical

trials of low-intensity treatment for adults with diagnosed depression or anxiety is associated with a $1-6$ point increase in the MCS score. The upper end of this range is considered moderate but meaningful while a gain of $1-2$ points is of questionable clinical significance (Huffman, et al., 2014; Wells, et al., 2000). The effects that we report in this paper for different demographic groups fall at the lower end of this distribution. However, they reflect population-level estimates for certain demographic groups rather than estimates obtained from individuals with the diagnosed illness and volunteered for trial participation. Thus, we argue that the effects observed in our study reflect a significant deterioration in emotional well-being and social role functioning among young adults, who lose coverage due to aging out of dependent coverage at age 26. This result is also supported by a statistically significant deterioration in other indicators of mental health, such as the Kessler index and PHQ scores, at age 26 for certain demographic groups of young adults.

Previous studies have found that the effects of the adult dependent coverage expansion were not uniform across men and women (Barbaresco, Courtemanche, Qi, 2015). Our findings imply that the statistically significant effects of the ACA's dependent coverage on mental health and psychological well-being come solely from females. This is consistent with findings from Burns and Wolfe (2016) but contradicts with results from Golberstein et al. (2015), who find that the dependent coverage expansion increased inpatient psychiatric admissions for both young women and young men, with larger effects observed among men. It is plausible that males and females have different attitudes towards risk, which may explain the differential effects of the policy among these two groups (Booth and Nolan, 2012). However, we document that the heterogeneous impact of the dependent coverage mandate on mental well-being among females and males cannot be explained by the differences in risk-taking behavior or physical health between these two groups.

Due to the nature of the RD design, the findings of this paper represent the short-run effects of the dependent coverage mandate and Medicare eligibility on mental health and psychological well-being. The short-run effects may be different than the long-run effects since individuals may shift the timing of health care visits across the policy cutoff ages. However, we find no evidence that people anticipate the effects of Medicare and significantly alter their health care consumption just before their 26th or 65th birthday. Furthermore, previous literature also documents that there is little evidence that individuals shift the timing of health care visits in anticipation of gaining or losing insurance coverage.[7] Since all RD designs estimate local treatment effects, the results of this paper apply to individuals close to their 26th or 65th birthday and cannot be generalized to the entire population of young adults

[7] See, for example, Gross (2010), Long, Marquis, and Rodgers (1998), Chatterji, Nguyen, Yörük (2021).

or the elderly. However, our results remain important for policymakers. This is because the effects of the change in health insurance coverage status on mental health are likely to be immediate due to delays in care. In addition, approximately 75% of mental health disorders emerge by age 24 (Kessler et al., 2005). However, young adults are less likely to seek mental health treatment than middle-aged adults, mostly due to the financial barriers to access health care. Our findings imply that those who benefit from the dependent coverage mandate the most (those who are slightly younger than 26 but did not have coverage before the implementation of the ACA) experienced significant improvements in mental health. On the other hand, according to the 2019 American Community Survey (ACS), 26-year-olds had the highest uninsured rate among all ages, followed by 27-year-olds (Conway, 2020). The raw data from the MEPS show that insurance coverage rates among 31-year-olds or older are comparable or higher than those who are slightly younger than 26. This implies that on average, young adults may struggle up to 5 years after turning 26 to regain access to health care. Low-income individuals are eligible for federal subsidies to lower their insurance premiums at the Federal Health Insurance Marketplace (FHIM). Our findings imply that additional subsidies for $26-31-$year-olds may have a significant impact on improving the health insurance coverage rates among these age groups. This policy may also increase access to health care, improve mental health and psychological well-being, and have positive spillover effects on workforce participation rates and productivity among those who lost health insurance coverage at age 26.

References

[1] Antwi, Y. A., A.S. Moriya, K. Simon, 2015, Access to health insurance and the use of inpatient medical care: Evidence from the Affordable Care Act young adult mandate, *Journal of Health Economics*, 2015, 39, 171–187.

[2] Ayyagari, P., D.M. Shane, 2015, Does prescription drug coverage improve mental health? Evidence from Medicare Part D, *Journal of Health Economics*, 41, 46–58.

[3] Baik, S.H., B.L. Rollman, C.F. Reynolds III, J.R. Lave, K.J. Smith, Y. Zhang, 2012, The effect of the Medicare Part D coverage gaps on medication use among beneficiaries with depression and heart failure, *The Journal of Mental Health Policy and Economics*, 15, 105-118.

[4] Bambauer, K.Z., D.G. Safran, D. Ross-Degnan, F. Zhang, A.S. Adams, J. Gurwitz, M. Pierre-Jacques, S.B. Soumerai, 2007, Depression and cost-related medication nonadherence in Medicare

beneficiaries, *Archives of General Psychiatry*, 64, 602–608.

[5] Barbaresco, S., C.J. Courtemanche, Y. Qi, 2015, Impacts of the Affordable Care Act dependent coverage provision on health-related outcomes of young adults, *Journal of Health Economics*, 40, 54–68.

[6] Barcellos, S.H. and M. Jacobson, 2015, The effects of Medicare on medical expenditure risk and financial strain, *American Economic Journal: Economic Policy*, 7, 41-70.

[7] Booth, A.L. and P. Nolan, 2012, Gender differences in risk behavior: Does nurture matter?, *Economic Journal*, 122, 56-78.

[8] Burns, M.E. and B.L. Wolfe, 2016, The effects of the Affordable Care Act adult dependent coverage expansion on mental health, *The Journal of Mental Health Policy and Economics*, 19, 3-20.

[9] Cattaneo, M.D., R. Titiunik, G. Vazquez-Bare, 2019, Power calculations for regression discontinuity designs, *Stata Journal*, 19, 210-245.

[10] Card, D., C. Dobkin, and N. Maestas, 2008, The impact of nearly universal insurance coverage on health care utilization: Evidence from Medicare, *American Economic Review*, 98, 2242-2258.

[11] Card, D., C. Dobkin, and N. Maestas, 2009, Does Medicare save lives?, *Quarterly Journal of Economics*, 124, 597-636.

[12] Casswell, K.J. and Goddeeris, J.H., 2020, Does Medicare reduce medical debt?, *American Journal of Health Economics*, 6, 72-103.

