Nutrition to Nurturance: The Impact of Children's WIC Eligibility Loss on Parental Well-being*

Namgyoon Oh†

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Abstract

I evaluate the impacts of children aging out of the Women, Infants, and Children (WIC) program on parental mental health, medication adherence, and food security, outcomes well known to be associated. Regression discontinuity analysis reveals a decline in maternal mental health, specifically in anxiety, as children lose WIC eligibility. Medication adherence also decreases among mothers, especially those not covered by Medicaid. Fathers do not exhibit similar adverse effects. Moreover, both mothers and fathers experience increased food insecurity. Heterogeneity analysis indicates that single mothers and mothers predicted to be at risk of serious mental illness are the primary drivers behind the deterioration in maternal mental health, highlighting the vulnerability of these groups to the cessation of WIC benefits.

JEL Classification: I3, H53, Q18

Keywords: WIC, spillovers, mental health, medication adherence, food security

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†University of Illinois Urbana-Champaign. no11@illinois.edu

1 Introduction

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) serves as one of the largest food and nutrition assistance programs in the United States, supporting over 3.4 million children and disbursing more than $5.7 billion in federal funds in fiscal year 2022 (Toossi and Jones, 2023). With its mission to promote the health of low-income women, infants, and children, WIC provides monthly vouchers to participants for the purchase of nutritious foods.

Applicants must meet specific eligibility criteria to participate in WIC, one of which is being a child aged five or younger. The age five cutoff was established to bridge between WIC and other school meal programs (U.S. General Accounting Office, 1985). However, it has been pointed out that many children do not start school immediately at age five, creating a nutritional gap, and there has been a continuous legislative effort to extend the maximum age of eligibility from five to six to close this gap (Smith and Valizadeh, 2023).[1] Despite the ongoing legislative attention, as pointed out by Bitler and Currie (2005), most of the existing studies are primarily focused on the health outcomes at birth and fail to capture the causal effect of the WIC program as they are based on the simple comparison between WIC participants and non-participants. Consequently, the empirical literature remains scant on the causal effect of a child aging out of WIC, particularly regarding its spillover effects on parental outcomes.

In this paper, I examine the spillover effects of a child aging out of WIC on low-income parents' mental health, medication nonadherence, and food insecurity, leveraging the quasi-experimental variation in children's WIC eligibility at age five. Employing a regression discontinuity (RD) design, I identify a child becoming ineligible for WIC as a causal channel that simultaneously deteriorates all three of these outcomes—for low-income mothers in particular.[2]

Extensive literature reveals complex connections among our three main outcomes. Established research shows a clear positive correlation between food security and psychological well-being (e.g., Whitaker et al. (2006); Haushofer and Shapiro (2016)). For instance, Vlassopoulos et al. (2024) find that a telecounselling intervention during the COVID-19 pandemic in Bangladesh significantly improved both psychological well-being and food security among women. Additionally, several studies present a negative correlation between food security and medication nonadherence (e.g., Berkowitz et al. (2014)). Gundersen and Ziliak (2015) highlight the adverse impacts of food insecurity on health outcomes, such as hypertension, primarily due to increased medication

[1]On May 15, 2023, during the 118th Congress, the "Wise Investment in Children Act" was reintroduced in the Senate with the aim of increasing the age of eligibility for children to receive WIC benefits (S. 1604 – 118th Congress 1st Session, 2023). Though the provisions of the bill have varied slightly with each introduction, it has been introduced multiple times since 2015 but has yet to make it out of committee.

[2]Although I employ the continuity-based framework for my main RD analysis, I show that the findings remain consistent when applying the local randomization framework. This approach offers the advantage of finite-sample exact inferences and makes adjustments for the discreteness of our running variable unnecessary.

nonadherence. To my knowledge, this study is the first to simultaneously investigate these three outcomes.

I use three main datasets. The first dataset is the WIC Participant and Program Characteristics (PC) National Sample Dataset, the U.S. Department of Agriculture (USDA) administrative data through which I validate the cutoff. The second dataset is the U.S. National Health Interview Survey (NHIS) data, and the third one is the Behavioral Risk Factor Surveillance Survey (BRFSS) data. The NHIS is the most comprehensive data for our sample period that includes information on all three main outcomes, and detailed information on individual participation in other means-tested programs, which are the potential confounders whose balance at the cutoff requires testing. Additionally, the NHIS and BRFSS provide a range of validated mental health measures. Given their focus on the general population, concerns regarding the Hawthorne effect are minimized in my setting compared to experimental studies.

As my first main result, I document that a child aging out of WIC has a significant negative impact on the mental health of low-income mothers but has no significant effect on that of fathers. I estimate that a child aging out of WIC increases parents' Kessler psychological distress scale (K6) scores by 1.22 points, and the proportion of parents considered at risk for serious mental illness (SMI) by 6.3 percentage points at the age cutoff. The estimated increase in K6 scores for mothers is 1.21 points (37%). For mothers, I also identify an increase of 0.40 points (37%) in the Washington Group (WG) anxiety indicator (WG-ANX) scores ($p = 0.065$), but an insignificant, yet small, positive increase in the eight-item Patient Health Questionnaire (PHQ-8) scores and the WG depression indicator (WG-DEP) scores at the age cutoff. For fathers, I detect no significant effects on any of these measures. These results are consistent with the earlier findings that women experience a greater distress compared to men when faced with disruptions in childcare (Meyer et al., 2008; Rosenfield and Mouzon, 2013). Combined with the standout effect on the nervous feelings of mothers among the six components of the K6, my findings further suggest that the decline in the maternal mental health can be particularly attributed to heightened anxiety.

To put these results in context, I provide three reference points. First, the changes in the mental health measures for mothers correspond to a 26.8 percentage point increase in the ratio of mothers who report that they have been diagnosed with an anxiety disorder by health professionals. Second, using the NHIS data paired with the National Death Index (NDI) records, I estimate that the yearly number of mental health-related deaths expected to occur per 100,000 low-income mothers—as predicted by the six components of the K6—increases by 1.12 at the age threshold, though this estimate is not statistically significant. Third, the RD estimate for the K6 index of parents is 4.05 times larger than the average estimated effect of cash transfers reported in the meta-analysis by Ridley et al. (2020), and it is 1.97 times larger than the average effect of multifaceted antipoverty programs from the same study.

The second main finding is that when a child becomes ineligible for WIC, there is an exacerbation of cost-related medication nonadherence among mothers, reflecting the income effect of WIC; however, this effect is not observed among fathers. This finding aligns with a large body of literature that examines non-unitary consumption responses to income shocks within households, indicating that mothers' responses tend to lean toward foods and child care (e.g., Thomas (1990); Lundberg et al. (1997); Duflo and Udry (2004); Doss (2013)). I further show that Medicaid enrollment status is correlated with the magnitude of the effect. While Medicaid enrolled mothers show no signs of an exacerbation in nonadherence behaviors, for non-enrolled mothers, I observe a large increase of 0.53 standard deviation (σ) units in the medication nonadherence index at the age cutoff ($p = 0.018$). For fathers, I do observe a marginally significant increase in the index for Medicaid enrollees, but do not find evidence of a significant increase for non-enrollees. The differential patterns observed between mothers and fathers appear to be driven by the underlying selection biases in Medicaid enrollment, with fathers exhibiting a stronger positive selection into Medicaid.

When a child loses access to WIC, both mothers and fathers also experience increased levels of food insecurity, measured by the USDA adult 30-day food security scale scores. The deterioration in mothers' food insecurity is consistent with the result from Bitler et al. (2023). Fathers also experience adverse effect, with the effect size being larger compared to that for mothers. These findings suggest that both mothers and fathers act as a buffer, "insuring" their children against the negative impacts of losing access to WIC (Bitler et al., 2023).

The magnitude of our estimated effects appears larger than typically seen in prior research (e.g., Ridley et al. (2020)). I propose two explanations for this discrepancy: the first is that my analysis focuses on parents close to the eligibility threshold, who demonstrate a significant need for the program. I find that families of treated complier children (those below the cutoff and enrolled in WIC) have lower income levels, and the mothers of these children face greater food insecurity compared to families of never-taker children (those below the cutoff but not enrolled). Second, I investigate potential non-monetary factors influencing the effect size by comparing the effects of children aging out of WIC with those of mothers aging out at a different cutoff, where the income shock magnitude is similar. This analysis reveals that mothers experience more adverse consequences when their children age out of WIC than when they themselves do.

Finally, following extensive balance tests and robustness checks, I conclude my analysis by demonstrating heterogeneity in spillover effect of a child aging out of WIC across two dimensions. First, from the separate analysis of single mothers and non-single mothers, I show that the negative effect on maternal mental health is driven by single mothers. However, I find no significant effects on other main outcomes for single mothers. Second, employing the method outlined by Braghieri et al. (2022), I estimate individual susceptibility to SMI and show that mothers deemed more vulnerable to SMI experience a greater decline in mental health when their child ages out of WIC.

Related Literature. This paper builds on three strands of literature. First, this study adds to a limited body of literature on the upward spillover effects (from children to parents) of WIC employing a quasi-experimental research design.[3] To the best of my knowledge, Bitler et al. (2023) is the only such study, which finds that mothers reduce caloric intake and experience greater food insecurity as their child ages out of WIC. My paper diverges from theirs in two main respects. Firstly, while their study focuses on the spillover effects on "likely mothers" (i.e., women aged 20–50 within households) due to the absence of a relationship variable in their datasets, my analysis distinctly includes both mothers and fathers for each child, enabled by the use of a relationship variable in my dataset. Secondly, while they focus on the caloric intake and food insecurity of "likely mothers", my research scope is broader, encompassing the mental health and medication nonadherence behavior of parents, both of which are closely linked to food insecurity.[4]

Second, in a broader context, this paper contributes to the rapidly expanding literature in economics that examines the causal relationship between poverty and mental health.[5] In particular, several randomized controlled trials (RCTs) have demonstrated positive effects of cash transfers and comprehensive antipoverty programs on mental health (Banerjee et al., 2015; Haushofer and Shapiro, 2016; Christian et al., 2019). Yet, the majority of these RCTs took place in low- or middle-income countries, limiting their external validity in high-income countries. An exception is the study by Finkelstein et al. (2012), which finds that health insurance increases the probability of low-income adults testing negative for depression by 7.8 percentage points, leveraging a randomized health insurance experiment in Oregon. Uniquely, this paper explores the impact of negative income shock on mental health, setting it apart from the majority of studies focused on positive income interventions. It highlights that even minor child-related negative income shocks can yield a considerable negative effect on mental health using various mental health measures.[6]

[3] According to De Neve and Kawachi (2017), only five out of 567 studies on spillover effects, from human capital to health outcomes, assessed upward spillover effects, while 286 studies assessed downward spillover effects (from parents to children).

[4] The existing literature on WIC is primarily focused on identifying WIC effects on health outcomes at birth (Hoynes and Schanzenbach, 2015). Hoynes et al. (2011) show that WIC initiation in the late 1970s increased birth weight among WIC participating mothers employing difference-in-differences framework. Rossin-Slater (2013) uses geographic variation in WIC clinic presence and identifies positive effect of WIC on maternal weight gain during pregnancy, birth weight, and the probability of a child being breastfed. Only recently, a small number of studies employed an RD design to investigate the impact of children's WIC exit on their food insecurity, although the results are mixed (Arteaga et al., 2016; Bitler et al., 2023; Smith and Valizadeh, 2023).

[5] Poverty and mental health are shown to have bidirectional causal relationship. See Ridley et al. (2020) and Haushofer and Salicath (2023) for a recent review. In Section 5.1, I compare my results with the meta-analysis results from Ridley et al. (2020).

[6] For example, while the cash transfer offered in Haushofer and Shapiro (2016) was worth about 3 to 12 months of Kenyan household income, the monthly WIC food benefit during our sample period was worth around \$35–\$45. Although not directly comparable, the estimated treatment effect in Haushofer and Shapiro (2016), measured by

Third, this paper also relates to the emerging literature in economics on the determinants of patients' medication nonadherence behaviors (Al-Ubaydli et al., 2017; Finkelstein et al., 2022). I provide evidence that means-tested programs can mitigate these behaviors among low-income patients. We observe an immediate, substantial increase in cost-related nonadherence among low-income patients following a child's exit from WIC, suggesting that financial incentives might serve as viable policy instruments to improve medication adherence for patients with low-income (Giuffrida and Torgerson, 1997). Another related branch of the literature concerns professionals' nonadherence to the medical guidelines and its negative impact on patient health outcomes (Currie and MacLeod, 2020; Abaluck et al., 2020; Cuddy and Currie, 2020). Our findings extend the literature by showing that patients might influence professionals' decision making on medical practices by actively asking for lower-cost medications in response to an income shock—a dynamic that warrants further study.

The remainder of the paper proceeds as follows. Section 2 details the WIC program and its institutional policies. Section 3 describes our data and the construction of the analysis sample. Section 4 outlines the empirical strategy. Results are presented in Section 5, and Section 6 examines the robustness of my findings against potential threats to validity. Section 7 carries out a heterogeneity analysis, and Section 8 concludes.

2 Background: the WIC program

The WIC program, administered at the federal level by the USDA's Food and Nutrition Service (FNS), provides participants with monthly cash-value vouchers for specific foods adhering to particular nutritional standards.[7] While a core objective of WIC is to promote the health of low-income women, infants, and children through nutritious food supplementation, its benefits extend beyond food. The benefits include health evaluations, guidance on diet and breastfeeding, checks and referrals for immunizations, references for substance misuse, and more (Food and Nutrition Service, 2022). Between 2002 and 2014, our primary study period, an average of approximately 4,961,800 children participated in WIC annually (Kline et al., 2020).

