Get Fit with MA?
Estimating the Impact of Medicare Advantage on Physical Activity

Jong Min Jung* Jing Li†

Abstract

Medicare Advantage plans increasingly offer supplemental fitness benefits, yet evidence on whether these benefits change preventive health behavior among older adults is limited. Using nationally representative panel data from the Health and Retirement Study, this paper estimates the effect of Medicare Advantage enrollment on physical activity using a difference-in-discontinuities design that exploits the Medicare eligibility threshold at age 65 as an exogenous source of variation. Medicare Advantage enrollment increases the probability of daily vigorous exercise by about 4 percentage points relative to non-Medicare Advantage counterparts. Event study estimates show no differential pre-trends and the effect attenuates after the initial response. Effects are larger among women, non-White beneficiaries, and adults without a college degree. These findings suggest that insurance benefit design can induce preventive health behavior at the point of Medicare eligibility, although whether the response persists beyond initial eligibility remains uncertain.

JEL Classification: I12, I13, I18, J14

Keywords: Medicare Advantage, physical activity, preventive health behavior, older adults, difference-in-discontinuities

*Department of Economics, University of Washington
†Department of Pharmacy, University of Washington

1 Introduction

Physical activity plays a central role in maintaining health and independence in ADL (Activities of Daily Living) in later life. Regular exercise reduces the risk of cardiovascular disease, diabetes, functional limitation, cognitive decline, and falls among older adults (Warburton et al. (2006); Lee et al. (2012)). Accordingly, the 2018 *Physical Activity Guidelines for Americans* recommend that adults over 65 engage in 150 - 300 minutes per week of moderate-intensity aerobic activity or 75 - 150 minutes per week of vigorous-intensity aerobic activity, along with multicomponent exercises that include muscle-strengthening training (U.S. Department of Health and Human Services (2018)). Despite the well-documented health benefits, physical inactivity remains widespread. In 2022, only 13.9 percent of U.S. older adults met federal physical activity guidelines(CDC (2022); Elgaddal and Kramarow (2024)).

As the financial and logistical costs of exercise are potentially modifiable, health insurance may provide one channel for encouraging physical activity among older adults. Medicare Advantage (MA), also known as Medicare Part C, is a privately administered alternative to Traditional Medicare (TM) that provides Medicare Part A and Part B coverage through private insurers and includes supplemental benefits such as dental, vision, and fitness services that are not covered by TM. This makes MA a particularly relevant policy setting to investigate whether insurance design affects physical activity. MA enrollment now accounts for more than half of all Medicare beneficiaries, and by 2025, approximately 95 percent of individual MA plans offered a fitness benefit (KFF (2025)). Fitness benefits are among the most common supplemental benefits and are provided through programs such as SilverSneakers, Renew Active, and Silver&Fit. These programs offer older adults free or subsidized access to gyms, group exercise classes, and community-based fitness opportunities. By lowering the financial and logistical barriers to exercise, MA plans may affect not only medical care use but also preventive health behaviors that shape later-life health.

Despite the rapid expansion of MA enrollment, causal evidence on its behavioral impact remains limited. Existing studies of MA covered fitness program document improvements in participants' physical and mental health and reduction in healthcare spending, but the participants are likely to differ systematically from non-participants in motivation, baseline health, and exercise preferences (Belza et al. (2006); Hamar et al. (2013); Brady et al. (2018); Nguyen et al. (2008)). Thus, it remains unclear whether MA-linked fitness benefits induce older adults to exercise more or primarily subsidize activities that would have occurred anyway.

To address this selection problem, we use nationally representative panel data from the Health and Retirement Study (HRS) from 2012 to 2022 and exploit the Medicare eligibility threshold at age 65 as an exogenous source of variation. The main empirical strategy is a Difference-in-Discontinuities (DiDC) design that compares the age-65 change in daily vigorous exercise among MA enrollees with the corresponding change for non-MA individuals. The DiDC design differences out age-65 shocks common to both groups, such as retirement, Social Security claiming, and general aging-related trends, while isolating the MA-specific discontinuity in exercise behavior. We find that MA enrollment increases the probability of daily vigorous exercise by approximately 4 percentage points relative to non-MA counterparts around age 65. The effects are larger among women, non-White beneficiaries, and individuals without a college degree, consistent with the idea that supplemental fitness benefits may matter most for groups that are facing greater barriers to exercise. Event study estimates show no evidence of differential trends prior to age 65, while the effect is concentrated near the eligibility threshold and attenuates over the following two years. This pattern suggests that access to fitness benefits may generate an initial behavioral response but may not lead to sustained increases in exercise on its own.

This paper makes two main contributions. First, to our knowledge, it provides the first quasi-experimental evidence on the impact of Medicare Advantage enrollment on physical activity. We estimate the reduced-form behavioral effect of MA enrollment, capturing whether access to MA-linked supplemental benefits changes exercise behavior around the Medicare eligibility. In addition, this paper contributes to the literature on insurance benefit design and preventive health behavior. Prior evidence on financial incentives for exercise behavior is largely concentrated in the experiments or workplace settings among younger adults (Charness and Gneezy (2009); Acland and Levy (2015); Royer et al. (2015)). We extend this literature to older adults and to a large public insurance setting, where incentives are embedded in plan benefits rather than offered as short-term experimental payments. The findings suggest that insurance benefit design can induce preventive health behavior among older adults.

2 Data

The main data source is the Health and Retirement Study (HRS), a nationally representative longitudinal survey of older adults in the United States conducted biennially by University of Michigan. We use survey waves from 2012 to 2022 providing detailed informa-

tion on insurance coverage, demographics, labor market status, and self-reported physical activity. As our empirical strategy exploits Medicare eligibility threshold at age 65, a key variable in the analysis is continuous age. We therefore construct a precise age by using the respondent's birth year and month with the survey year and month. This allows us to implement the difference-in-discontinuities design with age as the running variable centered at 65.

The primary outcome measures vigorous physical activity based on the following HRS question: *"How often do you take part in sports or activities that are vigorous, such as running or jogging, swimming, cycling, aerobics or gym workout, tennis, or digging with a spade or shovel?"*. Respondents report in five levels ("Every day," "More than once a week," "Once a week," "One to three times a month," or "Hardly ever or never"). We construct the main outcome as a binary indicator equal to one if the respondent reports vigorous exercise every day, and zero otherwise. This is an intensive margin of physical activity as shown in Table 1, only about 3 percent of respondents in the analytic sample report daily vigorous exercise. We focus on this threshold for both policy and measurement reasons. First, daily vigorous activity is the HRS category most closely aligned with guideline-concordant physical activity. The 2018 *Physical Activity Guidelines for Americans* recommend that older adults engage in 75–150 minutes per week of vigorous-intensity aerobic activity or 150–300 minutes per week of moderate-intensity aerobic activity, along with muscle-strengthening and multicomponent exercise (U.S. Department of Health and Human Services (2018)). As the HRS reports exercise frequency but not minutes, daily vigorous exercise provides the clearest available proxy for respondents who are likely to meet or exceed the federal guideline of vigorous-intensity physical activity.