[13] Chatterji, P., T. Nguyen, B.K. Yörük, 2021, The effects of Medicare on health care utilization and spending among the elderly, *American Journal of Health Economics*, https://doi.org/10.1086/716544.

[14] Conway, D., 2020, Adults age 26 had highest uninsured rate among all ages, followed by 27-year-olds, 2020, available at: https://www.census.gov/library/stories/2020/10/uninsured-rates-highest-for-young-adults-aged-19-to-34.html

[15] Dahlen, H.M., 2015, "Aging out" of dependent coverage and the effects on US labor market and health insurance choices, *American Journal of Public Health*, 105, 640-650.

[16] Dillender, M., 2015, The effect of health insurance on workers' compensation filing: Evidence from the affordable care act's age-based threshold for dependent coverage, *Journal of Health Economics*, 43, 204-228.

[17] Donohue, J., 2006, Mental health in the Medicare Part D drug benefit: A new regulatory model?, *Health Affairs*, 25, 707–719.

[18] Ghosh, A., and K. Simon, 2015, The effect of Medicaid on adult hospitalizations: Evidence from Tennessee's Medicaid contraction. National Bureau of Economic Research Working Paper No.21580.

[19] Golberstein, E. et al., 2015, Effect of the Affordable Care Act's young adult insurance expansions on hospital-Based mental health care, *American Journal of Psychiatry*, 172, 182–189.

[20] Hahn, J., P. Todd, and W. van der Klaauw, 2001, Identification and estimation of treatment effects with a regression-discontinuity design, *Econometrica*, 69, 201-209.

[21] Huffman, J. C, et al., 2014, Collaborative care for depression and anxiety disorders in patients with recent cardiac events. The management of sadness and anxiety in cardiology (MOSAIC) randomized clinical trial, *JAMA Internal Medicine*, 174, 927–935.

[22] Imbens, G. and T. Lemieux, 2008, Regression discontinuity designs: A guide to practice, *Journal of Econometrics*, 142, 615-635.

[23] Kessler R.C., et al., 2002, Short screening scales to monitor population prevalence and trends in non-specific psychological distress, *Psychological Medicine*, 32, :959–976.

[24] Kessler, R.C., et al., 2005, Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication, *Archives of General Psychiatry*, 62, 768–768.

[25] Kim, D., 2021, The effect of the Affordable Care Act dependent coverage mandate on health insurance and labor supply: Evidence from alternative research designs, *International Labor Relations Review*, https://doi.org/10.1177/0019793920984413.

[26] Kotsadam and Jakobsson, 2011, Do laws affect attitudes? An assessment of the Norwegian prostitution law using longitudinal data, *International Review of Law and Economics*, 31, 103-115.

[27] Kroenke K., R.L. Spitzer, J.B.W. Williams, 2003, The Patient Health Questionnaire-2: Validity of a two-item depressive screener, *Medical Care*, 41, 1284–1292.

[28] Lee, D.S. and T. Lemieux, 2010, Regression discontinuity designs in economics, *Journal of Economic Literature*, 48, 281-355.

[29] Lee, J. and J. Kim, 2020, The role of health insurance in mental health care for young adults, *Applied Economics*, 52, 4577–4593.

[30] Maclean, C., D. Tello-Trillo, D.A. Webber, 2019. Losing insurance and behavioral health hospitalizations: Evidence from a large-scale medicaid disenrollment, IZA Working Papers No. 12463.

[31] Nguyen, T. and B.K. Yörük, 2020, Aging out of dependent coverage and the effects on the use of inpatient medical care, *International Journal of Health Economics and Management*, 20, 381-390.

[32] Open Minds, 2020, The U.S. Mental Health Market, Market Intelligence Report. Available at: https://openminds.com/intelligence-report/the-u-s-mental-health-market-225-1-billion-in-spending-in-2019-an-open-minds-market-intelligence-report/

[33] Porter, J., 2003, Estimation in the regression discontinuity model, Unpublished Manuscript, Harvard University, Department of Economics.

[34] Saloner, B., B. Le Cook, 2014, An ACA provision increased treatment for young adults with possible mental illnesses relative to comparison group. *Health Affairs*, 33, 1425–1434.

[35] Shane, D.M., G.L. Wehby, 2018, Higher benefit for greater need: Understanding changes in mental well-being of young adults following the ACA dependent coverage mandate, *The Journal of Mental Health Policy and Economics*, 21, 171-180.

[36] Soss, J. and S. Schram, 2007, A public transformed? Welfare reform as policy feedback, *American Political Science Review*, 101, 111-127.

[37] Substance Abuse and Mental Health Services Administration. 2018. Key Substance Use and Mental Health Indicators in the United States: Results from the 2017 National Survey on Drug Use and Health. Rockville, MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration.

[38] Ware, J.E., M. Kosinski, S.D. Keller, 1996, 12-item short-form health Survey: Construction of scales and preliminary tests of reliability and validity, *Medical Care*, 34, 220-233.

[39] Wells, K.B., C.D. Sherbourne, R. Sturm, A.S. Young, M. Audrey Burnam, 2002, Alcohol, drug abuse, and mental health care for uninsured and insured adults, *Health Services Research*. 37, 1055–1066.

[40] Wells. K. B, et al., 2000, Impact of disseminating quality improvement programs for depression in managed primary care - A randomized controlled trial, *Journal of the American Medical Association*, 283, 212–220.

[41] Yörük, B.K., 2018, Health insurance coverage and health care utilization: Evidence from the Affordable Care Act's dependent coverage mandate, *Forum for Health Economics and Policy*, 21, 1-24.

[42] Yörük, B.K. and L. Xu, 2019, Impact of ACA's dependent coverage mandate on health insurance and labor market outcomes among young adults: Evidence from regression discontinuity design, *Eastern Economic Journal*, 45, 58-86.

Appendix A

The SAQ contained three measures of health status: the Short-Form 12 Version 2 (SF-12v2), the Kessler index of non-specific psychological distress, and the Patient Health Questionnaire (PHQ-2). The construction and validity of these measures are discussed in Ware, Kosinski, and Keller (1996), Kessler, et al. (2002), and Kroenke, Spitzer, and Williams (2003). Further details for these measures are discussed in the survey documentation of the MEPS for the relevant years.