To qualify for WIC, an individual must belong to one of the following groups: pregnant women (up to six weeks post-pregnancy); non-breastfeeding postpartum women (up to six months post-pregnancy); breastfeeding women (up to one year post-birth); infants (up to one year old); or

psychological well-being index, is 0.26σ, while our estimated treatment effect, measured by K6 index, is 0.27σ for parents.

[7]By October 1st, 2020, federal regulation required all WIC state agencies to transition to an Electronic Benefit Transfer (EBT) delivery system. Consequently, participants now receive EBT cards. Details on permissible foods and their nutritional criteria are accessible at: https://www.fns.usda.gov/wic/wic-food-packages-regulatory-requirements-wic-eligible-foods.

children (up to five years old). Additionally, applicants must either have a family income no greater than 185% of the Federal Poverty Guideline (i.e., Federal Poverty Level, FPL) or be enrolled in programs including the Supplemental Nutrition Assistance Program (SNAP), Medicaid, or Temporary Assistance for Needy Families (TANF) and adjunctively eligible. Another requirement is being nutritionally at risk, as determined by health professionals based on medical or dietary conditions. Nevertheless, this is not a significant barrier to participation as most applicants qualify based on dietary inadequacies (Bitler et al., 2003). Once enrolled, WIC participants undergo a recertification process every six months using the same eligibility criteria.

In the fiscal year 2022, WIC's average monthly food expense for each participant was \$47.75 (Food and Nutrition Service, 2023). This figure is considerable for low-income families, given that an individual needed a weekly food budget of \$20.91 in 2021 to ensure food security (Feeding America, 2023). Participants are given a one-month period to use the voucher, and the definition of 'month'—whether a calendar month or a rolling month—varies by state (Food and Nutrition Service, 2007).

Despite differing state definitions of a month, federal regulation under 7 CFR Part 246 has mandated that a child remains eligible until the *last day* of the month in which they reach the age of five. In Figure 1, using the PC2018 National Sample Dataset, I illustrate a sharp drop in WIC participation for children right at this 61-month regulatory cutoff, echoing similar patterns seen in Bitler et al. (2023).[8] The left panel of Figure 1 plots the number of WIC participants in the PC2018 sample against child age in months as of April 2018, determined by their exact birth dates. After a marked drop at 13 months, which corresponds to the age cutoff for infants, the number of participants shows a smoothly decreasing trend until 60 months. However, upon reaching the 61-month age cutoff, there is a significant drop, validating the cutoff.

The right panel of Figure 1 displays the national WIC participation rate against child age in months as of April 2018, relative to the 61-month threshold. To calculate national WIC participation rate for each age in months, which more accurately reflects the true participation than the sheer number of WIC participants, I incorporate the Vital Statistics Birth Data and apply the simple Bayes' rule.[9] At the 61-month threshold, the participation rate exhibits a stark drop, becoming virtually zero. This discontinuity is estimated to be a decrease of 15.9 percentage points, closely aligning with the 14.6 percentage points found by Bitler et al. (2023). Taken together, these findings clearly show the presence of a sharp discontinuity at the 61-month cutoff, decisively determining

[8]The PC2018 National Sample Dataset (N=78,365) is a nationally representative sample drawn from the PC2018 that provides a complete census of all 7,837,672 WIC participants. The term "participant" here is defined as "a person on WIC master lists or listed in WIC operating files who was certified to receive WIC benefits in April 2018" (Insight Policy Research, 2020). See Bitler et al. (2023) for details on the data, where they utilize the same dataset but from years 1996–2014 for their first stage estimation.

[9]$P(\text{in WIC} \mid \text{age in months} = x) = P(x \text{ months old} \mid \text{in WIC}) \times \frac{\text{total \# of WIC participants}}{\text{total \# of } x \text{ months olds}}$, the reference period for all figures is April 2018.

WIC eligibility for children.[10]

It is also crucial to consider legislative and procedural changes that might have influenced the validity of the eligibility cutoff. After the enactment of the William F. Goodling Child Nutrition Reauthorization Act of 1998, federal regulations governing the WIC certification process were amended to implement legislative requirements of the Act. Specifically, the Goodling Act mandates that all applicants physically present themselves at the WIC clinic at certification, and provide proof of residency and identification, as well as documentation of family income, to prevent dual participation. The final rule amending the regulations went into effect on January 10, 2001. According to U.S. General Accounting Office (1997), before the passage of the Goodling Act, 12 states did not require proof of identification at certification, which poses a potential challenge to the identifying assumption. Given this, I exclude data prior to 2002 to ensure that the changes in the certification process do not confound the true causal effect under study.

3 Data

3.1 Mental Health Measures

In my analysis, I employ three widely recognized self-report measures for assessing mental health. According to the *Diagnostic and Statistical Manual of Mental Disorders* fifth edition text revision (DSM-5-TR), which serves as the authoritative guide for health professionals diagnosing mental disorders, determining a mental disorder often hinges on assessing significant distress or disruptions in daily functions due to the lack of clear biological markers. Therefore, gathering information from an individual through interviews or self-reports is crucial for accurate evaluations.

K6 Scale. Kessler Psychological Distress Scale (K6) is developed by Kessler et al. (2002) to screen for serious mental illness (SMI) in the general population and has been adopted by government surveys across the 30 member countries of the World Mental Health (WMH) Survey Initiative. The validity of the scale are well-established in a substantial body of literature (e.g., Kessler et al. (2010)). Furthermore, it has been examined within economic literature to evaluate the mental health of target populations (Kling et al., 2007; Ludwig et al., 2013; Barker et al., 2022). The K6 scale asks respondents 6 questions about how frequently they experienced specific emotions or feelings over the past 30 days. The scale score can range from 0 to 24, and individuals who score 13 or higher are considered at risk for SMI (Kessler et al., 2003).

[10]The cutoff is further corroborated by Bitler et al. (2023). Their findings, based on the data directly obtained from the WIC offices, indicate that out of 48 states and Washington D.C., 27 terminate benefits on the last day of the month in which a child turns five, irrespective of whether benefits are dispensed on a rolling or calendar month basis.

My analysis of the K6 scale relies on pooled 2002–2014 U.S. National Health Interview Survey (NHIS) data, which is a nationally representative, cross-sectional survey of U.S. households. The K6 scale was developed specifically for the NHIS redesign in 1997, where its validity was subsequently assessed (Kessler et al., 2002). A key strength of the dataset is that it captures the intricate relationships among family members, allowing us to identify the respective mothers and fathers for every child. Additionally, since the NHIS includes data on the exact birth month and the interview month for all household members, we can determine the precise age of a child in months at the time of the interview.

The analysis sample is confined to parents with a single child aged between 49 months and 73 months, and whose annual family income falls below 200% of the poverty thresholds. This restriction ensures that a unique running variable is assigned to each parent, and reflects the income-eligibility criteria of WIC (Bitler et al., 2023; Smith and Valizadeh, 2023).

PHQ-8. The eight-item Patient Health Questionnaire (PHQ-8) is a widely-used diagnostic instrument for measuring depression. It is a variant of PHQ-9, and consists of eight of the nine criteria for depression from the DSM-5-TR.[11] The validity of PHQ-8 was established in the seminal study by Kroenke et al. (2009), which used the 2006 Behavioral Risk Factor Surveillance Survey (BRFSS) data. The PHQ-8 score ranges from 0 to 24, and a total score of 10 or greater is suggestive of the presence of depression (Kroenke et al., 2001).

For the PHQ-8 analysis, I pool BRFSS, which is a large, annual cross-sectional survey, for the years 2006, 2008, and 2010.[12] Mirroring the approach with the NHIS data, the analysis sample is limited to parents with at least one child aged between 49 and 73 months and an annual family income less than 200% of the FPL.[13] A child's age in months is calculated based on the exact birth month and interview month, and the relationship variable in the data uniquely identifies the parents of a child.

WG-ANX and WG-DEP. The Washington Group on Disability Statistics (WG), an entity under the United Nations Statistical Commission, developed the WG Extended Set on Functioning (WG-ES)

[11]The omitted question assesses suicidal or self-injurious thoughts. "It was omitted (from BRFSS) because interviewers are not able to provide adequate intervention by telephone. Research indicates that the deletion of this question has only a minor effect on scoring because thoughts of self-harm are fairly uncommon in the general population, and the ninth item is by far the least frequently endorsed item on the PHQ-9 (Kroenke et al., 2009, p. 165)." The precise phrasing of these questions can be found in Appendix Section C.

[12]The PHQ-8 questionnaire was administered in 39 states in 2006, 16 states in 2008, and 20 states in 2010, covering a total of 47 states. This is not a confounding factor, given that the WIC eligibility rule has been uniformly applied across states. The results remain consistent when including state fixed effects.

[13]In the BRFSS dataset, birth month data is only available for a randomly selected child within each household. Therefore, the analysis includes mothers or fathers who have any child within the age range of 49 to 73 months. See Appendix Section B for more details.

questions. This was done to unify the conceptualization and quantification of disability, aligned with the International Classification of Functioning, Disability, and Health (ICF) (Madans et al., 2011). Within the WG-ES, there are specific inquiries regarding the frequency and severity of anxious and depressive feelings. Based on these questions, we can construct the WG–ANX and WG–DEP indicators that place respondents into four mutually exclusive categories of no, low, medium, or high, each category corresponding to score 1 to 4. In constructing the WG–ANX and WG–DEP indicators, I adhere to the analytic guidelines provided by the Washington Group (Washington Group on Disability Statistics, 2021).

Data from the 2012–2014 NHIS is pooled for analysis, and our analysis sample consists of parents with a single child aged between 49 and 73 months and an annual family income less than 200% of the poverty threshold.

Analyzing the Magnitude of Effects. To provide intuition on the magnitude of the effect on mental health measures, I analyze additional variables. First, I use IPUMS NHIS, a harmonized set of data based on NHIS provided by the University of Minnesota, to investigate the association between the K6 scale and mortality. The data includes a set of mortality variables released by the National Center for Health Statistics (NCHS). The records of respondents aged 18 and older in NHIS are matched to National Death Index (NDI) records, based on their names, dates of birth, and social security numbers. We can determine not only the final vital status (either assumed alive or assumed deceased) of the 1986-2014 NHIS adult respondents as of December 31, 2019, but also the specific quarter in which the death occurred. Specifically, for the adult respondents of 1986-2004 NHIS whose final vital status was judged deceased as of December 2006, the detailed underlying cause of death is reported in 113 categories created by NCHS based on ICD-10.

Second, the BRFSS asks respondents: (i) "Has a doctor or other healthcare provider ever told you that you had an anxiety disorder?"; (ii) "Has a doctor or other healthcare provider ever told you that you have a depressive disorder?" While these questions do not provide a direct verification of a respondent being diagnosed with an anxiety or depressive disorder due to their self-reported nature, they do offer an indirect means of assessing such diagnoses. This facilitates comparison with the mental health measures, thereby aiding in the validation of these measures against actual diagnoses.

3.2 Medication Consumption Behavior

Another outcome variable of interest is medication consumption behavior, which can capture the income effect of a child aging out of WIC. While our primary datasets lack detailed data on individual medication consumption, the 2011–2014 NHIS surveys do ask respondents six questions about medication nonadherence behaviors they adopt to reduce prescription medication costs.[14] The specific phrasing of these questions allows us to distinctly capture the income effect, as it indicates whether changes in medication consumption behavior are financially motivated, rather than due to other external factors.[15] As with prior datasets, our analysis focuses on low-income parents (whose family income falling below 200% of the poverty thresholds) of a single child aged between 49 and 73 months.

Examining such medication nonadherence behaviors is pivotal for two reasons. First, individual health outcomes can deteriorate due to nonadherence behaviors, incurring avoidable costs resulting from suboptimal medicines use (World Health Organization, 2003; Al-Ubaydli et al., 2017). Second, medication nonadherence can impose a high cost burden on healthcare systems, encompassing direct costs (medical or nonmedical expenditures addressing the illness) and indirect costs (e.g., workers' productivity loss caused by the health problems) (Cutler et al., 2018). A meta-analysis by Cutler et al. (2018) indicates that the annual disease-specific economic cost of nonadherence per person ranges from $949 to $44,190 (in 2015 US dollars).

3.3 Food Insecurity and other Program Participation

Food Insecurity. I use pooled NHIS data from 2011–2012 to examine the impact of a child aging out of WIC on food insecurity among low-income parents with a single child in the age bracket of 49 to 73 months. Starting from 2011, the NHIS has included 10 questions that the USDA uses to assess the 30-day food security status of adults. Following Bickel et al. (2000), adults are classified based on their food security scale score, which is calculated from the responses to those questions. Those with a score of 3 or higher are considered food insecure, and those with a score of 6 or higher are classified as having very low food security.

Other Program Participation. A discontinuous change in other means-tested program participation can be a potential confounder. However, Bitler et al. (2023) shows that child exits from WIC do not coincide with changes in participation in other social, educational, or nutritional program participation including Medicaid, SNAP, and TANF, as well as changes in a child's school enrollment, using Survey of Income and Program Participation (SIPP) data. I confirm their results using pooled 2002–2014 NHIS data.[16]

[14] The precise phrasing of the six dichotomous questions can be found in Appendix Section C.

[15] The self-reporting nature of the questions is not a significant concern (Morisky and DiMatteo, 2011). Several studies indicate that self-report adherence measures generally demonstrate high specificity (Osterberg and Blaschke, 2005; Stirratt et al., 2015). That is, self-reports of nonadherence, our primary interest, are reliable, although self-reports of adherence are less so, often influenced by social desirability.