In addition, daily vigorous exercise corresponds closely to the type of structured, gym-based activity that Medicare Advantage fitness benefits are designed to encourage. The HRS question explicitly includes activities such as running, swimming, cycling, aerobics, gym workouts, and tennis, all of which are plausibly affected by free or subsidized access to fitness facilities. Although daily vigorous exercise is a demanding outcome, this feature strengthens the interpretation of the result that detecting a significant effect on such a low-prevalence and intensive margin suggests that MA-linked fitness benefits may shift some older adults into a substantively meaningful level of preventive health behavior. Thus, we interpret the main estimate as evidence on a high-value behavioral margin rather than as a measure of all physical activity. In Appendix Table 4A, we additionally examine broader binary cutoffs and a workout-frequency score to assess whether the result is sensitive to the

specific daily-exercise threshold.

In the main analysis, we define insurance groups using observed Medicare coverage histories. The MA group consists of respondents who are observed in Medicare Advantage but never in Traditional Medicare during the sample period, while the comparison group includes respondents observed in Traditional Medicare or never enrolled in Medicare at the time of the survey. To ensure balanced identification on both sides of the eligibility threshold, we restrict the samples to respondents who are observed in at least one wave before and one wave after age 65. Including individuals who are only observed prior to age 65 would contribute observations exclusively to the left side of the cutoff, introducing asymmetry in the local comparison and potentially biasing the discontinuity estimate. This restriction ensures that the DiDC estimate is identified from within-person variation across the eligibility threshold rather than from cross-sectional comparisons between individuals who happen to fall on only different sides of age 65.

In addition, we drop the year 2020 as the COVID-19 pandemic sharply disrupted physical activity opportunities and health behavior such as widespread gym closures due to nationwide lockdown policies that directly affected the fitness benefits at the core of our analysis. We additionally conduct analysis including 2020 separately in robustness checks. Table 1 reports summary statistics for the resulting estimation sample.

3 Empirical Strategy

A central challenge is that both Medicare Advantage and Traditional Medicare enrollment are endogenous choices. Individuals who select MA over TM or no Medicare may differ systematically in their health preferences, socioeconomic status, underlying health conditions, and baseline physical activity. A direct comparison of exercise behavior across insurance groups therefore conflates the behavioral effect associated with MA coverage with selection on unobserved characteristics.

We address this challenge using a Difference-in-Discontinuities (DiDC) design following Grembi et al. (2016). This method exploits the exogenous timing of Medicare eligibility at age 65 and compares the discontinuity in exercise among individuals in the MA group with the corresponding discontinuity among individuals in the non-MA comparison group. Medicare eligibility produces a sharp increase in Medicare coverage and MA enrollment at age

65. However, other factors that may affect exercise, such as retirement and Social Security claiming, may also change around the same threshold. A standard regression discontinuity design would therefore conflate the MA-specific behavioral response with other age-65 shocks, while a traditional difference-in-difference design would not directly isolate the discontinuous change occurring at the eligibility threshold. The DiDC framework addresses both limitations by differencing the age-65 discontinuity experienced by the MA group from the corresponding discontinuity experienced by the non-MA group. Under the identifying assumption that other age-65 shocks affect both groups similarly, the remaining differential discontinuity captures the MA-specific behavioral response at the eligibility threshold.

Formally, the DiDC estimand is:

$$\begin{aligned}\text{DiDC} = &\Big[E(Workout \mid Post65,\, MA{=}1) - E(Workout \mid Pre65,\, MA{=}1)\Big] \\ &- \Big[E(Workout \mid Post65,\, MA{=}0) - E(Workout \mid Pre65,\, MA{=}0)\Big]. \qquad (1)\end{aligned}$$

To clarify what this estimand recovers, we decompose the within-group differences for each insurance group as follows :

$$\begin{aligned}\Delta^{MA} &= \left(Workout^{MA}_{65,\text{post}} - Workout^{MA}_{65,\text{pre}}\right) \\ &= \underbrace{\text{Universal 65 shock}}_{\text{common to all}} + \text{MA-specific selection} + \underbrace{\text{MA fitness benefit}}_{\text{treatment effect}} + \underbrace{\cancel{\text{Time-invariant selection}}}_{\text{fixed traits}}\end{aligned}$$

$$\begin{aligned}\Delta^{\text{non-MA}} &= \left(Workout^{\text{non-MA}}_{65,\text{post}} - Workout^{\text{non-MA}}_{65,\text{pre}}\right) \\ &= \underbrace{\text{Universal 65 shock}}_{\text{common to all}} + \text{Non-MA-specific selection} + \underbrace{\cancel{\text{Time-invariant selection}}}_{\text{fixed traits}}\end{aligned}$$

Within-group differencing cancels time-invariant selection, and taking the difference across groups eliminates the universal age-65 shock common to both groups :

$$\text{DiDC} = \Delta^{MA} - \Delta^{\text{non-MA}} = \text{MA fitness benefit} + (\text{MA-specific selection} - \text{Non-MA-specific selection})$$

The DiDC estimand therefore removes confounders common to both groups at age 65 as well as time-invariant individual differences in exercise preferences. However, the remaining threat to identification is the possibility that MA and non-MA enrollees already exhibit different exercise trajectories before age 65. To assess this, we perform an event study to

check differential pre-trends in exercise behavior prior to age 65.

3.1 Difference-in-Discontinuity Specification

We estimate the following reduced-form equation as our main specification:

$$\begin{aligned} Y_{it} = \alpha &+ \beta\,(\text{Post}_{it} \times MA_i) + \gamma_1\,\text{Post}_{it} + \gamma_2\,MA_i \\ &+ f(Age_{it}) + \text{Post}_{it}\,f(Age_{it}) + MA_i\,f(Age_{it}) \\ &+ (\text{Post}_{it} \times MA_i)\,f(Age_{it}) + \boldsymbol{\delta}^\top X_{it} + \mu_i + \tau_t + \varepsilon_{it}, \end{aligned} \tag{2}$$

where Y_{it} is a binary indicator equal to 1 if individual i reports daily vigorous exercise at time t, and 0 otherwise. Post_{it} equals 1 if $Age_{it} \geq 65$ and 0 otherwise. MA_i equals 1 for individuals ever observed in Medicare Advantage during the study period. $f(Age_{it})$ is a local-linear function of age, estimated separately on each side of the cutoff and allowed to differ by MA status. X_{it} includes demographic controls for gender, race, and educational attainment. μ_i and τ_t denote individual and year fixed effects, respectively, which absorb time-invariant unobservables and common aggregate shocks. Standard errors are clustered at the individual level.