PCS and MCS

The PCS and MCS are developed from the SF-12v2. The SF-12v2 questions are as follows:

1. General health today.
2. During a typical day, limitations in moderate activities.
3. During a typical day, limitations in climbing several flights of stairs.
4. During the past 4 weeks, as a result of physical health, accomplished less than would like.
5. During the past 4 weeks, as a result of physical health, limited in kind of work or other activities.
6. During the past 4 weeks, as a result of mental problems, accomplished less than you would like.
7. During the past 4 weeks, as a result of mental problems, did work or other activities less carefully than usual.
8. During the past 4 weeks, pain interfered with normal work outside the home and housework.
9. During the past 4 weeks, felt calm and peaceful.
10. During the past 4 weeks, had a lot of energy.
11. During the past 4 weeks, felt downhearted and depressed.
12. During the past 4 weeks, physical health or emotional problems interfered with social activities.

The scoring algorithm for PCS and MCS incorporate information from all 12 questions. In the MEPS, a proprietary weighting algorithm is used to calculate the PCS and MCS. However, the PCS weights more heavily responses to questions 1-5 and 8. The MCS weights more heavily to responses to questions 6, 7, 9, 11, and 12. Higher scores from PCS and MCS indicate better physical and mental health.

Kessler Index

The Kessler index is developed from six questions that were designed to measure non-specific psychological distress. These questions are as follows:

1. During the past 30 days, felt nervous.
2. During the past 30 days, felt hopeless.
3. During the past 30 days, felt restless or fidgety.
4. During the past 30 days, felt so sad that nothing could cheer the person up.
5. During the past 30 days, felt that everything was an effort.
6. During the past 30 days, felt worthless.

A summary of the six variables above provides an index to measure non-specific, rather than disorder-specific, psychological distress, using the following values:

0	None of the time
1	A little of the time
2	Some of the time
3	Most of the time
4	All of the time

The Kessler index is a summation of the values of the six variables above. The higher the value of the Kessler index, the greater the person's tendency towards mental disability.

PHQ Score

PHQ score is developed from two questions that assess the frequency of the person's depressed mood and decreased interest in usual activities. These questions are:

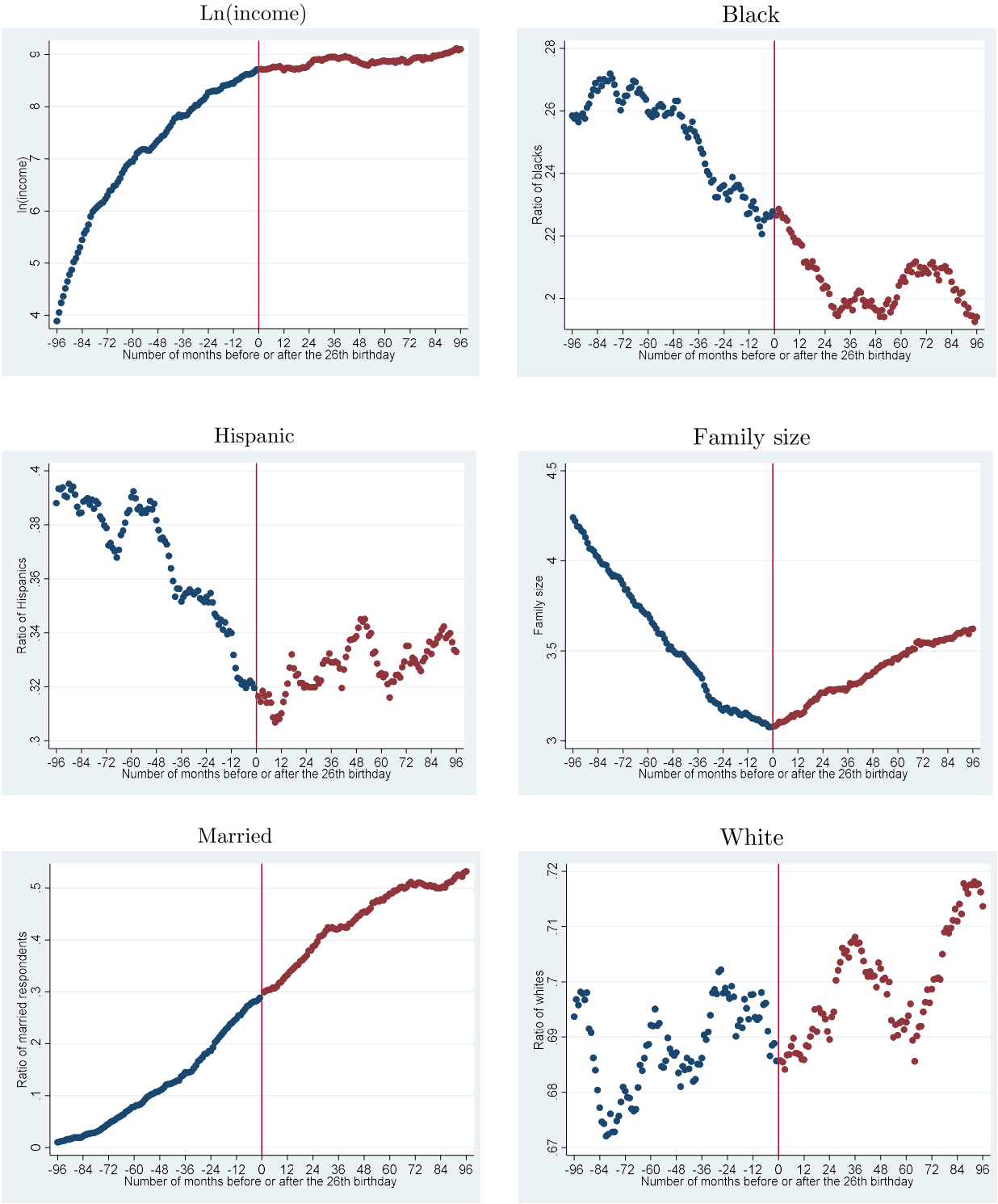
1. During the past two weeks, bothered by having little interest or pleasure in doing things.
2. During the past two weeks, bothered by feeling down, depressed, or hopeless.