[16] One complication arises from the program participation queries, which ask if participation occurred at any point in the previous calendar year. This makes it unclear when within that year children's program exits or entrances occurred.

3.4 Balance Table and Summary of Outcomes

In Panel A of Table 1, we observe largely similar demographic characteristics between the control group—defined as NHIS low-income sample parents whose child is aged between 59 to 60 months—and the treatment group—defined similarly but with a child aged 61 to 63 months. As shown in Column (4), there are no significant differences in the means of the characteristics between the treament and control groups, other than the proportion of parents living below the FPL and hours worked for pay in the last week. The absence of significant differences provides a robust basis for considering the treatment as-if randomly assigned within the recentered age window of [-2,2], selected following the Cattaneo et al. (2015) procedure elaborated in Section 4.2. On the other hand, the significant differences of 6 percentage points in the proportion of parents living in poverty and of 1.66 in weekly working hours between the groups are indicative of the income effect attributable to the discontinuation of WIC benefits. Finally, Panel B of Table 1 summarizes the main outcome variables detailed in the preceding sections, organized by the data sources.

4 Empirical Strategy

4.1 Main Identification Strategy

I employ a regression discontinuity (RD) design to analyze the impact of a child aging out of WIC on parental outcomes. The sharp eligibility cutoff for WIC at age 61 months provides the quasi-experimental variation required for the identification. The running variable is recentered child age that is obtained by subtracting 61 from the child age in months. In Section 2, it is shown that the 61-month cutoff correctly classifies treatment assignment, implying measurement error in the running variable is of less concern (Dong and Kolesár, 2023).

The key identifying assumption is that parents cannot manipulate their child's age (McCrary, 2008). This assumption is very likely to hold in my setting considering the nature of the dataset, although I present results from the formal test proposed by Cattaneo et al. (2020, 2022) in the Figure A.1.[17] The p-value from the test is 0.309, suggesting that the density of child age is continuous at the cutoff.

See Appendix Section B to see how we address this issue.

[17] Incentives for parents to falsely report their child's age in the survey are minimal because eligibility for WIC requires proof of identification, such as a child's birth certificate (the Goodling Act, see Section 2). Furthermore, the NHIS questionnaire includes checks and follow-up questions for accurate records of exact birthdates. The NHIS is conducted using computer-assisted personal interviewing (CAPI) technique, and the interview dates are digitally recorded.

I estimate the following model:

$$Y_{it} = \beta_0 + \beta_1 \mathbb{1}_{\{\widetilde{Age_{it}} \geq 0\}} + \beta_2 \widetilde{Age_{it}} + \beta_3 (\mathbb{1}_{\{\widetilde{Age_{it}} \geq 0\}} \times \widetilde{Age_{it}}) + \delta_t + \varepsilon_{it} \quad (1)$$

The dependent variable, Y_{it}, is an outcome for individual i who took the survey in year t. $\widetilde{Age_{it}}$ is the recentered child's age in months, measured at the time of the interview. $\mathbb{1}_{\{\widetilde{Age_{it}} \geq 0\}}$ is an indicator variable, which is set to 1 if $\widetilde{Age_{it}} \geq 0$. δ_t indicates survey year fixed effects.[18] The causal impact of a child aging out of WIC is captured by β_1.

My preferred model estimates a local linear regression with a triangular kernel employing mean-squared error (MSE) optimal bandwidth that is allowed to vary across outcomes but is fixed on either side of the cutoff, following the Calonico et al. (2014). The procedure takes into account the discreteness of the running variable and the presence of covariates in the model. I report MSE-optimal estimates of β_1 from equation (1) with robust bias-corrected confidence intervals that have smaller coverage error compared to conventional data-driven confidence intervals (Calonico et al., 2014). I check the robustness of my results in Section 6, employing several additional bandwidths and specifications. Standard errors are clustered by survey year and month.

4.2 Local Randomization

I also employ the local randomization method proposed by Cattaneo et al. (2015). This method serves as a complement to my primary analysis for two key reasons. First, it enables finite-sample exact inferences for outcomes with limited observations near the cutoff, where reliance on large-sample approximations from the primary analysis may prove unreliable.[19] Second, it requires minimal extrapolation that is unavoidable due to the lack of denseness near the cutoff especially when the running variable is discrete. This contrasts with the primary approach, which relies heavily on extrapolation to the cutoff.

The validity of the local randomization approach hinges on the assumption that treatment is quasi-randomly assigned within a small window around the cutoff. For this assumption to hold, selecting an appropriately small window, where the treatment can be considered as-if randomly assigned, is crucial. I choose the window $W_0 = [-2, 2]$, consistently employed across all outcomes.[20]

[18] I include survey year fixed effects to improve the precision of our RD estimates (Calonico et al., 2019). The estimates from the model without these fixed effects can be found in Appendix tables. As expected, these estimates align closely with those from our baseline specification.

[19] However, for the majority of outcomes I investigate, the number of observations is well above 500, a sample size benchmarked in several simulation studies (Imbens and Kalyanaraman, 2012; Calonico et al., 2014; Armstrong and Kolesár, 2020).

[20] Following the data-driven procedure suggested by Cattaneo et al. (2015), the largest possible window is $[-4, 4]$. To minimize extrapolation, I select the second smallest window within $[-4, 4]$, ensuring both compliance with the local randomization assumption and a sufficient number of observations for reliable inference. Cattaneo et al. (2015)

Moreover, to account for the direct effect of the running variable on potential outcomes in the given window, outcomes are transformed using first-order polynomials following Cattaneo et al. (2017).

In particular, my estimator is:

$$\hat{\tau}_{RD} = \frac{1}{N^+_{W_0}} \sum_{i \in I} \tilde{Y}_i \mathbb{1}_{\{\widetilde{Age_i} \geq 0\}} - \frac{1}{N^-_{W_0}} \sum_{i \in I} \tilde{Y}_i (1 - \mathbb{1}_{\{\widetilde{Age_i} \geq 0\}}) \tag{2}$$

where $N^+_{W_0} = |\{i : \widetilde{Age_i} \in [0, 2]\}|$, $N^-_{W_0} = |\{i : \widetilde{Age_i} \in [-2, 0)\}|$, $I = \{i : \widetilde{Age_i} \in W_0\}$, and $\tilde{Y}_i$ is a transformed outcome.

(2) is simply the standard difference-in-means estimator under fixed-margins randomization mechanism. I also report both the randomization p-value from a test of the Fisherian sharp null hypothesis, and the asymptotic p-value from a test of the null hypothesis that the average treatment effect (ATE) is zero, adopting a Neyman approach that is asymptotically conservative.[21]

4.3 Addressing concerns about multiple hypothesis testing

I take two approaches to alleviate concerns about multiple testing. The first approach is to construct summary indices following the procedure similar to that of Kling et al. (2007). The procedure is as follows: first, adjust all variables composing the index to ensure higher values indicate worse health outcomes; second, calculate the z-score for each variable by subtracting the mean of the control group (i.e. parents with a child aged 49 to 60 months) and dividing by its standard deviation; third, calculate an equally weighted average of these z-scores, excluding observations with any components missing; finally, standardize this average to derive the final index.[22]

The second approach is to control the family-wise error rate (FWER) through the Holm-Sidak step-down correction. While this correction assumes that outcomes are independent, the outcomes I am examining are correlated. In this sense, this correction is considered conservative (Jones et al., 2019). Outcomes comprising an index are grouped as one family, and the p-values adjusted within each subgroup are presented in Appendix Tables A.13 and A.14.

recommend maintaining at least ten observations on either side of the cutoff to achieve adequate statistical power. The predetermined covariates incorporated in the procedure are gender, age, and race/ethnicity.

[21]The Fisherian sharp null hypothesis has long faced criticism for being "uninteresting and academic" (Neyman and Iwaszkiewicz, 1935). However, recent literature provides a more comprehensive justification for Fisher randomization tests. For example, Caughey et al. (2023) show that the randomization p-value I report is valid for testing whether all individual effects are non-positive ("bounded null hypothesis"), a much more general hypothesis than the sharp null of no effects.

[22]I show in Appendix Table A.15 that the results remain robust using an alternative index construction based on Anderson (2008).

5 Results

5.1 Parental Mental Health

5.1.1 Estimating the Effect Using Multiple Measures

I first examine the effect of a child aging out of WIC on parental mental health, using various mental health measures as the dependent variables. According to Rosenfield and Mouzon (2013), one of the most notable observations in mental health is the distinct differences between men and women.[23] Given the noted gender-specific differences in mental health, I analyze mothers and fathers separately. Figure 2 and Figure 3 show stark jumps in the measures for mothers at the age threshold, providing graphical evidence of a deterioration in maternal mental health as a child loses access to WIC.[24] In contrast, the graphs for fathers do not display such discontinuities.

Panel A in Table 2 reports MSE-optimal RD estimates of β_1 from equation (1), with each of the four different mental health measures described in Section 3.1 being the outcome variable. As shown in Column (2), a child aging out of WIC leads to a significant increase in raw K6 scale scores for low-income parents of 1.22 points at the cutoff, a 41% increase relative to the control group (i.e. parents with a child aged 49 to 60 months) mean of 2.96 points reported in Column (1).[25] The proportion of parents considered at risk for SMI significantly increases by 6.3 percentage points, a 146% increase relative to the control group mean of 4.3. Point estimates of all other measures for parents are positive, although they are not statistically significant at the conventional significance level.

Columns (4) and (6) of Table 2 reveal that the deterioration in parental mental health is driven by mothers, which aligns with the graphical evidence presented earlier. The raw K6 score for mothers shows a significant increase of 1.21 points (37%) at the age cutoff. In contrast, the estimated effect for fathers is -0.18 points (-8%), which is statistically indistinguishable from zero. Additionally, the proportion of mothers at risk for SMI increases by 5.1 percentage points (104%) at the age cutoff, achieving marginal significance ($p = 0.075$). However, the effect on fathers is a negligible decrease of -0.3 percentage points (-12%) and is not statistically significant. Indeed, for fathers, the estimated effects across all other measures are negative (except for WG-DEP) and statistically insignificant. The results corroborate the extensive literature on gender disparities in

[23]Starting in early adolescence, women suffer from internalizing disorders like depression and anxiety more frequently than men, leading to heightened feelings of self-blame, loss, and helplessness. Conversely, men are more prone to externalizing disorders that affect others around them, such as antisocial behaviors and substance abuse (Rosenfield and Mouzon, 2013).

[24]Following Gelman and Imbens (2019), for the figures, I fit separate global linear lines to each side of the cutoff for illustrative purposes, while for inference, I employ the MSE-optimal bandwidths. Appendix Figure A.5 displays local averages calculated within 2-month bins, aiming to streamline the visual representation and reduce noise.

[25]External validity of the findings is assessed in Appendix Figure A.14 using the pooled 2007 and 2009 BRFSS as an alternative data source.

mental health. Specifically, women, bearing the primary responsibility for childcare and household tasks, experience significant distress when faced with unstable childcare arrangements, reflecting the gender disparities suggested by role theory (Meyer et al., 2008; Rosenfield and Mouzon, 2013).

Column (4) of Table 2 reports a marginally significant increase of 0.40 (27%) in the mothers' WG-ANX score at the cutoff ($p = 0.065$). In comparison, the increases in the mothers' PHQ-8 and WG-DEP scores, 0.62 (12%) and 0.12 (9%) respectively, are relatively small in magnitude and not statistically significant. While the K6 scale offers a broad assessment of non-specific psychological distress, PHQ-8, WG-ANX, and WG-DEP are tailored to pinpoint particular conditions; the WG-ANX is designed to gauge anxiety, while both PHQ-8 and WG-DEP target depressive symptoms. The findings suggest that the decline in mothers' mental health, following a child aging out of the WIC program, can be attributed to heightened anxiety rather than depression.[26]

To further delve into the nuances of the mothers' mental health, Panel A of Figure 4 examines each of the six components that consist of K6 scale individually. To ensure comparability across the six components, each component is standardized using the control group mean and standard deviation. The point estimates for each of the six K6 components for mothers are positive and substantial, in stark contrast to those for fathers, which are all centered around zero and insignificant. The K6 index for mothers, constructed following the method delineated in Section 4.3, increases by 0.26σ at the age threshold ($p = 0.062$), while for fathers, the estimated effect is -0.05σ ($p = 0.739$). Interestingly, among the six components, the effect on the nervous feelings for mothers distinctly stands out, 0.35σ ($p = 0.021$), confirming the earlier findings of heightened anxiety among mothers. As illustrated in Appendix Table A.13, even after the conservative correction for multiple testing, the effect on nervous feelings remains marginally significant for parents while the rest do not, further emphasizing the large effect on anxious feelings, particularly among mothers.

One may worry about the power of the tests given the limited sample sizes for certain outcomes, particularly those for fathers.[27] To mitigate this concern, in Panel C of Appendix Tables A.5 and A.6, I test for the Fisherian sharp null of no effects, where the test is finite-sample exact. While the randomization p-values for mothers suggest rejection of the null across all measures, for fathers, we cannot rule out the possibility of no effect on both WG-ANX and WG-DEP.

5.1.2 Contextualizing the Magnitude of the Effect

In Panel B of Table 2, I provide contextual references to give insight into the scale of the effects and to further validate the measures used. Firstly, I examine the change in the fraction of parents who report

[26] Anxiety and depression symptoms often appear together, yet they represent distinct dimensions. Both conditions have different, independent impacts on functional impairment and disability (Spitzer et al., 2006).