The coefficient of interest is β, which captures the differential discontinuity at age 65 in the probability of daily vigorous exercise for MA enrollees relative to non-MA individuals. Under the identifying assumption that both groups would have experienced similar discontinuities in exercise at age 65 absent MA-specific fitness benefits, β recovers the reduced-form causal effect of MA fitness benefit access on exercise behavior at the eligibility threshold. The local-linear age controls on each side of the cutoff, interacted with both Post_{it} and MA_i, flexibly absorb smooth age trends in exercise that may differ across groups, ensuring that β is identified from the discontinuous jump at the threshold rather than extrapolation from age trends.

We select the estimation bandwidth using the data-driven procedure of Calonico et al. (2014), which selects the bandwidth by minimizing the asymptotic mean squared error of the local polynomial estimator. This approach balances bias and variance in estimation near the threshold without relying on an artificial bandwidth choice. The resulting data-driven bandwidth is approximately 3.5 years. To assess sensitivity, we report estimates across a range of alternative bandwidths and present the full bandwidth sensitivity plot.

To assess whether the two groups exhibit detectable differential trajectories before age 65 and to describe how the MA–non-MA difference evolves after eligibility, we estimate an event-study specification. Let b_{it} index one-year age bins relative to age 65, so that $b_{it} = 0$ corresponds to the eligibility year and $b_{it} = -1$ serves as the omitted reference category which is a year before Medicare eligibility (age 64) :

$$\begin{aligned} Y_{it} = \alpha &+ \sum_{k \neq -1} \beta_k \mathbb{1}\{b_{it} = k\} \, MA_i + \sum_{k \neq -1} \phi_k \mathbb{1}\{b_{it} = k\} \\ &+ g(Age_{it}) + \text{Post}_{it} \, g(Age_{it}) + MA_i \, g(Age_{it}) + (\text{Post}_{it} \times MA_i) \, g(Age_{it}) \\ &+ \boldsymbol{\delta}' X_{it} + \mu_i + \tau_t + \varepsilon_{it}. \end{aligned} \tag{3}$$

The coefficients β_k measure the age-bin-specific difference in the probability of daily exercise between the MA and non-MA groups, relative to the corresponding difference in the omitted year immediately before Medicare eligibility (age 64). The pre-65 coefficients are used to assess whether there are detectable differential exercise trajectories before age 65 and the post-65 coefficients describe how the MA–non-MA difference evolves after the eligibility threshold.

4 Results

4.1 Discontinuities in Workout Behaviour

We begin by presenting non-parametric evidence on exercise behavior around the Medicare eligibility threshold. Figure 1 plots linear fit of the monthly binned means of the probability of daily exercise separately for individuals in the Medicare Advantage group and those in the non-MA comparison group. Prior to age 65, the probability of daily vigorous workout for MA groups is less than non-MA group but, exactly at the eligibility threshold, MA enrollees exhibit a discrete increase in daily workout probability, whereas Non-MA enrollees do not. This visual jump anticipates the parametric DiDC estimates and suggests that MA-linked fitness benefits trigger behavioral responses.

Importantly, the figure also demonstrates that while MA enrollees increase their workout levels at age 65, Non-MA drop theirs. This divergent pattern is consistent with a wide range of age-related health, and lifestyle transitions such as retirement, increased caregiving responsibilities, and broader aging related declines in physical activity. The presence of

these countervailing forces at age 65 emphasize why neither a simple RD nor a standard DiD design can isolate the causal effect of MA on physical activity.

4.2 Difference-in-Discontinuities Results

Figure 2 presents the first-stage discontinuity in Medicare Advantage enrollment at the Medicare eligibility cutoff. Consistent with the institutional setting, Medicare Advantage enrollment increases sharply at age 65, indicating that Medicare eligibility generates substantial variation in MA enrollment. This pattern supports the empirical relevance of the age-65 cutoff for the DiDC design.

Table 2 reports reduced-form DiDC estimates of the differential age-65 discontinuity in the probability of daily vigorous exercise for the MA group relative to the non-MA group across several bandwidth choices. Our preferred specification uses the mean squared error optimal bandwidth following Calonico et al. (2014). In our setting, the selected reference bandwidth is approximately 3.5 years, allowing the local estimation window to be determined by the statistical properties of the data rather than by an arbitrary bandwidth choice.

At this data-driven bandwidth, the estimated differential discontinuity is 0.04, corresponding to a 4.0 percentage point increase in the probability of daily vigorous exercise for the MA group relative to the corresponding age-65 change in the non-MA group. This estimate should not be interpreted as the difference between the raw pre- and post-65 means reported in Table 3. Those means average all observations within the selected bandwidth, whereas the regression estimates the discontinuous change at the age-65 threshold after accounting for group-specific local age trends, individual fixed effects, year fixed effects, and observed covariates. The estimate therefore implies approximately four additional daily exercisers per MA 100 individuals at the threshold, relative to the counterfactual change represented by the non-MA group.

To assess sensitivity to the choice of local window, Panel B of Table 2 reports estimates using narrower and wider bandwidths around the cutoff, and Figure 3 plots the corresponding point estimates and 95% confidence intervals across bandwidths. The estimates are noisier at very narrow bandwidths, reflecting limited precision in a small local sample, but remain positive and broadly stable across bandwidths of 2.5 years and above. This pattern indicates that the main result is not driven by a single bandwidth choice.

As an additional diagnostic to check differential pretrends, Appendix Figure A1 reports event-study estimates around age 65. The pre-65 coefficients are small and statistically insignificant, providing no evidence of differential exercise trends between the MA and non-MA groups before Medicare eligibility. At age 65, the estimated MA–non-MA differential rises by approximately 3.5 percentage points. The estimates in subsequent age bins are generally smaller and imprecisely estimated. This pattern descriptively highlights the attenuation following the initial age-65 response rather than a clearly sustained effect. However, as enrolling in MA or TM are both endogenous choices, the post-65 coefficients are not interpreted as causal dynamic treatment effects. They instead describe how the conditional MA–non-MA exercise differential evolves after eligibility.

5 Heterogeneous Analysis

We investigate whether the DiDC differential effect of Medicare eligibility on daily exercise differs across subgroups. Heterogeneity analysis is crucial for our understanding of how behavioral response to Medicare Advantage's fitness benefits. We examine heterogeneity along three dimensions including Gender, Race/Ethnicity (White and all other groups) , Educational attainment (College degree and No College degree). For each subgroup analysis, we estimate the same reduced-form DiDC specification used in the main analysis and report the DiDC estimates using data-driven bandwidths.