Response values for each item: 0 = not at all; 1 = several days; 2 = more than half the days; 3= nearly every day.

PHQ score is a summation of the values of the two variables above, with scores ranging from 0 through 6. The higher the value of PHQ score, the greater the person's tendency towards depression. Kroenke et al. (2004) suggest a score of 3 as the optimal cut point for screening purposes.

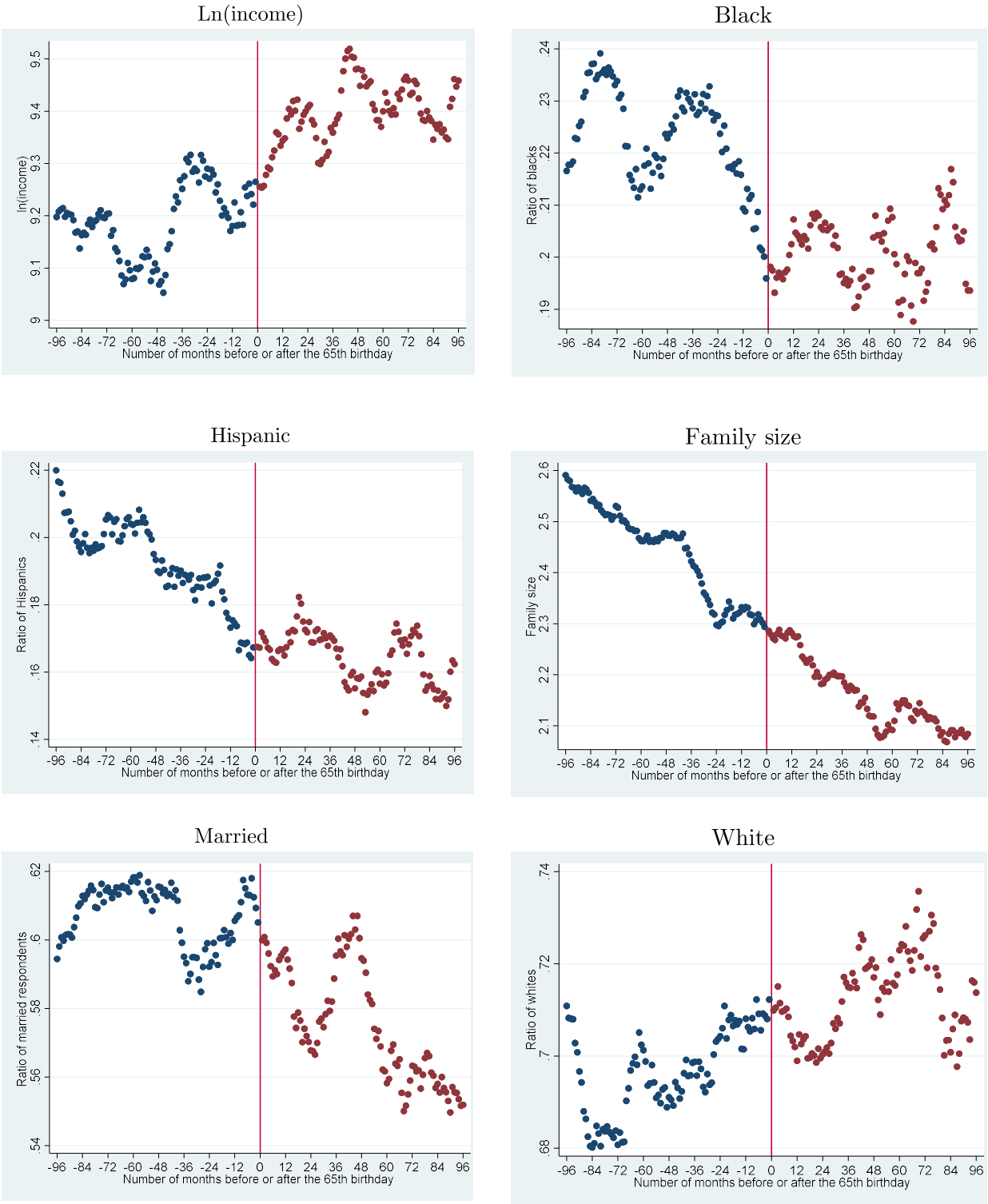
Appendix B

Figure B1. Change in selected control variables at age 26



Notes: Means of the selected control variables for 1-month intervals 96 months before and after the 26th birthday are plotted.

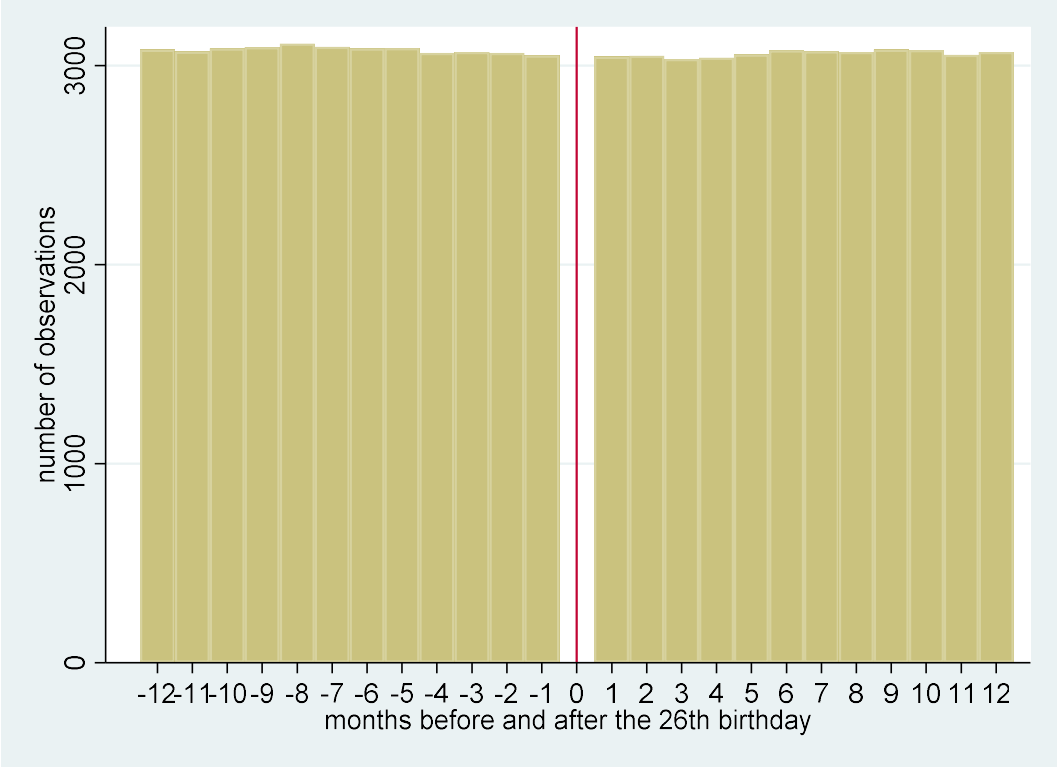
Figure B2. Change in selected control variables at age 65