[27] The discrepancy in sample sizes between mothers and fathers is attributed to the prevalence of single-mother-headed households in low-income populations. Among mothers in our sample, 50.0% are single mothers. We analyze single mothers separately in Section 7.1.

they have been diagnosed with either an anxiety or depressive disorder by a healthcare professional. There is a significant increase of 26.8 percentage points at the age threshold in the proportion of mothers diagnosed with an anxiety disorder.[28] In contrast, there is a slight decrease of −3.9 percentage points for mothers diagnosed with depressive disorder, but this change is minor and not statistically significant. For fathers, the estimated effect on the fraction diagnosed with an anxiety disorder is an increase of 4.1 percentage points, and there is a decrease of −3.2 percentage points for those diagnosed with a depressive disorder; neither of these changes are statistically significant. These results align with previous observations, indicating a more pronounced deterioration in mothers' mental health compared to fathers, with a particular emphasis on elevated anxiety levels over depressive symptoms.

While the data shows an uptick in anxiety disorder diagnoses among mothers, it is worth noting that the frequency of visits to healthcare professionals has remained unchanged. The NHIS asks the respondents, "During the past 12 months, have you seen or talked to any of the following health care providers about your own health?" The affirmative responses from mothers decrease by 2.6 percentage points at the cutoff, a change that is statistically insignificant ($p = 0.351$). This indicates that the observed increase is indicative of a true surge in the prevalence of anxiety disorders, rather than a mere consequence of change in healthcare interactions (i.e. individuals with severe symptoms positively selecting into active healthcare interactions).

Second, I determine the optimal weights for the six components of the K6 scale and demographic control variables using logistic regression to best predict an indicator, set to 1 if mental health-related mortality occurs within a 20-quarter (approximately 5-year) period following the recording of the K6 scores, and 0 otherwise.[29] Following Alexander and Schnell (2019), mental health-related mortality is defined to include not only deaths by suicide but also those resulting from accidents of poisoning, fire/smoke exposure, drowning, and firearm discharge, to capture the true suicide rates attributable to poor mental health.[30] Using these weights, I calculate the probability of experiencing mental health-related mortality for each sample parent. By multiplying this by 100,000, I examine the change in the expected number of mental health-related deaths per 100,000 low-income parents

[28] While this point estimate is large, the associated confidence interval includes values suggesting more modest yet still economically significant effects. Taking a conservative approach, even the lower bound of our confidence interval (0.066) indicates a 34% increase in the proportion relative to the control group mean.

[29] For the precision, I control for gender, age, and race/ethnicity, which are shown to be continuous at the cutoff, thus not confounding the estimated effect. My analysis is restricted to low-income sample adults from 1997–2001 IPUMS NHIS to address right censoring in the data, given that the tracking of an exact cause of deaths of each individual extends only up to December 2006. We are left with 45,591 sample adults. To evaluate the performance of my binary classifier model, I present the receiver operating characteristic curve (ROC curve) in Appendix Figure A.15.

[30] Mental health-related mortality includes: accidental poisoning (NCHS code: 122, comprises 37.1% of the total deaths analyzed), suicide by other or means (126, 27.1%), suicide by discharge of firearms (125, 24.3%), accidental fire/smoke exposure (121, 6.4%), accidental drowning (120, 3.6%), accidental discharge of firearms (119, 0.7%), and firearm discharge of unknown intent (132, 0.7%).

over a 5-year period at the age cutoff. Panel B of Table 2 shows that, at the cutoff, the yearly number of mental health-related deaths expected to occur per 100,000 low-income parents over the subsequent 5-year period significantly increases by 5.72 (= 28.6/5), provided that the deaths will occur uniformly each year. For mothers, there is an annual increase of 1.12 deaths per 100,000, which is statistically insignificant. In contrast, for fathers, the annual increase is 11.98 deaths per 100,000, and this is statistically significant, although, due to the noisy estimation, we refrain from drawing a definite conclusion as the significance may partly capture noise.

Nevertheless, given the significant effect of a child aging out of WIC on mothers' mental health rather than fathers', these findings appear counterintuitive. However, upon closer examination, two reasons reconcile these findings. First, as shown in Panel C of Appendix Table A.6, the small randomization p-value for K6 scale suggests a rejection of the sharp null of no effect ($p = 0.0008$). This underscores that some fathers do experience adverse effects on their K6 scale scores when a child ages out of WIC. In Section 7.2, I show that fathers predicted to be least susceptible to SMI are the ones experiencing such adverse effects. Second, our results are consistent with prior research suggesting that while women take a more expressive approach to distress and are often more proactive in seeking assistance, prevailing male norms which prioritize self-control prompt men to perceive suicide as the final act of self-control in the face of adversity (Möller-Leimkühler, 2003). Given the high prevalence of single-mother families, parenthood, which is associated with a reduced suicide risk, may also be an influential factor (Qin and Mortensen, 2003).

For the final reference point, I compare the magnitude of my estimates to those from the related meta-analysis by Ridley et al. (2020), which examines the effect of cash transfers and comprehensive antipoverty programs on mental health based on RCT studies conducted in low- or middle-income countries. The average estimated effect of multifaceted antipoverty programs from 10 studies is 0.138σ, and the average estimated effects of cash transfer from 18 studies is 0.067σ. In contrast, the estimated effect of a child aging out of WIC on parents' K6 index is 0.272σ, markedly higher than the previously mentioned estimates. This discrepancy underscores my study's focus on the adverse impacts of negative income shocks, contrasting with the positive income interventions analyzed in the aforementioned research. Accordingly, the larger effect observed could be attributed to "loss aversion," where the psychological impact of income losses outweighs that of comparable gains (Kai-Ineman and Tversky, 1979; Dean and Ortoleva, 2019). The effect size will be discussed in detail in Section 5.4.

5.2 Cost-related Medication Nonadherence Behaviors of Parents

I next analyze the effect of a child aging out of WIC on the prescription medication nonadherence behavior of parents, which not only has long-run impacts on individual health outcomes but also imposes a cost burden on the healthcare system as a whole. The analysis is done separately for those who are enrolled in Medicaid and those who are not, given that the heterogeneity in effects between these two groups can be pronounced when the target population is low-income parents. Panel B of Figure 5 displays a clear discontinuity in the medication nonadherence index at the age threshold for non-Medicaid enrollees. For the non-enrolled mothers, we observe not only a noticeable jump in the index at the threshold, but also an evident change in the trend: transitioning from a large negative slope below the cutoff to a modest positive one above it. Using a kink RD design, I estimate a slope change of 0.38 at the age cutoff, with the p-value of 0.033.[31] In contrast, for Medicaid enrollees, we do not observe such a jump in the index at the threshold as shown in Panel A.

Panel A in Table 3 reports MSE-optimal estimates of β_1 from equation (1), each of the six components comprising the nonadherence index being the outcome variable. Column (2) shows significant increases in five of the six components at the age cutoff, suggesting a child aging out of WIC exacerbates medication nonadherence behavior among parents. Of the five components, the fraction of respondents seeking lower-cost medication from their doctors exhibited the largest, significant increase in terms of non-standardized units, an increase of 13.3 percentage points, or an 80% rise relative to the control group mean.

Column (4) and (6) of Table 3 reveal that the observed deterioration in parents' nonadherence behavior is primarily driven by mothers, rather than fathers. For mothers, we identify significant effects in five out of the six components, whereas for fathers, none of the components display a significant increase. Such striking disparities between mothers and fathers underscore prior findings that mothers, more than fathers, prioritize children's welfare in response to income shocks (Thomas, 1990; Lundberg et al., 1997; Duflo and Udry, 2004; Doss, 2013).

Panel C of Figure 5 summarizes these findings, presenting the effects on each component for both fathers and mothers in standard deviation units. Specifically, for mothers, 'lower cost medication' component demonstrates the largest increase of 0.51σ at the age cutoff. As shown in Appendix Table A.14, the effect on the 'lower cost medication' component for mothers remains significant even after the conservative correction for multiple testing. This illustrates that low-income mothers, facing income shocks, actively seek more affordable medication options through interactions with their physicians. Such interactions may serve as a mechanism through which doctors become aware of and adjust their medical prescriptions in response to patients' socioeconomic status, extending the observations made by Carrera et al. (2018). Additionally, the observed significant effect on 'delayed prescription' for mothers further elucidates the "liquidity sensitivity" in healthcare consumption

[31] Should we observe only a slope change without a level change in WIC eligibility at the cutoff, ATE would be proportional to this estimate. However, given the clear discontinuity observed at the cutoff, I do not employ a kink RD design for the identification.

among low-income patients, as analyzed by Gross et al. (2022).

Panel B of Table 3 reports a significant increase in the medication nonadherence index of 0.44σ for mothers and an insignificant rise of 0.19σ for fathers. Column (4) indicates that the increase in the index for mothers is largely driven by those not enrolled in Medicaid, rather than enrollees, consistent with the previous graphical evidence. The estimated increase for mothers not participating in Medicaid is 0.53σ, which is statistically significant ($p = 0.018$). In contrast, for mothers who are Medicaid enrollees, the estimated increase is 0.17σ, and it is not statistically significant ($p = 0.376$). Conversely, for fathers, Column (6) reveals a marginally significant increase of 0.23σ in the index among those enrolled in Medicaid, while non-enrollees show a insignificant increase of 0.30σ despite Figure 5 illustrating a distinct spike at the age threshold for father non-enrollees. Given the limited sample size of father enrollees, I test for the sharp null, a test not dependent on asymptotics. The null is rejected with the p-value less than 0.0001.

To be clear, due to adverse selection into Medicaid, we cannot attribute Medicaid as a buffer against the WIC income shock (Finkelstein et al., 2012). Yet, despite this selection bias, the pronounced deterioration in nonadherence behavior among non-enrolled mothers, in stark contrast to the insignificant changes seen in enrolled mothers, is notable. Furthermore, this selection bias provides an explanation for the marginally significant increase in the index for enrolled fathers, unlike enrolled mothers. If fathers exhibit a stronger selection into Medicaid than mothers, this larger selection bias could lead to a larger WIC income effect on father enrollees compared to mother enrollees.

To provide intuition on the magnitude of selection bias, leveraging the 2014 Affordable Care Act's (ACA) Medicaid expansion as an exogenous source of variation, I conduct an exploratory instrumental variable (IV) analysis using the 2013–2014 NHIS low-income adult sample. Our dependent variable is a binary indicator for being prescribed a medication by a healthcare professional in the past 12 months. I use a 2014 survey year dummy as the instrument for Medicaid enrollment, alongside saturated demographic controls.[32] For women, the ordinary least squares (OLS) estimate ($\hat{\beta}_{OLS}$) is 0.12 with the p-value less than 0.001, and the 2SLS estimate ($\hat{\beta}_{2SLS}$) is 0.40 with the Anderson-Rubin p-value of 0.023.[33] For men, $\hat{\beta}_{OLS}$ is 0.19 with the p-value less than 0.001, and $\hat{\beta}_{2SLS}$ is -0.003 with the Anderson-Rubin p-value of 0.994. These results indicate a strong positive selection into Medicaid among fathers, unlike mothers, who do not exhibit a similar pattern. This difference could be the underlying reason for the observed discrepancy in the WIC income effect

[32]Given the randomness in the survey year for an individual, and the close temporal proximity between the analyzed years, the exclusion restriction assumption is conceivable to be met.

[33]Following Andrews et al. (2019), I report a p-value from the Anderson-Rubin Wald test, which is fully robust and efficient to the presence of weak instruments in just-identified models. The first-stage F-statistics are 32.74 for women and 7.56 for men. Due to the limited sample size of parents in our main sample, I extend the IV analysis to include all adults.

between father and mother enrollees, as previously discussed.

5.3 Food Insecurity of Parents

Lastly, I investigate the effect of a child aging out of WIC on the food insecurity outcomes of parents. Panel A of Figure 6 depicts clear jumps in the USDA 30-day food security scale scores for both fathers and mothers. When delving into the individual components of the scores, distinct variations in effects emerge. As seen in Panel B, there are evident increases in the proportion of fathers and mothers reporting their inability to afford balanced meals in the past 30 days. However, in Panel C, we do not identify such distinct discontinuities in the proportion of both fathers and mothers reporting they had cut size or skipped meals in the last 30 days.

Table 4, which reports MSE-optimal estimates of β_1 from equation (1), validates our prior visual findings. The estimated increase in food security scale scores at the age threshold is 1.47 points for mothers and 2.07 points for fathers, both of which are statistically significant. Furthermore, the fraction of mothers who are classified as food insecure (food security scale score ≥ 3) rises by a significant 25.9 percentage points at the threshold, and for fathers, the increase is 42.4 percentage points. The fraction of fathers classified as having very low food security (food security scale score ≥ 6) also rises by 12.9 percentage points; however, the increase for mothers in this category is not statistically significant. Breaking down the components, mothers exhibit a 29.2 percentage point increase in the 'couldn't afford balanced meals' component, whereas for fathers it is 47.4 percentage points. This suggests that parents may choose more affordable, yet less balanced meals for themselves to maintain balanced nutrition for their children, in line with the fundamental goals of WIC. However, the variations in the 'cut size or skipped meals' component are not significant for either group. Overall, these results highlight that a child aging out of WIC contributes to increased food insecurity for both mothers and fathers with fathers facing a larger effect, and distinct variations across components.