The heterogeneity results presented in Figure 4 underscore the meaningful variations in behavioral responses to Medicare Advantage (MA) fitness benefits at age 65. Female beneficiaries experience an increase of approximately 5–6 percentage points in the probability of exercising daily, while the corresponding estimate for males is smaller and statistically insignificant. Racial difference is particularly conspicuous where Non-White beneficiaries experience a large increase of approximately 14 percentage points. We do not detect any significant impact among White beneficiaries. Educational differences mirror this pattern as well. College-educated respondents show small and statistically insignificant effects, while non-college educated seniors show statistically significant increases of roughly 5 percentage points. Overall, we find meaningful impact among female, Non-White and non-college educated beneficiaries.

This evidence emphasizes MA supplemental fitness benefits may generate larger gains among populations that historically face greater structural barriers to physical activity which speaks to equitable healthcare access. Non-White and lower-educated seniors often face fi-

nancial and informational frictions, limited access to recreational facilities, and higher baseline health risks. The substantial effects among disadvantaged groups is consistent with the interpretation that MA fitness incentives may help reduce disparities in preventive health behaviors at later life. Even though the analysis does not necessarily measure the inequality reduction, the distribution of estimated impacts aligns with an equity enhancing mechanisms.

6 Robustness Check

To assess the validity of our results, we perform a comprehensive set of robustness checks that address potential concerns about our findings. These series of robustness checks support the estimated differential discontinuity at age 65 represents a genuine behavioral response associated with the enrollment in Medicare Advantage with fitness benefits, rather than the artifacts of model specification, age related dynamics,and local irregularities in the running variables, or spurious discontinuities.

6.1 Alternative Outcomes

We estimate the same DiDC specification using several alternative outcomes that may change around Medicare eligibility and potentially affect workout frequencies: retirement, private insurance coverage, an alternative measure of vigorous exercise, and moderate physical activity. The purpose of these tests is to rule out the possibility that the estimated physical activity jump reflects broader life-cycle transitions around age 65. Consistent with expectations, retirement does not show a meaningful differential discontinuity at age 65, as shown in Table 3. In addition, we find a statistically significant decline in the number of private insurance plans at age 65 for the MA group relative to the non-MA group, as shown in Table 3. This sharp reduction indicates that seniors are not simultaneously holding private coverage that could independently encourage exercise. The only insurance margin that changes discontinuously at age 65 for the MA group is the shift into MA plans, which uniquely offer structured free fitness benefits.

To further assess whether the estimated MA effect reflects an increase in overall physical activity rather than a mechanism linked to structured fitness benefits, we examine a separate outcome measuring daily engagement in moderate physical activities such as gardening, walking at a moderate pace, dancing, and car washing. Table 3 shows that the differential discontinuity at age 65 in this outcome is small and statistically insignificant across all bandwidth choices. The absence of a significant effect on daily moderate activity suggests

that our primary findings on vigorous physical activity are unlikely to be driven by broad shifts in activity or general health motivation triggered by Medicare eligibility. Instead, the results are consistent with a more targeted mechanism in which MA-related fitness benefits primarily affect structured or vigorous exercise behaviors, such as gym-based workouts, rather than everyday moderate physical activity.

We also examine whether the main result extends to alternative measures of vigorous physical activity. Columns (1)–(3) of Appendix Table 4A use progressively broader binary definitions which are exercising more than once per week, exercising at least once per week, and engaging in any vigorous exercise. The estimated differential discontinuities for these outcomes are small and statistically insignificant. These results indicate that the main finding does not extend broadly to less frequent definitions of vigorous exercise and is instead concentrated at the daily exercise margin.

Column (4) uses an alternative workout-frequency score that retains some information from the original survey categories. For the most parsimonious analysis, the measure is coded as 7 for respondents who report vigorous activity every day, 1 for those who report activity more than once per week, once per week, or one to three times per month, and 0 for those who report no vigorous activity. The estimated differential discontinuity is 0.184 and is statistically significant at the 10 percent level. As this outcome is a frequency score rather than a binary indicator, the coefficient is interpreted in score units rather than percentage points. Taken together, the results indicate that the MA-associated increase in vigorous exercise is concentrated primarily at the daily exercise margin, with more limited evidence of an increase in overall exercise frequency.

6.2 Placebo Cutoffs and Sample Specifications

We conduct three additional robustness checks to assess whether the main DiDC estimate is driven by local irregularities around the age-65 cutoff, by spurious age-related discontinuities, or by the exclusion of COVID-era observations. First, we estimate a donut-hole specification that excludes observations within one month on either side of age 65. This test addresses concerns that very local administrative errors, reporting issues, or mechanical changes immediately around the Medicare eligibility threshold may drive the results. Second, we estimate a placebo DiDC specification using age 66 as a false cutoff. Because age 66 does not correspond to the main Medicare eligibility threshold, we should not observe a meaningful differential discontinuity at this age if the main design is valid. Third, we

re-estimate the main specification including the COVID-era observations that are excluded from the preferred specification.

Table 4 reports the results using the reference bandwidth for each robustness exercise. The donut-hole estimate which excludes one month pre and post 65 remains positive and similar in magnitude to the main estimate, suggesting that the result is not driven by observations immediately around the age-65 cutoff. The placebo estimate at age 64 and 66 are both small and statistically insignificant, which supports the interpretation that the main discontinuity is specific to the true Medicare eligibility threshold. Finally, when year 2020 (Covid) observations are included, the estimate still remains positive and statistically significant but the magnitude significantly drops. This finding highlights that the main result is not mechanically driven by excluding the COVID period, during which nationwide lockdown policies and gym closures significantly disrupted access to structured exercise across both MA and non-MA groups.

6.3 Heterogeneity by Fitness-Benefit Availability over Time

The proportion of Medicare Advantage which covers fitness benefits has expanded substantially during the late 2010s and early 2020s. KFF (2022) reports that in 2022, 97% of individual Medicare Advantage plans offer a fitness benefit, underscoring the near-universal availability of fitness-related supplemental coverage in recent years. We assess whether the impact of MA covered fitness benefit is more pronounced in later years when fitness benefits are more widely available.

For this analysis, we split the analysis into an early period (2012-2014) and a later period (2016–2022). Table 5 shows that estimates in 2012-2014 are small and statistically insignificant across all bandwidth choices, with even negative impact at the optimal bandwidth. In contrast, Table 5 shows more positive, bigger, and statistically significant effects in 2016–2022 for several bandwidths. While the optimal-bandwidth estimate in the later period is not statistically significant, precision is sensitive to bandwidth because the effective estimation sample shrinks substantially at narrow bandwidths. Overall, this earlier year versus later year results are consistent with stronger behavioral responses in the later period when fitness benefits were more broadly available in Medicare Advantage plans.