Notes: Means of the selected control variables for 1-month intervals 96 months before and after the 26th birthday are plotted.

Figure B3. Distribution of the number of observations around the cutoff ages

A. Age 26 cutoff



B. Age 65 cutoff

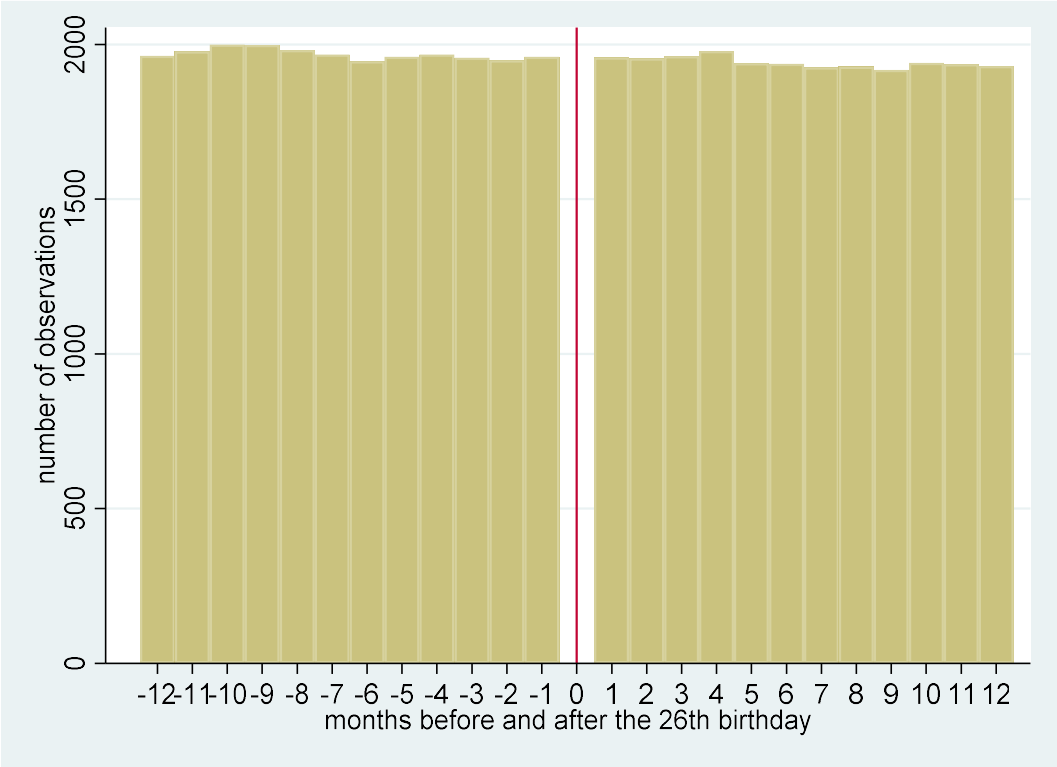


Table 1. Summary statistics

Outcomes	Younger than 26	Older than 26	Younger than 65	Older than 65
Has health insurance	0.752	0.749	0.866	0.994
	(0.432)	(0.434)	(0.341)	(0.077)
	[266273]	[265820]	[209668]	[141957]
Mental health	0.768	0.746	0.640	0.651
	(0.422)	(0.435)	(0.480)	(0.477)
	[55120]	[54965]	[43458]	[29525]
MCS	52.34	51.38	51.60	53.05
	(9.26)	(9.33)	(9.79)	(9.19)
	[16868]	[17808]	[14303]	[9557]
Kessler Index	2.92	3.03	3.25	2.80
	(3.81)	(3.91)	(4.38)	(3.80)
	[16739]	[17638]	[14093]	[9653]
PHQ	0.54	0.56	0.72	0.61
	(1.09)	(1.14)	(1.34)	(1.22)
	[16861]	[17780]	[14275]	[9833]
PCS	54.56	53.70	46.70	44.68
	(6.17)	(7.02)	(11.61)	(11.74)
	[16867]	[17797]	[14295]	[9857]
Risk	0.287	0.241	0.165	0.163
	(0.452)	(0.428)	(0.372)	(0.369)
	[16779]	[17703]	[14228]	[9771]

Notes: Data for health insurance outcomes are from the HC of the MEPS. Data for the remaining outcomes are from the SAQ of the MEPS. Sample weighted means are reported. Standard deviations are reported in parentheses. The number of observations is reported in brackets.

Table 2. The change in outcome variables at age-based health insurance eligibility cutoffs: Full sample