The larger adverse effect on fathers relative to mothers could be attributed to diminishing marginal effects. Note that the control mean of food security scale scores are higher for mothers than for fathers, leading us to reject the null in favor of the alternative that the control mean for mothers is higher, with a significant p-value of 0.03.[34] Subjected to a negative shock in food security, the marginal mother, already at a more disadvantaged baseline, could experience less severe incremental negative effects, while the marginal father, from a relatively better baseline, might face a notably larger impact.

To provide a frame of reference, we compare our results with that of Bitler et al. (2023).

[34] Out of the 10 components of the scale score, mothers in the control group reported poorer food security outcomes in 8 components compared to control fathers. Furthermore, the fraction of mothers experiencing very low food security is 1.46 times that of fathers at the baseline.

As previously stated, while my analysis includes both mothers and fathers explicitly linked to each child through the relationship variable in the dataset, referred to as "specifically identified" parents, Bitler et al. (2023) employ a "likely mothers" sample, defined as all women aged 20–50 in households, due to the lack of such relationship variable in their dataset. Their RD estimate from NHANES data indicates a significant 42.6 percentage point increase in moderate food insecurity among likely mothers, compared to our significant 20.6 percentage point estimate for specifically identified mothers.[35] Similarly, while they report a significant 21.1 percentage point increase in severe food insecurity (very low food insecurity) for likely mothers, our corresponding estimate for specifically identified mothers is an insignificant 7.3 percentage points. Additionally, Bitler et al. (2023) observe a reduction in caloric intake among likely mothers as their children age out of WIC, a contrast to our findings where no significant effect is observed on the 'cut size or skipped meals' component for specifically identified mothers.

These discrepancies could be attributed to two main factors: their longer reference period for the food insecurity measure (the previous calendar year) compared to ours (last 30 days), and their use of a substantially wider bandwidth for RD estimation (719 days) relative to ours (2 to 3 months).[36] Given the local nature of our estimates, we would expect them to be smaller if impacts on mothers' food insecurity worsen over time, necessitating more drastic measures like reducing portion sizes or skipping meals.

5.4 Discussion: Magnitude of Effects

Despite the significance of WIC monthly food benefits for low-income families—amounting to about 2.3 times their weekly food budget to ensure food security (Feeding America, 2023)— the magnitude of our estimates appears larger than what is typically observed in related research (e.g., Ridley et al. (2020)). This discrepancy prompts a closer examination of two factors: (i) RD estimates, given their local nature, primarily capture the impact among parents near the eligibility cutoff, whose children tend to be long-term participants with the most pressing needs for WIC, contributing to large effect size; and (ii) there might also be non-monetary factors, potentially unobservable, that influence the effect size.

[35] Individuals classified under "food insecure" comprise both those who are moderately insecure and those who are severely insecure. To make our findings directly comparable, I separately estimate the change in the fraction of mothers experiencing moderate insecurity ($3 \leq$ food security scale score < 6).

[36] A key advantage of shorter reference periods in subjective measures is their lower risk of recall bias (Kahneman and Krueger, 2006).

5.4.1 Who Remains in the WIC Program?

The gradual decrease in WIC participation with increasing child age, depicted in Figure 1, naturally leads to the hypothesis that parents who perceive the greatest need for the program are more likely to keep their children enrolled for longer periods. This implies that the adverse effect of children aging out of WIC is predominant among these persistent parents, compared to those further from the eligibility threshold who choose to voluntarily exit their children from the program due to small perceived needs.[37] Recent meta-analysis indicates that a higher socioeconomic status is a principal reason for participants leaving the WIC program before reaching the maximum eligible age (Lora et al., 2023). Furthermore, a qualitative study of caregivers who chose to exit while still eligible highlights concerns among participants about potentially displacing others more in need of the program's benefits (Gago et al., 2022). Given this selective retention, focusing our analysis and policy efforts on this vulnerable group at the cutoff becomes crucial, thus mitigating concerns about the external validity of RD estimates. This section analyzes the characteristics of WIC participants who remain, shedding light on the mechanisms of persistent participation.

Using the PC2018 National Sample Dataset, I first show that parents near the cutoff are indeed those whose children remain extended periods in WIC relative to parents further from the cutoff. Appendix Figure A.6a illustrates a strong positive correlation between the total months a child has participated in WIC and the child's age in months at the time of (re)certification. Consequently, this indicates that children nearing the cutoff age at (re)certification are more likely to be long-term (exceeding 40 months) WIC participants, rather than being new entrants.

I next explore how the duration of WIC participation correlates with the percentage of FPL. Appendix Figure A.6b plots the average residualized percent of FPL at (re)certification against the total months of participation until (re)certification, where the residualized percent of FPL is derived by partialling out the effect of age at (re)certification to account for variation in (re)certification timing. If the selection into longer participation is primarily driven by greater needs, it is expected that the percent of FPL will exhibit a downward trend as participation duration extends. In line with our expectations, a decreasing trend in the residualized percent of FPL is observed, with this downward trajectory becoming more pronounced towards the higher end of the duration in WIC participation. In Appendix Figures A.6c–A.6f, I further illustrate that children with longer WIC participation tend to have superior anthropometric outcomes, such as higher height-for-age z-scores, though this observation requires careful interpretation to account for potential selection bias.

[37]Due to data constraints, a detailed exploration of the costs influencing WIC participation decisions is beyond the scope of this paper. The costs associated with continuing WIC participation may not be negligible, as it requires physical presence at WIC clinics for recertification every six month. Gago et al. (2022)'s research underscores that early leavers frequently cite administrative barriers—such as long waits and transportation challenges to clinics—as primary obstacles.

To address the limitations of previously analyzed datasets, which lack detailed monthly WIC participation information or only cover WIC participants like in the PC2018 National Sample Dataset, we incorporate an additional dataset: 2018–2020 SIPP. We treat the SIPP as a repeated cross-section to ensure comparability with other datasets, and select only the initial wave from each year's data to avoid overlap of individuals across different years. With this additional dataset, I am equipped to compare the mean characteristics of treated compliers and never-takers at the 61-month eligibility cutoff. In Angrist et al. (1996)'s terms, compliers are children who enroll in WIC when eligible and refrain when not, with treated compliers being those eligible and enrolled due to being below the cutoff. Never-takers are those children who would not participate in WIC, regardless of their eligibility. Specifically, by adapting the Abadie (2002, 2003) approach to our RD setup, I estimate the following:

$$X_{it} \times WIC_{it} = \alpha_0 + \alpha_1 WIC_{it} + \alpha_2 \widetilde{Age}_{it} + \alpha_3(\mathbb{1}_{\{\widetilde{Age}_{it}<0\}} \times \widetilde{Age}_{it}) + \delta_t + \eta_{it} \tag{3}$$

$$X_{it} = \gamma_0 + \gamma_1 \widetilde{Age}_{it} + \delta_t + \xi_{it}, \quad \text{for } i \text{ where } WIC_{it} = 0 \text{ and } \mathbb{1}_{\{\widetilde{Age}_{it}<0\}} = 1 \tag{4}$$

where X_{it} can be both predetermined and non-predetermined characteristics, and WIC_{it} is an indicator for participating in WIC. WIC_{it} in equation (3) is instrumented by $\mathbb{1}_{\{\widetilde{Age}_{it}<0\}}$. Under the conventional IV assumptions, α_1 in equation (3) identifies the mean characteristics of treated compliers at the eligibility cutoff. The mean characteristics of never-takers at the cutoff are captured by the constant term γ_0 in equation (4).

The comparisons in Table 5 reveal that complier families at the cutoff have greater economic needs than never-taker families, as shown in lower income-to-poverty ratio and monthly earnings, aligning with previous findings. The distinction stands out as complier children at the cutoff are notably more likely to receive SNAP benefits and have mothers experiencing low food security, highlighting greater food insecurity compared to never-takers. Moreover, the significantly lower SNAP participation among never-taker children suggests a complementary, rather than substitutive, relationship between WIC and SNAP that provides higher monetary value benefits than WIC. The higher Medicaid participation rates and doctor visits among complier children may reflect poorer health status compared to never-takers, underscoring their greater health needs, yet drawing definitive conclusions is limited by potential selection biases. Complier children are more likely to be female and more likely to be Hispanic than never-taker children, although these differences are not statistically significant.

5.4.2 Potential Non-Monetary Determinants of Effect Size

Is the monetary value of WIC food benefits the primary determinant of the aging out effect size? To address this question, we utilize an alternate age eligibility cutoff for WIC at 13 months, comparing the aging out effects here with those at the 61-month cutoff. Mothers are eligible to receive WIC food packages up to the last day of the month in which their infant turns 1 year old, provided they are breastfeeding. Specifically, the monetary value of the WIC food package for breastfeeding mothers is marginally higher than that for children. For instance, in fiscal year 2018, the average monthly food package cost for breastfeeding mothers was $37.76, compared to $31.78 for children (Kline et al., 2020). This implies that resource sharing families would experience a comparable size of income shock whether it is children or mothers aging out of WIC. If anything, this disparity, though seemingly minor, might amplify the mothers aging out effect relative to children aging out on our main outcomes, including mental health, medication nonadherence, and food insecurity.

Obviously, however, the comparison between the aging out effects at the 13-month cutoff for mothers and the 61-month cutoff for children is not straightforward due to the evident differences in observable and unobservable characteristics between parents at these cutoffs. Appendix Table A.1 shows parents in the control group defined around the 13-month cutoff have significantly lower ages and higher poverty levels compared to those in the control group at the 61-month cutoff. Yet, other observable characteristics, including key outcome variables, remain similar across both groups. The economic and psychological vulnerabilities faced by these younger parents with infants could play a role in intensifying the aging out effect at the 13-month cutoff. Caring for infants, who demand more personalized attention, may strain younger parents both financially and emotionally. This is particularly critical as these parents are often earlier in their careers, and postpartum mothers face a heightened risk of mental health challenges (Howard et al., 2014). Nevertheless, if the monetary value of food benefits significantly shapes the effect size, one would anticipate comparable aging out effect sizes at both the 13- and 61-month cutoffs.

Table 6 reports MSE-optimal RD estimates of β_1 from equation (1), now with age recentered relative to the 13-month cutoff. Surprisingly, we find no significant effects of mothers aging out of WIC on the mental health and medication nonadherence of both mothers and fathers, while we observe a notable impact on food insecurity among mothers, with no corresponding effect detected for fathers. This does not align with our anticipation of seeing similar or marginally higher impacts compared to the effects of children aging out, suggesting that factors beyond the monetary value of food benefits might be influencing the effect size. Additionally, the effect of mothers aging out on their food security scores (1.43-point increase) closely matches the effect of children aging out on mothers' scores (1.47-point increase). However, unlike the effect of children aging out, mothers aging out does not impact fathers' food security scores. This implies that mothers are as significantly impacted by their children aging out as by their own aging out, but the mothers' aging out effect does not spill over to fathers as it does from children aging out. In the words of Bitler et al. (2023), the food shock experienced by mothers upon aging out of WIC is not "insured" against by their partners.[38]

Considering factors aside from the monetary value of WIC benefits, various elements may come into play. First, the absence of a mental health impact on mothers at the 13-month cutoff may highlight how women are particularly sensitive to stressors related to family dynamics, disproportionately bearing "the costs of caring" (Kessler et al., 1985). This sensitivity suggests that the direct targets of income shocks—children at the 61-month cutoff—could explain the variance in women's mental health outcomes, as opposed to when mothers themselves age out of WIC. Second, benefits from WIC that extend beyond the 13-month cutoff for mothers, accessible through their children, could play a crucial role. For instance, Gago et al. (2022) indicates that the social support WIC clinic staff provide is highly valued by participants, offering an aspect of WIC benefits for mothers that continues beyond 13-month cutoff. Third, one might anticipate smaller effect on medication nonadherence among mothers at the 13-month cutoff if they had higher Medicaid participation rates compared to those at the 61-month cutoff. Yet, Appendix Table A.1 shows that the baseline Medicaid participation is not significantly different across both cutoffs, challenging this expectation. Fourth, while it is possible that other aspects of mental health not captured by the measures in Table 6 could have worsened for mothers at the 13-month cutoff, this scenario seems unlikely. Appendix Figure A.7 illustrates that among the six components of the K6 scale, five show no significant deterioration for these mothers, with only the 'how often felt hopeless' component reaching significance at the 10% level. Even when focusing on single mothers, the critical subgroup to be further discussed in Section 7.1, no significant impacts are observed across all six components.

6 Threats to Validity

6.1 Balance Tests

While the identifying assumption of continuous potential outcomes at the cutoff is inherently untestable, I conduct balance tests over several predetermined covariates and placebo outcomes, which provide compelling evidence of the continuity and further validate my RD design. If the exit of a child from WIC coincides with exits of any family members from other means-tested

[38] Two factors might confound our findings: (i) changes in Medicaid eligibility criteria as children reach one year, and (ii) a notable decline in WIC participation among children, not only mothers, at the 13-month cutoff as shown in Figure 1. Nonetheless, Panel B of Table 6 and separate analysis on children (RD estimate: -0.026, $p = 0.523$) reveals no discontinuity in Medicaid participation at this cutoff. Moreover, contrary to our expectations of observing effects similar to or greater than those at the 61-month cutoff, due to reduced mothers *and* children participation at the 13-month cutoff, we do not find significant effects. This finding corroborates our hypothesis that voluntary exits do not significantly impact the main outcomes.

programs, this could confound the results.[39] As illustrated in Appendix Table A.2, the data do not show evidence of abrupt exits of family members from Medicaid, SNAP, TANF, SSI, or other welfare programs at the age threshold, a finding consistent with Bitler et al. (2023).