7 Conclusion

This paper studies whether insurance benefit design can change preventive health behavior at older ages. Using nationally representative panel data from the Health and Retirement Study from 2012 to 2022, we exploit the Medicare eligibility threshold at age 65 as an exogenous variation and estimate a difference-in-discontinuities design comparing MA enrollees with non-MA individuals. The design differences out age-65 shocks common to both groups, including retirement, Social Security claiming, and broader age-related changes in health behavior, while isolating the MA-specific discontinuity in daily vigorous exercise.

The results show that MA enrollment increases the probability of daily vigorous exercise at Medicare eligibility. The estimated effect is meaningful considering low baseline prevalence of daily vigorous activity among older adults. Although daily vigorous exercise is an intensive margin and does not directly measure total weekly minutes of activity, it captures a demanding, guideline concordant preventive health behavior that is closely aligned with the structured exercise opportunities offered by MA fitness benefits.

The heterogeneity results suggest that these benefits may be especially impactful for groups facing greater barriers to physical activity. The effects are larger among women, non-White beneficiaries, and adults without a college degree. While the analysis does not directly measure reductions in inequality, the concentration of effects among these groups suggests that supplemental fitness benefits may help reduce disparities in preventive health behaviors at later life.

As Medicare Advantage continues to expand, supplemental benefits are likely to play an increasingly important role in shaping the non-medical dimensions of health insurance. The findings in this paper suggest that benefit design can induce preventive health behavior among older adults. However, determining whether these behavioral responses persist beyond the initial eligibility will require the designs that are capable of supporting longer-term and sustained effects.

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8 Tables and Figures

Table 1: Baseline Characteristics by Medicare Advantage Status (Ages 60–70)

	Non-MA N(%)	MA N(%)	Total N(%)
Gender			
Male	3,212 (44.13)	1,888 (39.79)	5,100 (42.42)
Female	4,066 (55.87)	2,857 (60.21)	6,923 (57.58)
Race			
White/Caucasian	5,033 (69.49)	2,789 (59.04)	7,822 (65.36)
Black/African American	1,347 (18.60)	1,331 (28.18)	2,678 (22.38)
Other	863 (11.91)	604 (12.79)	1,467 (12.26)
Hispanic			
Not Hispanic	5,984 (82.40)	3,785 (79.87)	9,769 (81.40)
Hispanic	1,278 (17.60)	954 (20.13)	2,232 (18.60)
Education			
No college degree	4,700 (65.05)	3,441 (73.10)	8,141 (68.23)
College degree or higher	2,525 (34.95)	1,266 (26.90)	3,791 (31.77)
Health Conditions			
Health condition index, mean (SD)	1.95 (1.45)	2.06 (1.47)	1.99 (1.46)
Physical Activity (Vigorous)			
Every day	229 (3.16)	145 (3.07)	374 (3.12)
>1 per week	1,903 (26.23)	1,173 (24.80)	3,076 (25.67)
1 per week	840 (11.58)	569 (12.03)	1,409 (11.76)
1–3 per month	815 (11.23)	510 (10.78)	1,325 (11.06)
Never	3,468 (47.80)	2,332 (49.31)	5,800 (48.40)
Total observations	7,278	4,745	12,023

Notes: Counts are shown with column percentages in parentheses for respondents ages 60–70, except for the health condition index, which is reported as mean and standard deviation. The health condition index is based on RAND HRS variable RWCONDE and is defined as the sum of indicators for whether a doctor has ever told the respondent that they had any of the following eight conditions: high blood pressure, diabetes, cancer, lung disease, heart disease, stroke, psychiatric problems, and arthritis. The analytic sample includes 12,023 observations. Sample sizes vary slightly across characteristics due to missing values.

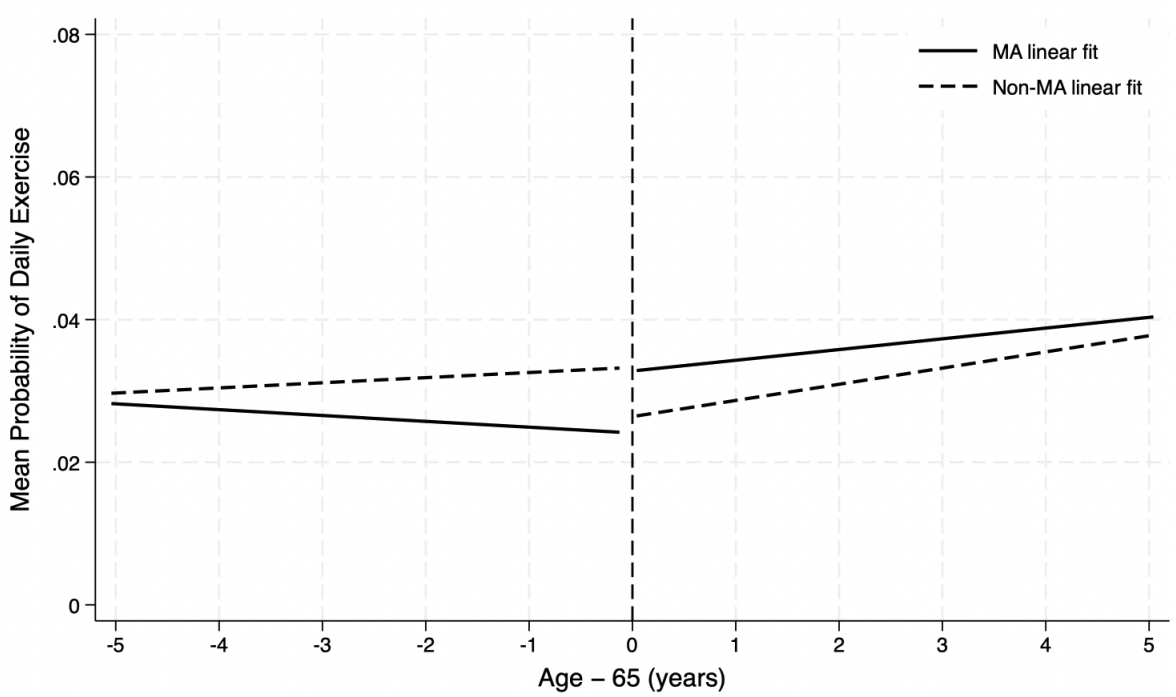


Figure 1: Binned means of the probability of exercising every day (binary indicator equal to 1 if the respondent reports daily exercise) around age 65 for Medicare Advantage (MA) and non-MA groups. Solid line represents MA group means and dashed line represent non-MA group means, computed using one-month bins. Solid lines show local linear fits estimated separately on each side of the age-65 cutoff. The vertical dashed line indicates the eligibility threshold at age 65.