	Has health insurance		Mental health		MCS		Kessler index		PHQ	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(7)	(8)
A. Age 26 Cutoff										
Parametric (Quadratic)	-0.063***	-0.064***	-0.017	-0.019*	-0.850**	-0.920**	0.199	0.215	0.032	0.037
	(0.005)	(0.004)	-0.011	(0.011)	(0.362)	(0.366)	(0.138)	(0.135)	(0.043)	(0.043)
Parametric (Cubic)	-0.044***	-0.041***	-0.042***	-0.041***	-0.713	-0.717*	0.071	0.054	0.046	0.046
	(0.004)	0.004)	(0.015)	(0.015)	(0.441)	(0.428)	(0.189)	(0.185)	(0.058)	(0.058)
Pre-age-26 mean	0.752	0.753	0.768	0.769	52.339	52.340	2.918	2.919	0.537	0.537
No. of obs.	532093	529893	110085	109638	34676	34568	34377	34271	34641	34534
Non-parametric	-0.056***		-0.049**		-0.590		0.100		0.032	
	(0.004)		(0.020)		(0.440)		(0.172)		(0.052)	
No. of obs.	77947		22907		8095		11846		12638	
B. Age 65 Cutoff										
Parametric (Quadratic)	0.126***	0.128***	-0.008	0.000	-0.304	-0.053	0.082	-0.051	0.009	-0.023
	(0.003)	(0.003)	(0.013)	(0.013)	(0.395)	(0.386)	(0.158)	(0.156)	(0.055)	(0.056)
Parametric (Cubic)	0.124***	0.124***	-0.001	0.009	-0.836	-0.578	0.136	-0.006	0.059	0.025
	(0.005)	(0.005)	(0.019)	(0.019)	(0.553)	(0.519)	(0.216)	(0.207)	(0.080)	(0.079)
Pre-age-65 mean	0.866	0.866	0.640	0.640	51.600	51.613	3.252	3.249	0.717	0.715
No. of obs.	351625	350118	72983	72678	24160	24091	23746	23674	24108	24037
Non-parametric	0.089***		-0.011		-0.333		0.039		0.071	
	(0.002)		(0.022)		(0.646)		(0.208)		(0.080)	
No. of obs.	19123		18855		5516		7199		8089	
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Notes: Parametric RD models contain a quadratic or cubic polynomial of the forcing variable that is fully interacted with the treatment variable. Sample weights are used in all models. Standard errors are clustered by the forcing variable and reported in parentheses. The signs *, **, and *** denote statistical significance at 10, 5, and 1 percent levels, respectively.

Table 3. The change in outcome variables at age-based health insurance eligibility cutoffs: Subsamples

	Age 26 cutoff					Age 65 cutoff				
	Has health insurance	Mental health	MCS	Kessler index	PHQ	Has health insurance	Mental health	MCS	Kessler index	PHQ
Not covered by public insurance	-0.073***	-0.027**	-1.040**	0.293*	0.035					
	(0.004)	(0.012)	(0.404)	(0.163)	(0.049)					
No. of Obs.	414918	84074	26428	26219	26406					
Unemployed	-0.089***	0.016	-0.014	0.245	-0.068	0.152***	0.006	0.517	-0.159	-0.027
	(0.009)	(0.020)	(1.022)	(0.404)	(0.147)	(0.006)	(0.018)	(0.562)	(0.241)	(0.083)
No. of Obs.	141257	29581	8996	8907	8980	188968	39123	13057	12754	13001
Not married	-0.087***	-0.022*	-0.977**	0.178	0.052	0.164***	-0.001	-0.728	-0.090	-0.023
	(0.006)	(0.012)	(0.469)	(0.168)	(0.053)	(0.003)	(0.020)	(0.678)	(0.273)	(0.096)
No. of Obs.	385280	79956	24895	24679	24876	140601	29186	9797	9594	9779
High income	-0.030***	-0.016	-0.889	0.224	-0.059	0.081***	-0.006	0.303	-0.093	-0.082
	(0.006)	(0.019)	(0.876)	(0.303)	(0.091)	(0.003)	(0.018)	(0.586)	(0.219)	(0.067)
No. of Obs.	114136	23677	7345	7309	7334	132944	27710	9341	9293	9343
Female	-0.077***	-0.020	-1.413**	0.483**	0.074	0.138***	0.006	0.973*	-0.271	-0.125*
	(0.004)	(0.015)	(0.645)	(0.217)	(0.068)	(0.003)	(0.018)	(0.530)	(0.229)	(0.071)
No. of Obs.	275339	56923	18336	18184	18331	190411	39575	13186	12938	13155
Male	-0.054***	-0.019	-0.471	-0.040	0.005	0.119***	-0.008	-1.223*	0.222	0.096
	(0.006)	(0.014)	(0.539)	(0.191)	(0.055)	(0.005)	(0.017)	(0.622)	(0.259)	(0.083)
No. of Obs.	254554	52715	16232	16087	16203	159707	33103	10905	10736	10882
Black	-0.058***	0.008	-1.110	0.777**	0.300***	0.135***	-0.019	-0.249	0.391	0.065
	(0.009)	(0.021)	(0.797)	(0.343)	(0.093)	(0.005)	(0.034)	(0.830)	(0.403)	(0.115)
No. of Obs.	121184	25139	7813	7722	7806	74516	15414	4954	4779	4918

Notes: Parametric RD models are estimated using a full set of control variables and a quadratic polynomial of the forcing variable that is fully interacted with the treatment variable. Sample weights are used in all models. Standard errors are clustered by the forcing variable and reported in parentheses. The signs *, **, and *** denote statistical significance at 10, 5, and 1 percent levels, respectively.

Table 4. The change in mental health outcomes at age 26: Robustness checks for the full sample

	Mental health	MCS	Kessler index	PHQ
BW=72 months	-0.029**	-0.731*	0.095	0.034
	(0.013)	(0.383)	(0.156)	(0.049)
No. of Obs.	81321	25834	25639	25824
Donut RD	-0.001	-0.912**	0.253	0.036
	(0.009)	(0.448)	(0.167)	(0.053)
No. of Obs.	106155	33427	33140	33394
Placebo treatment (Age=25)	0.006	-0.411	-0.035	0.002
	(0.009)	(0.382)	(0.128)	(0.046)
No. of Obs.	110207	32289	32023	32259
Placebo treatment (Age=27)	0.017*	-0.276	0.222	0.002
	(0.010)	(0.395)	(0.155)	(0.047)
No. of Obs.	109022	34677	34368	34644

Notes: Parametric RD models are estimated using a full set of control variables and a quadratic polynomial of the forcing variable that is fully interacted with the treatment variable. Sample weights are used in all models. Standard errors are clustered by the forcing variable and reported in parentheses. The signs * and ** denote statistical significance at 10 and 5 percent levels, respectively.