In Appendix Table A.4, I probe for potential discontinuities in program entries at the age threshold. It is important to note that a discontinuous surge in program participation is less concerning than abrupt exits. Such an increase, exemplified by the spike in Medicaid participation at the cutoff as depicted in A.8, likely reflects families seeking alternative support following the loss of WIC benefits. This suggests that such a rise in program participation is a direct response to a child aging out of WIC, rather than a confounding factor. Turning to Appendix Table A.4, we do observe continuity in participation rates across most programs at the age cutoff. However, there is a significant increase of 4.5 percentage points in mothers reporting child support income. It is plausible that as a child ages out of WIC, child support might come more sharply into play, given its direct link to the welfare of the child.

Considering the availability of school meal programs, a child's school enrollment could be a primary confounding factor. Nevertheless, as demonstrated in Panel B of Appendix Table A.2, despite observing a sharp change in the slope at the cutoff in Figure A.8, there is no significant discontinuity in a child's Head Start participation at the cutoff. Bitler et al. (2023) also found that a child's enrollment in general schools does not change discontinuously at the age threshold using 2014 SIPP data. Figure A.8 illustrates a smooth transition in a child's Head Start participation around the age cutoff. To further address potential concerns regarding the confounding effects of a child's school enrollment, I repeat the analysis on the primary outcomes dropping parents interviewed in August, the commencement month for more than 85% of the US schools (Bitler et al., 2023). Appendix Tables A.16–A.18 show that the findings remain consistent upon this exclusion.

In Appendix Table A.3, we find no evidence of discontinuities in parental socioeconomic status (SES) at the threshold. As depicted in Figure A.8, neither the age distribution of parents nor the share of males shows discernible discontinuities at the cutoff. There is a significant decrease of −12.6 percentage points in the fraction of mothers who reported searching for employment the preceding week, although there is no notable change in hours mothers worked last week. This could potentially reflect the income effect of WIC, leading to psychological distress among mothers who experience difficulty in securing employment despite their desire to work (Darity Jr and Goldsmith, 1996).

[39] We check for potential discontinuities in the program participation of not only a child but *any* family members to adequately capture intra-household spillover effects.

6.2 Robustness Checks and Placebo Cutoffs

Appendix Tables A.5–A.10 illustrate the robustness of our main findings across a host of specifications and bandwidth choices, as well as when employing the local randomization method as an alternative approach. As shown in Panel A of the tables, both the magnitude and significance of our point estimates remain consistent across various specifications, compared to the baseline results in the first row. The specifications considered include: (i) omitting survey year fixed effects, (ii) adding demographic controls, and (iii) fitting a separate global quadratic for each side of the cutoff. Not surprisingly, exclusion or inclusion of these covariates affects the precision of our estimates without changing the results, reaffirming the covariate balance at the age cutoff. Specification (iii) yields results in the same direction, but generally smaller than the baseline, and occasionally insignificant, particularly for the mental health outcomes. This aligns with the general observation that for many individuals, deteriorations in mental health tend to be transient, often persisting for less than six months, shorter than the one year bandwidth we employ for the global parametric specification.[40] Additionally, in Appendix Table A.11, I determine the optimal local polynomial order for each main outcome to minimize asymptotic mean square error, as outlined by Pei et al. (2022). For all examined outcomes, the optimal polynomial order is identified as one, validating our use of local linear regression as the primary specification.

In Panel B of the tables, we show that our main findings are robust to a range of bandwidth choices. They generally follow the pattern where smaller bandwidths yield larger estimates with wider confidence intervals, while larger bandwidths produce more modest estimates accompanied by tighter confidence intervals. The bandwidths considered are: (i) bandwidth twice the size of the MSE-optimal one used in our baseline specification, (ii) MSE-optimal bandwidths allowed to be different on either side of the cutoff, (iii) CER-optimal bandwidth, and (iv) bandwidth twice the size of the CER-optimal bandwidth.[41]

Lastly, in Panel C of the tables, I apply a local randomization approach to address potential concerns related to the limited sample size for certain outcomes and the discrete nature of our running variable. The difference-in-means estimates are closely in line with MSE-optimal estimates. Both the randomization p-value and the asymptotic p-value support the baseline conclusion. This consistency further underscores the robustness of our primary results.

I also employ 72 placebo cutoffs, ranging from 25 to 96 months in age, and re-estimate our

[40] According to the DSM-5-TR, anxiety disorders require symptoms to last at least six months for diagnosis. Adjustment disorders, a different type of anxiety-related mental disorder triggered by identifiable stressors like being fired from a job, are considered chronic when symptoms persist for six months or longer (American Psychiatric Association, 2022).

[41] The CER-optimal bandwidth, which minimizes the asymptotic coverage error (CER) rate of the robust bias-corrected confidence interval, has a faster decay rate than its MSE counterpart, implying that it is, in general, smaller than the MSE-optimal bandwidth. When the effective number of observations within the CER-optimal bandwidth is small, results can lose significance due to large variance.

baseline model for the main outcomes. Appendix Figrues A.9 and A.10 display histograms of robust, bias-corrected t-statistics from these 72 regressions for each outcome. These empirical distributions are approximately normal with a mean close to zero. Our t-statistics at the true cutoff value, marked by the blue dashed lines, are situated in the far tail of the distributions, emphasizing that these results are unlikely to have risen by mere chance.

7 Heterogeneity Analysis

7.1 Single Mothers

Given that 18.7% of children under six reside solely with their mothers, an examination of this subgroup is warranted (U.S. Census Bureau, 2022).[42] Following the general definition, single mothers herein are defined as mothers who are widowed, divorced, separated, or have never been married. Appendix Table A.19 reports MSE-optimal RD estimates of key outcomes for single mothers, along with control group means of each outcome. As shown in the table, across all outcomes, control group means of single mothers are consistently higher than control group means of both general mothers (including single mothers) and fathers, in accordance with previous findings (Brown and Moran, 1997; U.S. Department of Agriculture, 2022). Such pattern suggests that single mothers face more challenges in terms of mental health, medication nonadherence, and food insecurity at baseline.

While relatively small sample sizes may raise concerns regarding statistical power, we still find significant effects of a child aging out of WIC on K6 score and ratio of serious mental illness with marginally significant effects on PHQ-8 score and ratio of major depression among single mothers. The estimated increases of 2.84 points in K6 score and 11.4 percentage points in the ratio of SMI for single mothers are higher than the corresponding figures for general mothers, which are 1.21 points for K6 score and 5.1 percentage points for the ratio of SMI. The estimated increases of 3.60 points in PHQ-8 score and 24.7 percentage points in the ratio of major depression are also higher than those for general mothers, which are 0.62 points for PHQ-8 score and 6.3 percentage points for the ratio of major depression. The absence of significant effects on WG-ANX and WG-DEP measures for single mothers is likely attributable to the small sample size.

In Figure 7, I present RD estimates in standard deviation units for each of the K6 components, accompanied by robust, bias-corrected 95% confidence intervals across three subgroups: fathers, non-single mothers, and single mothers. We find no significant effect on the K6 index for non-single mothers with an estimated effect at the cutoff of -0.05σ ($p = 0.739$), but a large, significant effect

[42] Race also constitutes an important dimension of heterogeneity. Detailed results for each racial group are presented in Appendix Table A.20.

of 0.61σ for single mothers ($p = 0.002$). This result implies that the mental health deterioration of mothers following a child aging out of WIC is driven by single mothers rather than non-single mothers. Furthermore, when examining all mothers, the deterioration in mental health was primarily observed in the realm of anxiety. However, when focusing solely on single mothers, we notice a decline in mental health across multiple domains.

Appendix Table A.19 also demonstrates that a child aging out of WIC has no significant impact on the medication nonadherence index for single mothers, regardless of their Medicaid enrollment status. One possible interpretation of this result is that single mothers with the most pressing need for Medicaid benefits have successfully enrolled in Medicaid meeting the income criteria.[43]

Finally, the insignificant impact on food security scale scores can be attributed to diminishing marginal effects discussed in Section 5.3. The control group mean for single mothers is 1.88, significantly higher than the 1.49 of non-single mothers. This suggests that single mothers, already facing greater challenges at baseline, might experience smaller adverse effects compared to their non-single counterparts. In Appendix Figure A.12, we observe a discernible jump at the age cutoff, but this jump is short-lived.

7.2 Predicted Susceptibility to Serious Mental Illness

I examine how the effects of a child aging out of the WIC program on parental mental health vary according to their predicted susceptibility to serious mental illness, following the method outlined by Braghieri et al. (2022).[44] To this end, I implement a least absolute shrinkage and selection operator (LASSO) to estimate an indicator, which takes the value of one if the K6 scale score is 13 or higher, and 0 otherwise. The predictors employed are immutable individual characteristics: gender, age, race/ethnicity dummies, decade-based birth cohort dummies, and a categorical variable indicating birthplace. All possible two-way interactions of these predictors, as well as their second- and third-order monomials, are considered in the LASSO estimation. For the prediction, we include all sample adults with complete data for the predictors from the NHIS 2002–2014 data, yielding a total of 362,159 observations. As shown in Appendix Table A.12, the control group mean of K6 index is larger for the higher tertiles for all subgroups. To ensure comparable sample sizes, tertiles are determined within each subgroup. Appendix Figure A.13 further demonstrates this, depicting a

[43]To provide descriptive evidence, two t-tests are performed: (i) The proportion of single mothers below 50% FPL—a threshold under which most income-qualified for Medicaid before the ACA expansion—is significantly higher among Medicaid-enrolled single mothers (36.1%) than among non-enrolled single mothers (23.1%) ($p < 0.0001$). (ii) Among single mothers enrolled in Medicaid, a greater proportion affirmed receiving a medical prescription in the past 12 months (60.9%) compared to those not enrolled (46.9%) ($p = 0.0003$). In our primary sample, 10.6% of non-single mothers live below 50% of FPL compared to 27.6% of single mothers. Medicaid enrollment is 23.7% for non-single mothers, and 42.4% for single mothers.

[44]Given that the K6 score captures non-specific psychological distress and has a larger sample size compared to other outcomes, we focus on susceptibility to SMI as our main dimension of heterogeneity.

positive correlation between K6 scores and predicted susceptibility to SMI. These findings support the validity of our prediction.

The upper panel of Figure 8 presents the differential effects across the tertiles of LASSO-predicted susceptibility to SMI for both fathers and mothers. For mothers, the impact of a child transitioning out of the WIC program on the K6 index is concentrated in the second and third tertiles, with the estimated effects of 0.55σ and 0.49σ, respectively. In contrast, the first tertile exhibits an effect of -0.01σ, which is close to zero and statistically insignificant. This suggests that mothers who are predicted to be more susceptible to SMI experience a more pronounced decline in mental health as their child ages out of WIC.

For fathers, we observe a strikingly contrasting pattern to that of mothers. Specifically, fathers in the lowest tertile of predicted susceptibility to SMI demonstrate the most significant impact, with an estimated effect of 0.80σ. As we move to the higher tertiles, this effect attenuates; the second tertile shows a marginally significant effect of 0.35σ. Notably, for fathers in the third tertile, the estimated effect becomes -0.36σ, which is not statistically distinguishable from zero. This variation across tertiles suggests that fathers with a lower predicted susceptibility to SMI exhibit a more pronounced decline in mental health after their child loses access to WIC, while those with higher susceptibility remain relatively unaffected, obscuring the significant effects among fathers in the lower tertiles when analyzed collectively, as noted earlier.

The distinct patterns between mothers and fathers require careful interpretation, and the following discussion offers some preliminary insights based on the data at hand. As depicted in the bottom panel of Figure 8, for mothers, the predicted tertiles positively correlate with their share of working hours within households and the proportion of mothers living below the FPL. Considering the share of working hours as a proxy for economic responsibility, we find that those at higher risk of SMI are often burdened with greater responsibilities and are more likely to live in poverty. This is not surprising considering the adverse effects of mental health on marital stability and economic outcomes, such as employment (Frijters et al., 2014). These mothers also face a more significant negative impact on the K6 index from the WIC income shock, which is consistent with earlier studies (Simon, 1995; Smith and Mazure, 2021).[45]

In contrast, fathers exhibit an inverse relationship. The predicted tertiles negatively correlate with their respective contributions to working hours and the ratio of fathers living under the FPL.[46] Those fathers who bear greater economic responsibility within households and are economically

[45]"The majority of wives felt that employment prevents them from fulfilling their primary responsibility to nurture their children and husbands. In contrast, the majority of husbands felt that employment is the cornerstone of their family roles, which enables them to fulfill an important component of their marital and parental role obligations (Simon, 1995, p. 191)."

[46]The correlation coefficient between predicted susceptibility to SMI and the share of mothers' working hours within households is 0.150. For fathers, this coefficient is -0.112.

disadvantaged face a more pronounced impact from the WIC income shock, aligning with societal expectations that they should fulfill the role of the family's primary provider. Yet, surprisingly, these fathers are predicted to be less susceptible to SMI. One plausible hypothesis is that societal male norms might lead these fathers to underreport or mask their psychological distress, thereby leading to underestimated SMI risks at baseline (Möller-Leimkühler, 2003).

8 Conclusion

This study provides empirical evidence underscoring the adverse impact on low-income parents when a child ages out of the WIC program. Exploiting the sharp eligibility cutoff at age five for WIC as an exogenous source of variation, the regression discontinuity design employed herein reveals a significant deterioration in the mental well-being, medication adherence, and food security of these parents. Interestingly, the observed decline in mental health and medication adherence is primarily driven by low-income mothers, leading them to experience heightened anxiety and resort to low-cost medications; the corresponding effects on fathers are statistically insignificant and notably less pronounced. However, the exacerbation in food insecurity is discernible for both mothers and fathers. This highlights that while there is an established correlation between the aforementioned outcomes, the WIC income shock elicits differential responses between mothers and fathers and across outcomes, a finding in line with earlier research (Thomas, 1990; Möller-Leimkühler, 2003; Duflo and Udry, 2004; Rosenfield and Mouzon, 2013).