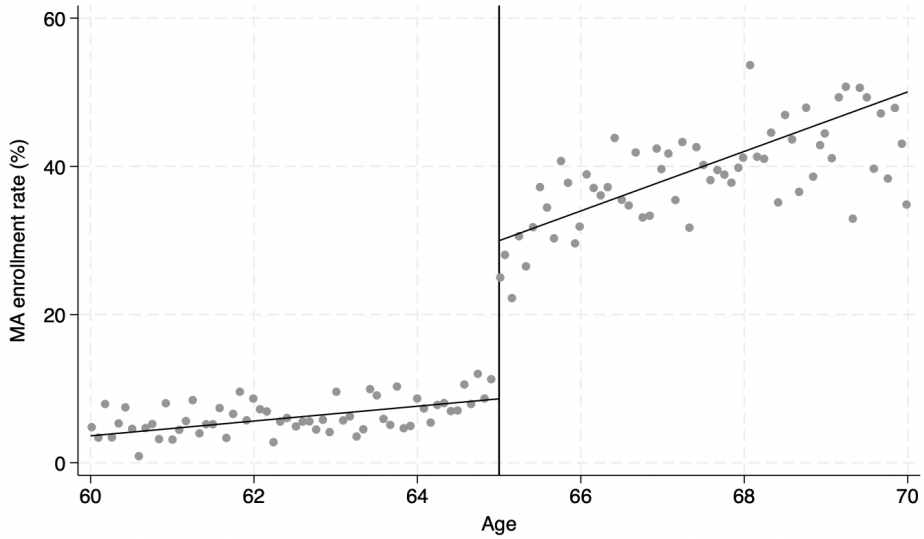


Figure 2: First-Stage Discontinuity in Medicare Advantage Enrollment at Age 65. Points represent monthly binned means of Medicare Advantage enrollment by age. Solid lines show local linear fits estimated separately on each side of the age-65 cutoff. The vertical line indicates the Medicare eligibility threshold at age 65.

Table 2: DiDC Estimates of the Differential Jump in Daily Exercise at Age 65

	Panel A: Main	Panel B: Alternative Bandwidths			
	(1) $b = 3.53$	(2) $b = 2$	(3) $b = 3$	(4) $b = 4$	(5) $b = 5$
$\Delta^{MA} - \Delta^{\text{Non-MA}}$ (pp)[a]	0.040***	0.033	0.047***	0.031**	0.020
	(0.015)	(0.030)	(0.017)	(0.014)	(0.012)
Pre-65 mean, MA group[b]	0.026	0.022	0.027	0.025	0.025
Post-65 mean, MA group[b]	0.037	0.039	0.039	0.038	0.038
Pre-65 mean, Non-MA group[b]	0.031	0.026	0.031	0.031	0.030
Post-65 mean, Non-MA group[b]	0.033	0.025	0.031	0.033	0.033
Observations	8,718	3,816	7,226	10,009	11,891
R^2	0.498	0.574	0.537	0.476	0.432
Individual fixed effects	✓	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓	✓

Notes: Table reports reduced-form DiDC estimates of the differential discontinuity at age 65 in a binary indicator for daily exercise, using different bandwidth choices in years. The dependent variable equals 1 if the respondent reports daily exrcise, and 0 otherwise. The coefficient $\Delta^{MA} - \Delta^{\text{Non-MA}}$ captures the difference between the jump at age 65 for individuals in the MA group and the corresponding jump for the non-MA comparison group. The one-year bandwidth is not reported as the HRS is biennial and this window leaves a very small and uneven estimation sample around the cutoff. [a] Coefficients are reported in percentage points. [b] Means are computed within the estimation sample for each bandwidth, separately by MA status. Standard errors clustered at the individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

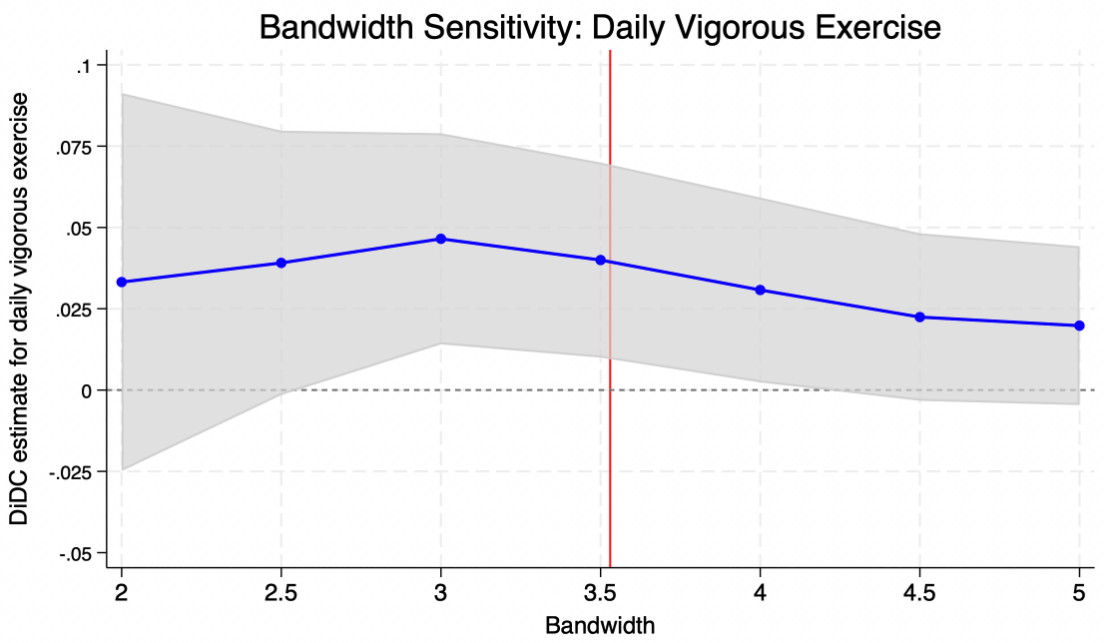


Figure 3: Bandwidth Sensitivity of the Difference-in-Discontinuity Estimate. The figure plots the estimated DiDC coefficient for daily vigorous exercise across alternative bandwidths around the age-65 cutoff. The solid line denotes the point estimate, and the shaded area denotes the 95% confidence interval. The vertical line marks the preferred data-driven bandwidth of 3.53 years.