Table 5. The change in mental health outcomes at age 26: Robustness checks for the selected subsamples

	Not covered by public insurance				**Not married**			
	Mental health	MCS	Kessler index	PHQ	Mental health	MCS	Kessler index	PHQ
BW=72 months	-0.039	-0.886**	0.224	0.054	-0.026*	-0.641	0.028	0.049
	(0.014)	(0.423)	(0.192)	(0.056)	(0.014)	(0.488)	(0.185)	(0.059)
No. of Obs.	64060	20218	20071	20210	58985	18554	18407	18548
Donut RD	-0.006	-1.080**	0.303*	0.029	-0.005	-1.060*	0.197	0.030
	(0.011)	(0.490)	(0.182)	(0.059)	(0.011)	(0.561)	(0.204)	(0.069)
No. of Obs.	81262	25503	25302	25482	77445	24077	23872	24061
Placebo treatment (Age=25)	0.008	-0.438	-0.022	0.007	0.016*	-0.599	0.001	0.011
	(0.011)	(0.402)	(0.144)	(0.049)	(0.009)	(0.472)	(0.163)	(0.057)
No. of Obs.	82443	24608	24423	24590	84077	23801	23597	23780
Placebo treatment (Age=27)	0.023*	-0.497	0.273	0.020	0.002	-0.569	0.331	0.039
	(0.012)	(0.430)	(0.174)	(0.052)	(0.013)	(0.481)	(0.209)	(0.064)
No. of Obs.	85425	27045	26820	27019	75783	23866	23648	23853
	Female				**Black**			
	Mental health	MCS	Kessler index	PHQ	Mental health	MCS	Kessler index	PHQ
BW=72 months	-0.031*	-1.178	0.308	0.054	0.031	-1.656*	0.734*	0.317***
	(0.018)	(0.730)	(0.250)	(0.076)	(0.025)	(0.910)	(0.394)	(0.109)
No. of Obs.	42360	13761	13666	13764	18465	5787	5716	5783
Donut RD	0.006	-1.240	0.516**	0.065	0.026	-0.226	0.531	0.170*
	(0.013)	(0.816)	(0.256)	(0.078)	(0.024)	(0.860)	(0.395)	(0.094)
No. of Obs.	55106	17741	17595	17736	24354	7569	7482	7560
Placebo treatment (Age=25)	0.014	-0.669	0.097	0.045	-0.007	1.109	-0.402	-0.103
	(0.012)	(0.633)	(0.216)	(0.075)	(0.018)	(0.808)	(0.371)	(0.095)
No. of Obs.	56822	17053	16921	17051	25690	7358	7268	7349
Placebo treatment (Age=27)	0.007	-0.676	0.416*	0.047	0.048**	0.990	-0.231	-0.002
	(0.015)	(0.628)	(0.232)	(0.066)	(0.021)	(0.781)	(0.325)	(0.099)
No. of Obs.	57036	18543	18383	18538	24561	7703	7619	7703

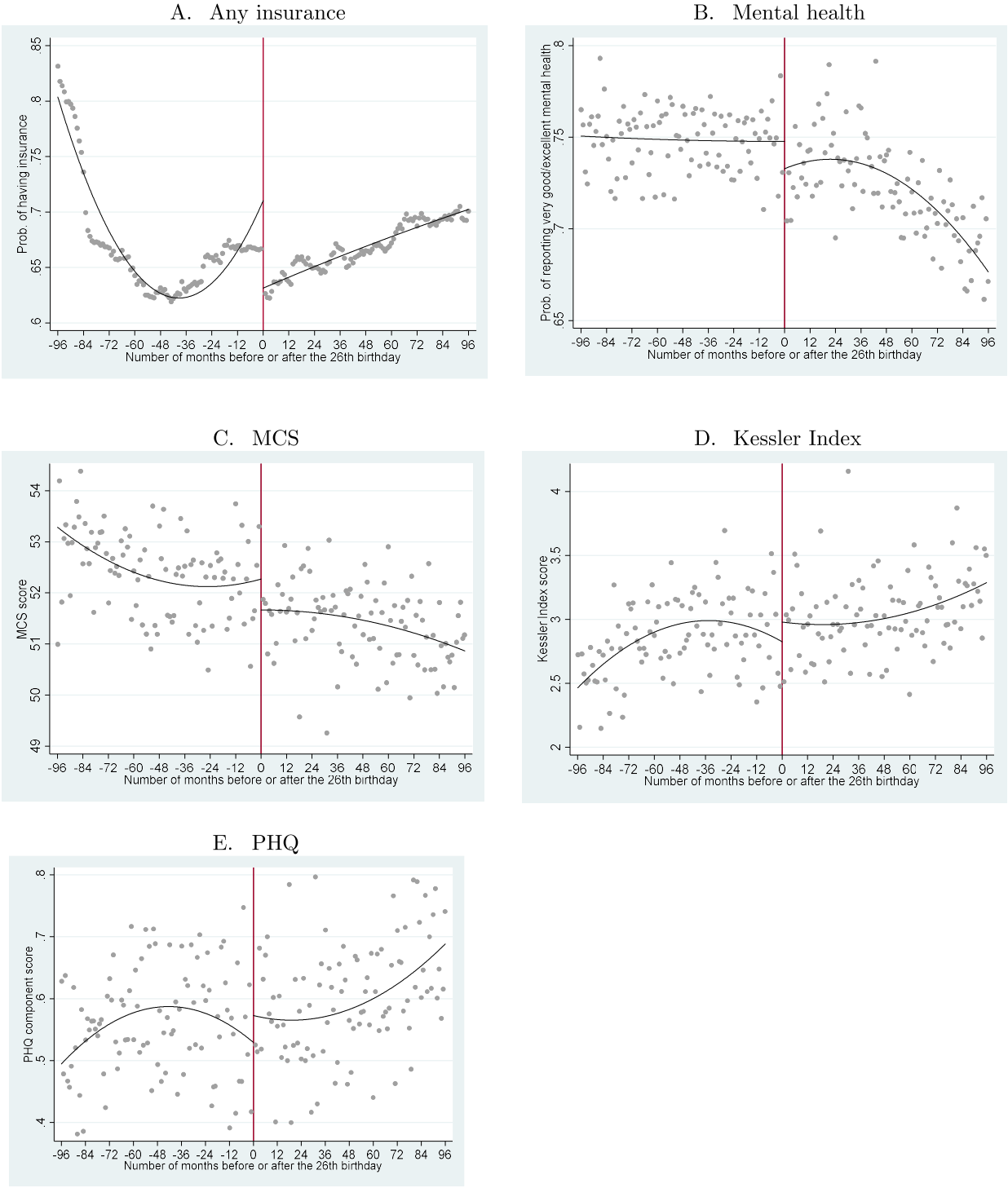
Notes: Parametric RD models are estimated using a full set of control variables and a quadratic polynomial of the forcing variable that is fully interacted with the treatment variable. Sample weights are used in all models. Standard errors are clustered by the forcing variable and reported in parentheses. The signs *, **, and *** denote statistical significance at 10, 5, and 1 percent levels, respectively.