The implications of this study also resonate with ongoing legislative endeavors to raise the WIC's age cutoff from five to six, aiming to bridge the gap between WIC and other school meal programs. My findings suggest that closing this nutritional gap for children could mitigate the negative spillovers observed in parents. Existing literature provides some insights into the effects on children aging out of WIC, but the repercussions on parents are underexplored, given the predominant focus on birth outcomes in prior work. This study fills this gap, shedding light on previously unexamined outcomes such as parental mental health and medication nonadherence. The detailed datasets allow us to pinpoint the subgroups that would gain the most from extending the WIC's age cutoff: single mothers, mothers outside the Medicaid system, and mothers predicted to be susceptible to SMI. In essence, the most vulnerable mothers would benefit the most from the amendment.

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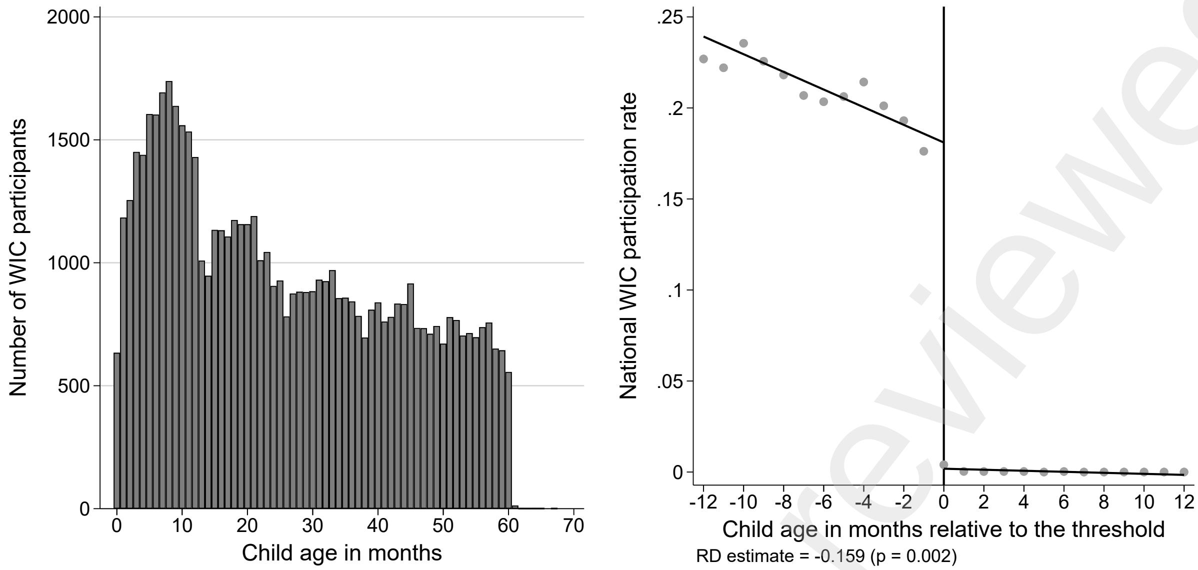
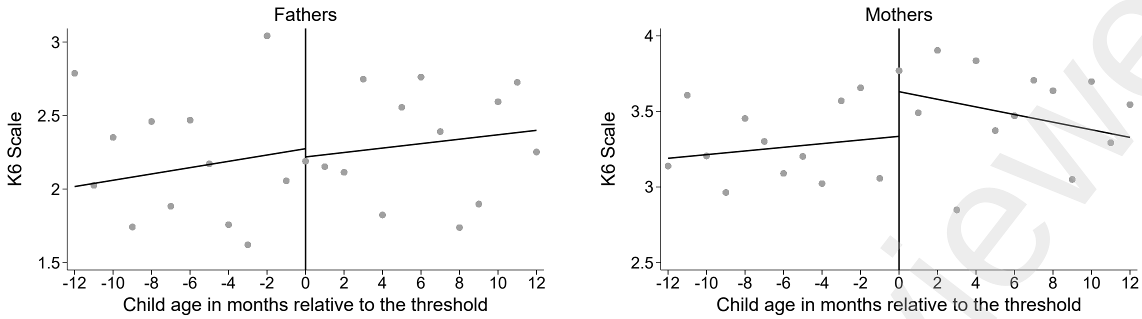


Figure 1: WIC participation by child age in months

Notes: This figure illustrates variations in WIC participation across different age cohorts of children, using the administrative PC2018 National Sample Dataset. The left panel plots the raw number of WIC participants in the sample against child age in months as of April 2018 and the right panel plots the national WIC participation rate against (child age in months – 61) as of April 2018. The national WIC participation rate is derived using the simple Bayes' rule paired with the Vital Statistics Birth Data. Each dot in the right panel represents the mean value of the outcome variable for the corresponding age group. A global linear fit with a triangular kernel is imposed on either side of the threshold, marked by solid dark lines. For the inference, I employ an MSE-optimal bandwidth and report an MSE-optimal RD estimate with a robust, bias-corrected *p*-value (in the parentheses).

Panel A. K6 scale



Panel B. PHQ-8

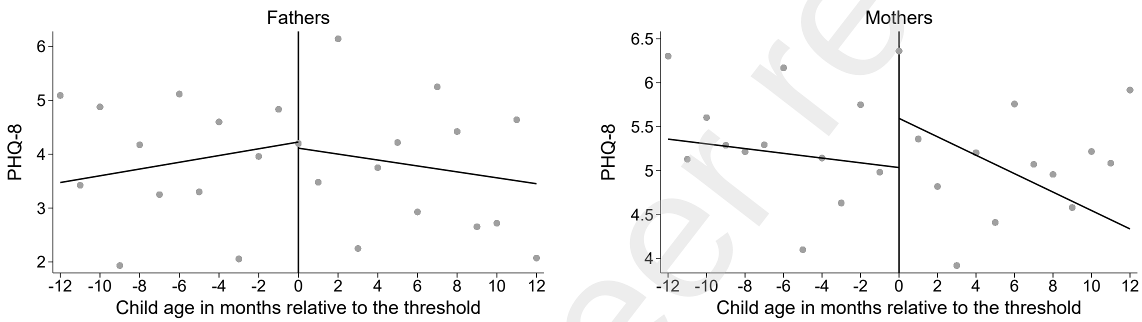
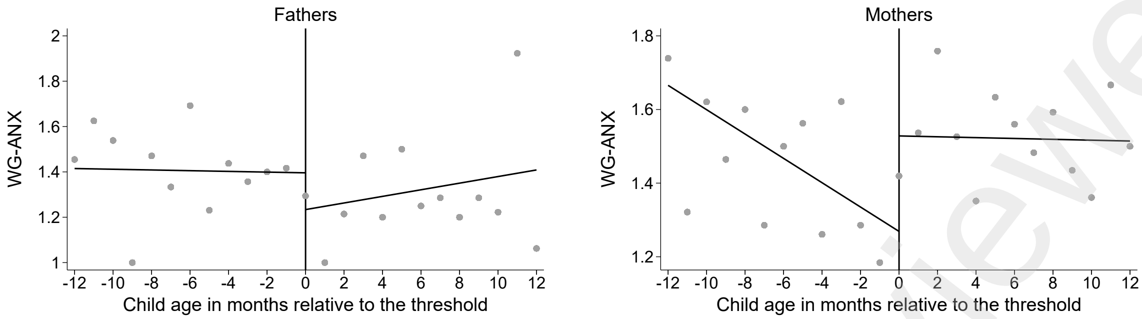


Figure 2: K6 scale and PHQ-8 scores of parents by a child age relative to the threshold

Notes: This figure shows K6 and PHQ-8 scores of fathers (left side) and mothers (right side) by their child age, relative to the age threshold at which children become ineligible for the WIC program. Each dot represents the mean value of the outcome variable for the corresponding age group. A global linear fit with a triangular kernel is imposed on either side of the threshold, marked by solid dark lines. For the inference, I employ mass points adjusted MSE-optimal bandwidths and report RD estimates of β_1 from equation (1) in Table 2.

Panel A. WG-ANX



Panel B. WG-DEP

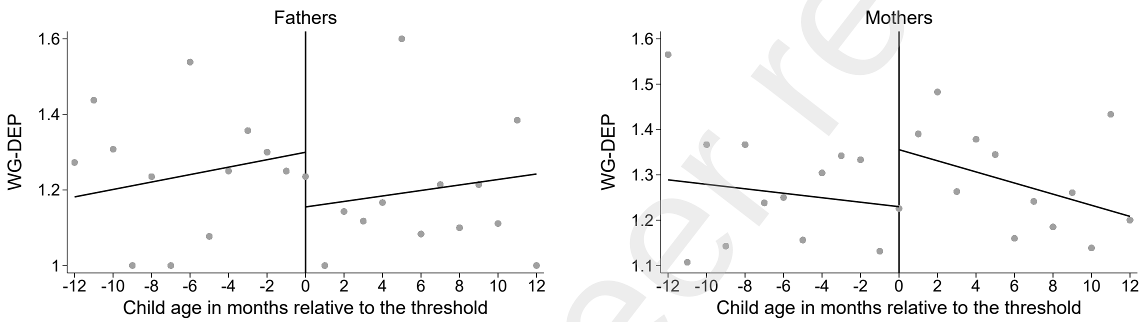


Figure 3: WG-ANX and WG-DEP scores of parents by a child age relative to the threshold

Notes: This figure shows WG-ANX and WG-DEP scores of fathers (left side) and mothers (right side) by their child age, relative to the age threshold at which children become ineligible for the WIC program. Each dot represents the mean value of the outcome variable for the corresponding age group. A global linear fit with a triangular kernel is imposed on either side of the threshold, marked by solid dark lines. For the inference, I employ mass points adjusted MSE-optimal bandwidths and report RD estimates of β_1 from equation (1) in Table 2.

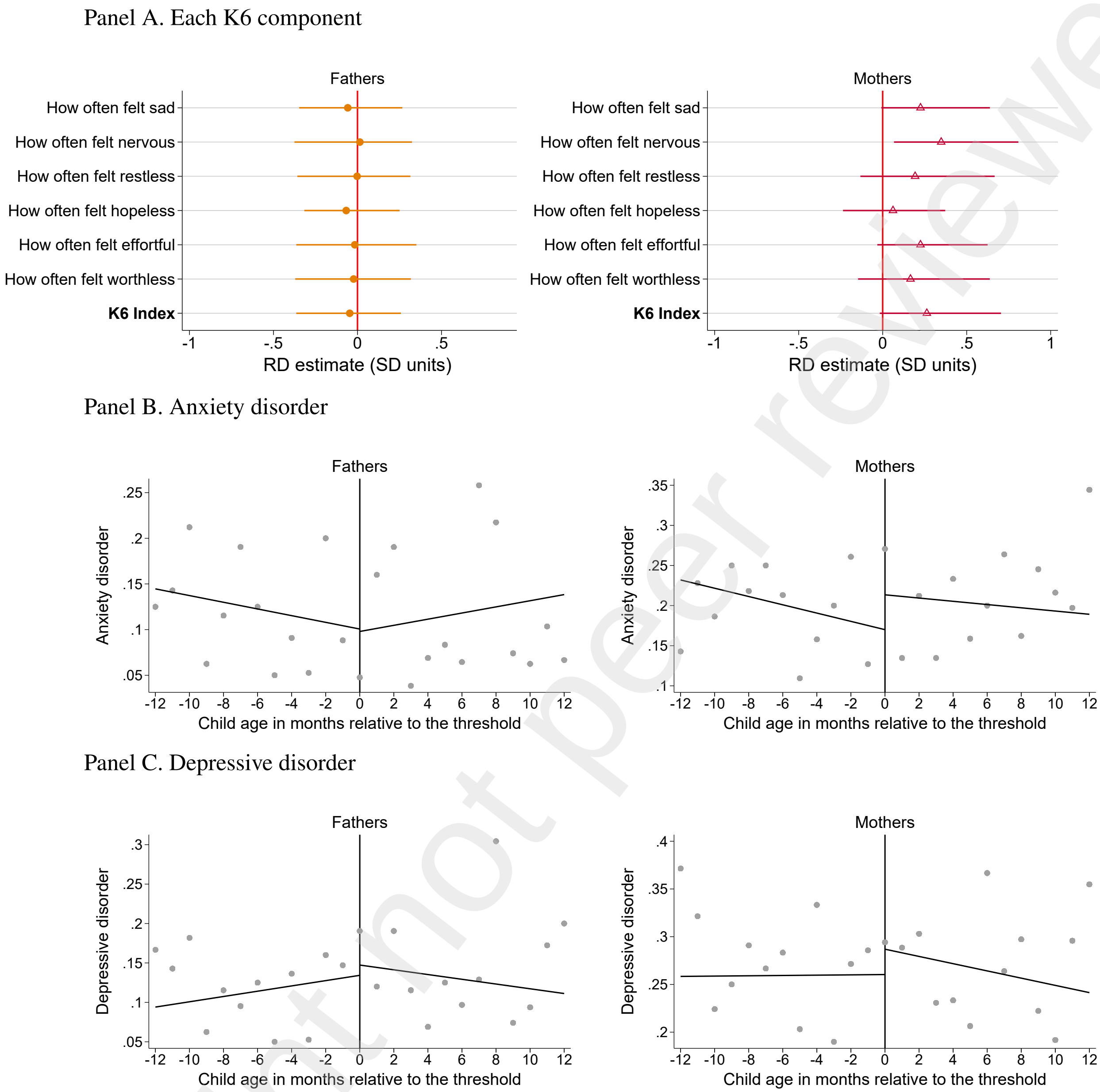
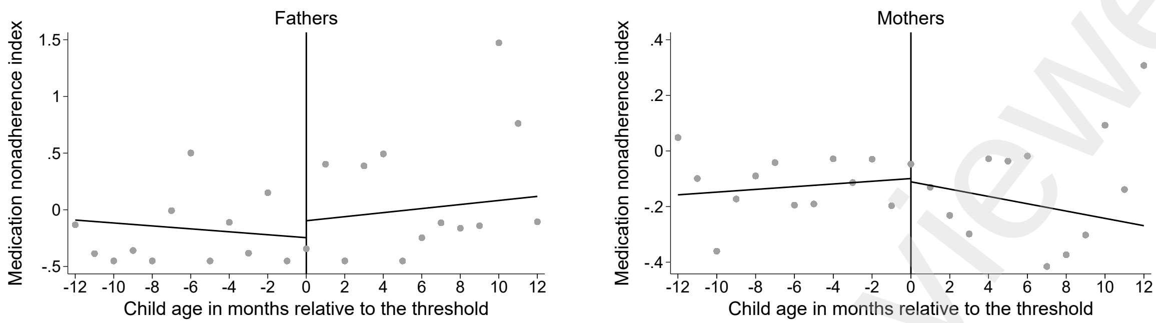