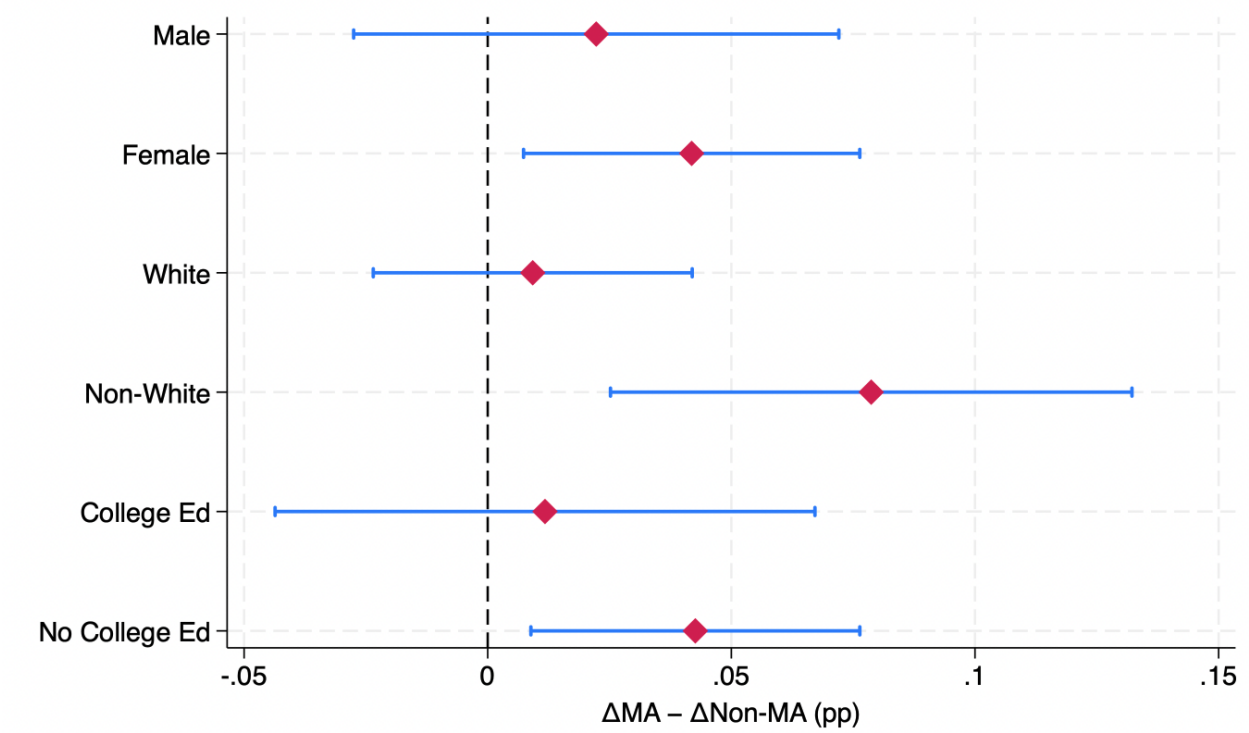


Figure 4: *Notes:* Reduced-form regression discontinuity in difference-in-discontinuities (DiDC) estimates of the differential jump at age 65 in daily exercise across demographic subgroups. Points denote subgroup-specific estimates of $\Delta^{MA} - \Delta^{\text{Non-MA}}$ expressed in percentage points. Horizontal bars represent 95% confidence intervals based on standard errors clustered at the individual level. Estimates are computed using the MSE-optimal bandwidth and include individual and year fixed effects.

Table 3: DiDC Estimates of Differential Jumps at Age 65 Across Outcomes

	Alternative Outcomes		
	Retirement	Private plan	Moderate PA
	(1)	(2)	(3)
	$b = 3.530$	$b = 3.530$	$b = 4.541$
$\Delta^{MA} - \Delta^{\text{Non-MAa}}$	0.043	-0.379***	0.019
	(0.029)	(0.043)	(0.021)
Mean dependent variable	0.617	0.634	0.095
Pre-65 mean, MA group[b]	0.566	0.703	0.070
Post-65 mean, MA group[b]	0.818	0.181	0.099
Pre-65 mean, Non-MA group[b]	0.499	0.772	0.090
Post-65 mean, Non-MA group[b]	0.678	0.687	0.122
Observations	8,556	8,715	11,060
R^2	0.754	0.688	0.455
Individual fixed effects	✓	✓	✓
Year fixed effects	✓	✓	✓

Notes: This table reports difference-in-discontinuities (DiDC) estimates of the differential jump at age 65 for several alternative outcomes. Each column uses the preferred bandwidth selected for the corresponding outcome. The dependent variables are retirement status, private plan coverage, and daily moderate physical activity. The coefficient $\Delta^{MA} - \Delta^{\text{Non-MA}}$ reports the differential discontinuity for the MA group relative to the non-MA group at age 65. Pre- and post-65 means are computed within the estimation sample by MA status and age group. Standard errors clustered at the individual level are reported in parentheses. All specifications include individual and year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Placebo cutoffs and sample Specifications

	Donut hole	Placebo cutoffs (64, 66)		Including year 2020
	(1)	(2)	(3)	(4)
	$b = 3.53$	$b = 4.06$	$b = 4.75$	$b = 5.00$
$\Delta^{MA} - \Delta^{\text{Non-MA}}$	0.038**	0.009	-0.009	0.019*
	(0.016)	(0.013)	(0.014)	(0.011)
Pre-cutoff mean, MA group	0.026	0.025	0.027	0.023
Post-cutoff mean, MA group	0.037	0.035	0.036	0.037
Pre-cutoff mean, Non-MA group	0.031	0.028	0.028	0.030
Post-cutoff mean, Non-MA group	0.034	0.033	0.038	0.034
Observations	8,611	10,462	10,385	13,476
R^2	0.186	0.468	0.457	0.405
Individual fixed effects	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓

Notes: The table reports reduced-form DiDC robustness estimates for a binary indicator equal to one if the respondent reports exercising every day. Column (1) excludes observations within one month of age 65. Columns (2) and (3) use placebo cutoffs at ages 64 and 66, respectively. Column (4) includes COVID period observations. Means are computed within each estimation sample. Standard errors clustered at the individual level are reported in parentheses. All specifications include individual and year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: DiDC Estimates of the Differential Jump in Daily Exercise at Age 65 by Period

	Dependent Variable: Daily Exercise	
	2012–2014	2016–2022
	(1)	(2)
	$b = 1.465$	$b = 4.100$
$\Delta^{MA} - \Delta^{\text{Non-MA}}$[a]	0.046	0.038*
	(0.122)	(0.023)
Pre-65 mean, MA group	0.009	0.029
Post-65 mean, MA group	0.018	0.042
Pre-65 mean, Non-MA group	0.020	0.034
Post-65 mean, Non-MA group	0.035	0.037
Observations	630	6,045
R^2	0.567	0.538
Individual fixed effects	✓	✓
Year fixed effects	✓	✓

Notes: Columns report reduced-form DiDC estimates using the preferred data-driven bandwidth for each period. Standard errors clustered at the individual level are in parentheses. All specifications include individual and year fixed effects. [a] The coefficient $\Delta^{MA} - \Delta^{\text{Non-MA}}$ captures the difference between the jump at age 65 for individuals in the MA group and the corresponding jump for the non-MA comparison group. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