Table 6. The change in risk-taking behavior and physical health at age-based health insurance eligibility cutoffs

	Age 26 cutoff		Age 65 cutoff	
	Risk	PCS	Risk	PCS
Full sample	0.004	0.106	0.013	0.405
	(0.018)	(0.227)	(0.019)	(0.550)
No. of Obs.	34374	34556	23931	24083
Not covered by public insurance	-0.011	0.140		
	(0.018)	(0.252)		
No. of Obs.	26280	26417		
Not married	-0.012	0.016	0.025	-0.073
	(0.022)	(0.268)	(0.031)	(0.916)
No. of Obs.	24752	24887	9726	9795
Female	-0.007	0.377	-0.022	0.720
	(0.020)	(0.347)	(0.022)	(0.641)
No. of Obs.	18246	18330	13088	13180
Black	0.025	0.002	-0.006	0.373
	(0.032)	(0.532)	(0.046)	(1.129)
No. of Obs.	7780	7813	4887	4953

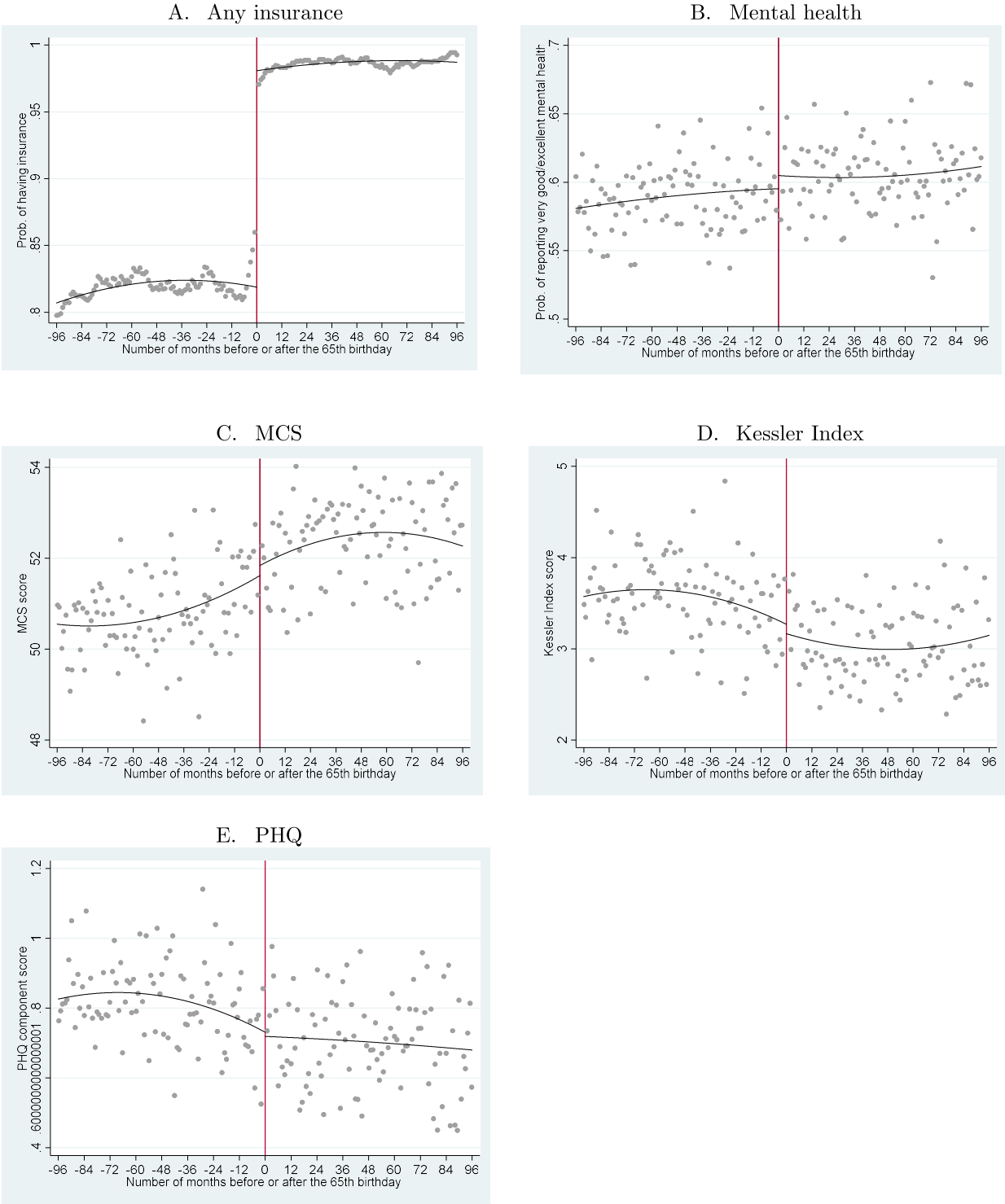
Notes: Parametric RD models are estimated using a full set of control variables and a quadratic polynomial of the forcing variable that is fully interacted with the treatment variable. Sample weights are used in all models. Standard errors are clustered by the forcing variable and reported in parentheses.

Figure 1. Change in insurance and mental health outcomes at age 26



Notes: Means of the outcome variables for 1-month intervals 96 months before and after the 26th birthday are plotted. Solid lines are fitted lines from the RD model.

Figure 2. Change in insurance and mental health outcomes at age 65



Notes: Means of the outcome variables for 1-month intervals 96 months before and after the 26th birthday are plotted. Solid lines are fitted lines from the RD model.

Figure 3. Change in risk-taking behavior and physical health at age 26 and 65