A Appendix- Additional Figures and Tables

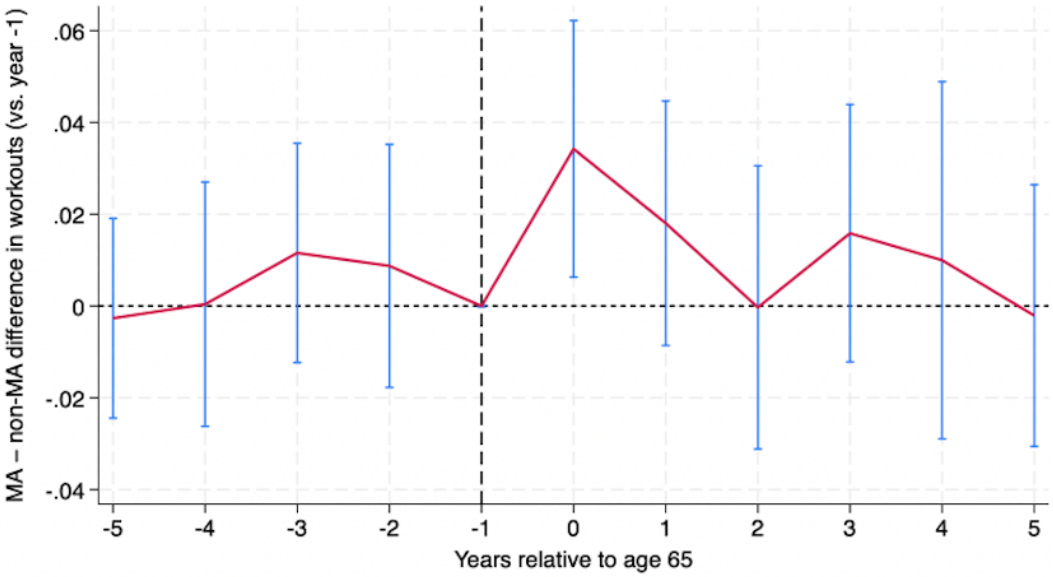


Figure A1: Event-Study Estimates of Daily Exercise Around Medicare Eligibility

Notes: Points report estimated age-bin coefficients for the difference in daily vigorous exercise between the Medicare Advantage and non-MA groups, relative to the year immediately preceding Medicare eligibility. Vertical bars show 95 percent confidence intervals. The dotted horizontal line indicates zero, and the dashed vertical line marks the omitted reference period. The figure is used primarily to assess differential pre-trends. The pre-65 estimates are statistically not significant. As MA and TM enrollment are endogenous, coefficients at and after age 65 are descriptive and are not interpreted as causal dynamic treatment effects.

Table 4A: DiDC Estimates Across Alternative Exercise Outcomes

	Dependent Variable			
	> Once/week	At least once/week	Any workout	Alternative workout
	(1)	(2)	(3)	(4)
	$b = 5.000$	$b = 3.799$	$b = 4.707$	$b = 3.820$
$\Delta^{MA} - \Delta^{\text{Non-MA}}$[a]	0.004	-0.000	-0.031	0.184*
	(0.027)	(0.036)	(0.030)	(0.098)
Pre-65 mean, MA group[b]	0.276	0.395	0.515	0.658
Post-65 mean, MA group[b]	0.280	0.386	0.490	0.704
Pre-65 mean, Non-MA group[b]	0.306	0.415	0.536	0.710
Post-65 mean, Non-MA group[b]	0.279	0.392	0.505	0.704
Observations	11,891	9,418	11,313	9,418
R^2	0.621	0.666	0.658	0.556
Individual fixed effects	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓

[a] The coefficient $\Delta^{MA} - \Delta^{\text{Non-MA}}$ captures the differential discontinuity at age 65 for the MA group relative to the non-MA comparison group.

[b] The pre- and post-65 means are computed within the estimation sample and bandwidth used for each outcome.

Notes: This table reports reduced-form difference-in-discontinuities (DiDC) estimates across alternative definitions of vigorous exercise. Column (1) uses an indicator equal to one if the respondent reports vigorous exercise more than once per week. Column (2) uses an indicator equal to one if the respondent reports vigorous exercise at least once per week. Column (3) uses an indicator equal to one if the respondent reports any vigorous exercise rather than never exercising. Column (4) uses an alternative workout-frequency score coded as 7 for vigorous exercise every day, 1 for vigorous exercise more than once per week, once per week, or one to three times per month, and 0 for no vigorous exercise. Standard errors clustered at the individual level are reported in parentheses. All specifications include individual and year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

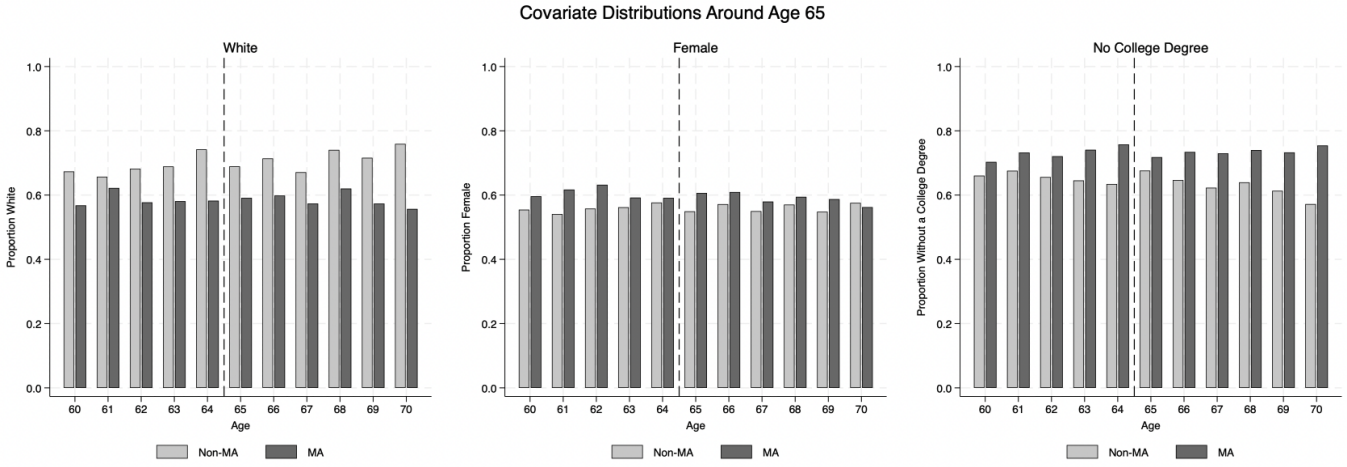


Figure A2: Covariate Distributions Around Age 65. Bars show the proportions of respondents who are White, female, and without a college degree for the Medicare Advantage (MA) and non-MA groups. The vertical dashed line indicates the Medicare eligibility threshold at age 65.