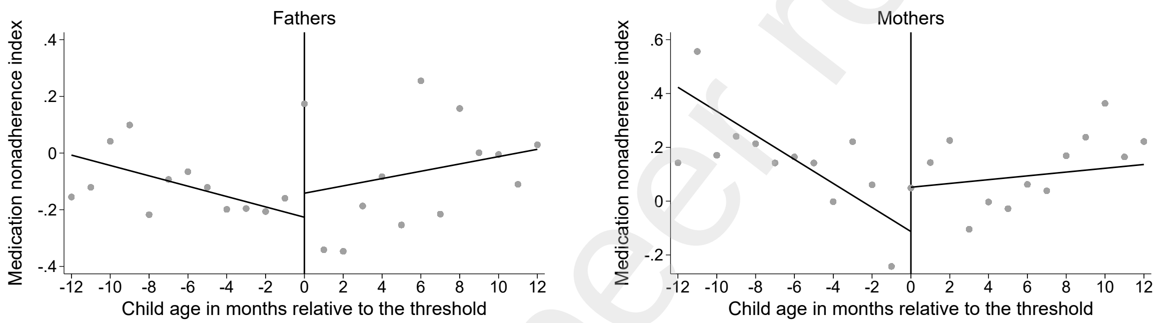
Figure 4: Child aging out of WIC effect on parental mental health

Notes: Panel A of the figure presents MSE-optimal RD estimates of β_1 from equation (1), where each component of the K6 scores is the dependent variable. The bars represent 95 percent robust, bias-corrected confidence intervals with standard errors clustered by survey year and month. Panels B and C display the reported diagnosis rates of anxiety and depression disorders in fathers (left side) and mothers (right side) by their child age, relative to the age threshold at which children become ineligible for the WIC program. Each dot represents the mean value of the outcome variable for the corresponding age group. A global linear fit with a triangular kernel is imposed on either side of the threshold, marked by solid dark lines. RD estimates employing mass points adjusted MSE-optimal bandwidths are reported in Table 2.

Panel A. Index among Medicaid enrollees



Panel B. Index among non-Medicaid enrollees



Panel C. Each index component

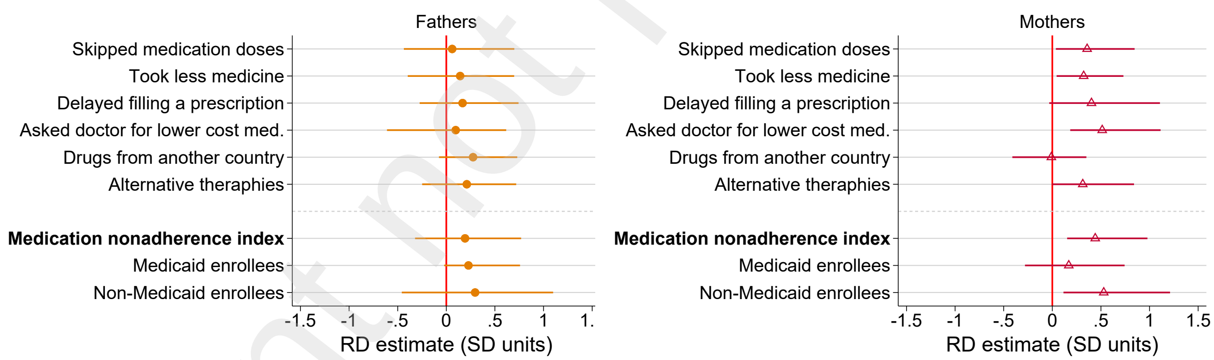


Figure 5: Child aging out of WIC effect on medication nonadherence behaviors of parents

Notes: Panels A and B of the figure display medication nonadherence indices for Medicaid-enrolled and non-enrolled fathers (left side) and mothers (right side) by their child age, relative to the age threshold at which children become ineligible for the WIC program. The indices are constructed following the method delineated in Section 4.3. Each dot represents the mean value of the outcome variable for the corresponding age group. A global linear fit with a triangular kernel is imposed on either side of the threshold, marked by solid dark lines. RD estimates employing mass points adjusted MSE-optimal bandwidths are reported in Table 3. Panel C presents MSE-optimal RD estimates of β_1 from equation (1), where each component of the medication nonadherence index is the dependent variable. The bars represent 95 percent robust, bias-corrected confidence intervals with standard errors clustered by survey year and month.

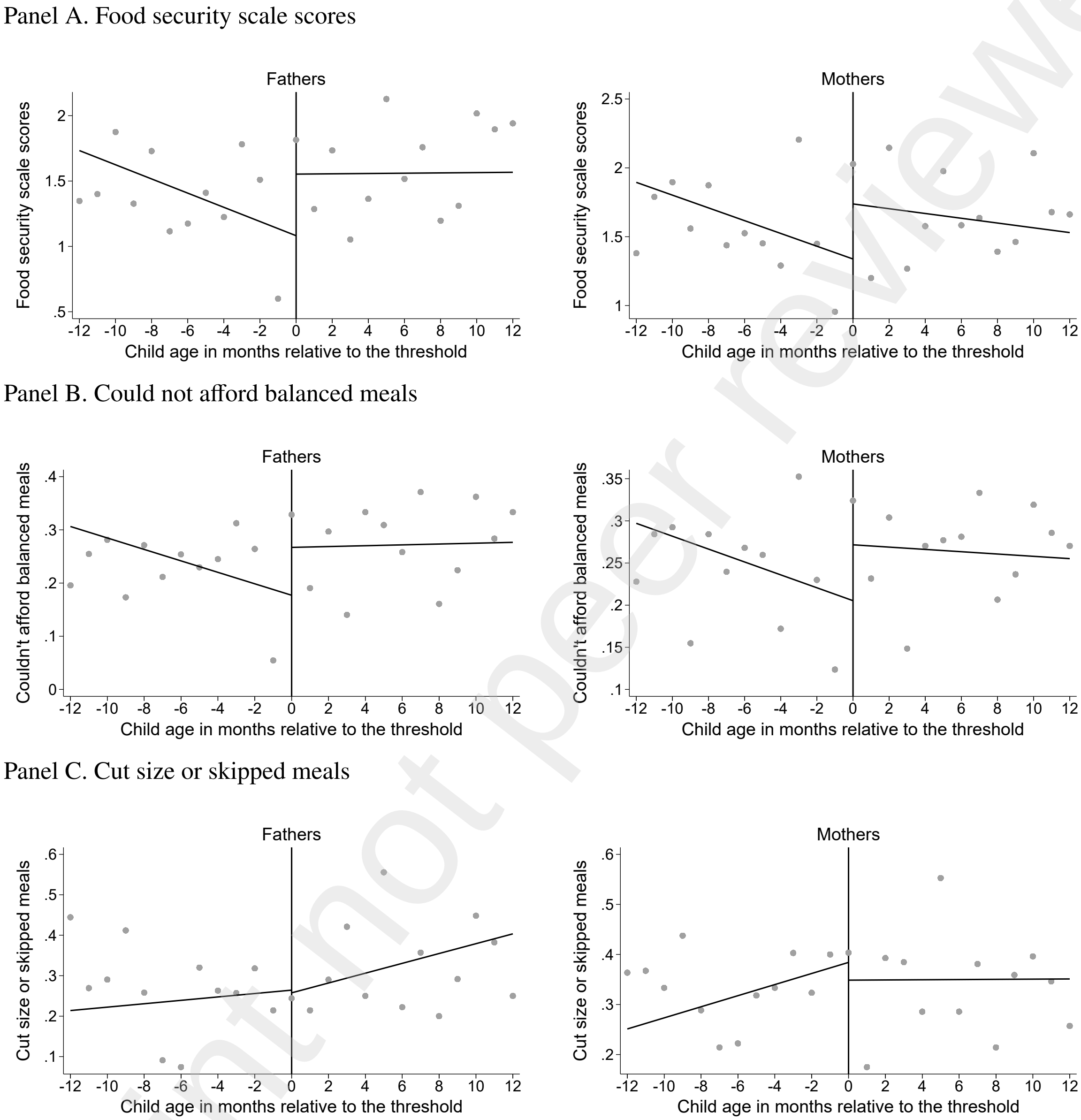


Figure 6: Food insecurity outcomes of parents by a child age relative to the threshold

Notes: This figure shows food insecurity levels of fathers (left side) and mothers (right side) by their child age, relative to the age threshold at which children become ineligible for the WIC program. Each dot represents the mean value of the outcome variable for the corresponding age group. A global linear fit with a triangular kernel is imposed on either side of the threshold, marked by solid dark lines. For the inference, I employ mass points adjusted MSE-optimal bandwidths and report RD estimates of β_1 from equation (1) in Table 4.

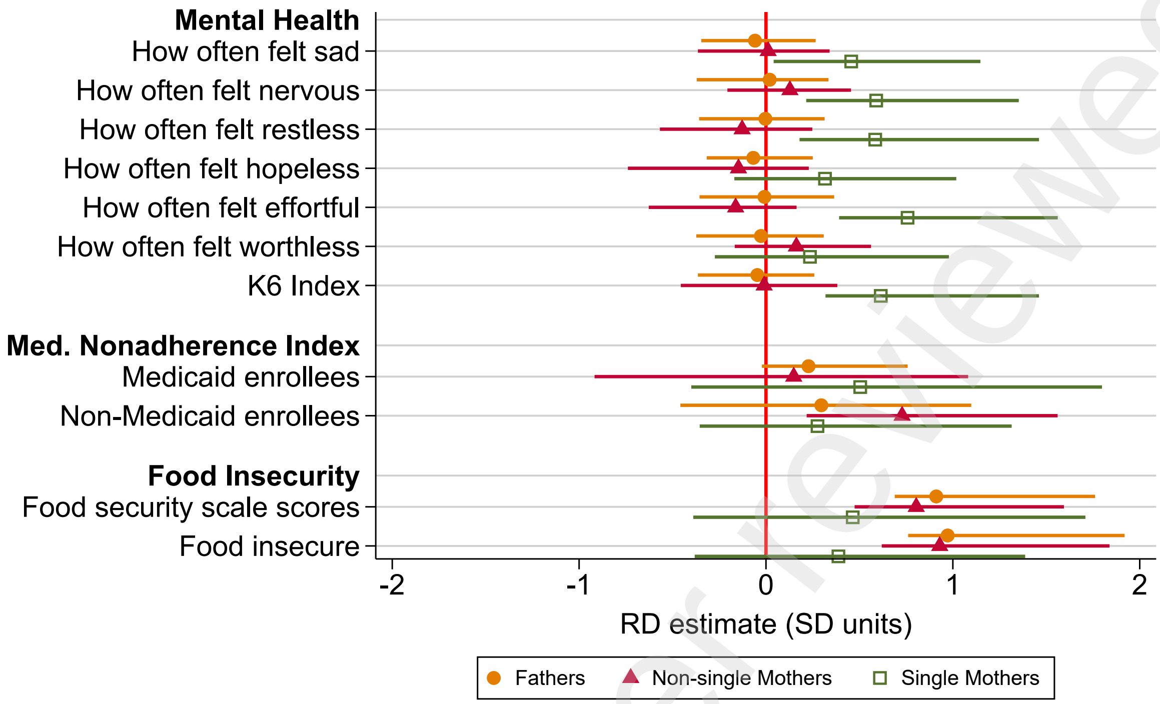


Figure 7: Comparison of WIC ineligibility effects on parental outcomes across subgroups

Notes: This figure examines the heterogeneous effects of a child's ineligibility for the WIC program on various parental outcomes across different subgroups: fathers, non-single mothers, and single mothers. The markers represent MSE-optimal RD estimates of β_1 from equation (1). The bars indicate 95 percent robust, bias-corrected confidence intervals with standard errors clustered by survey year and month. All outcome variables are standardized using the mean and standard deviation of the control group. The indices are constructed following the method delineated in Section 4.3.

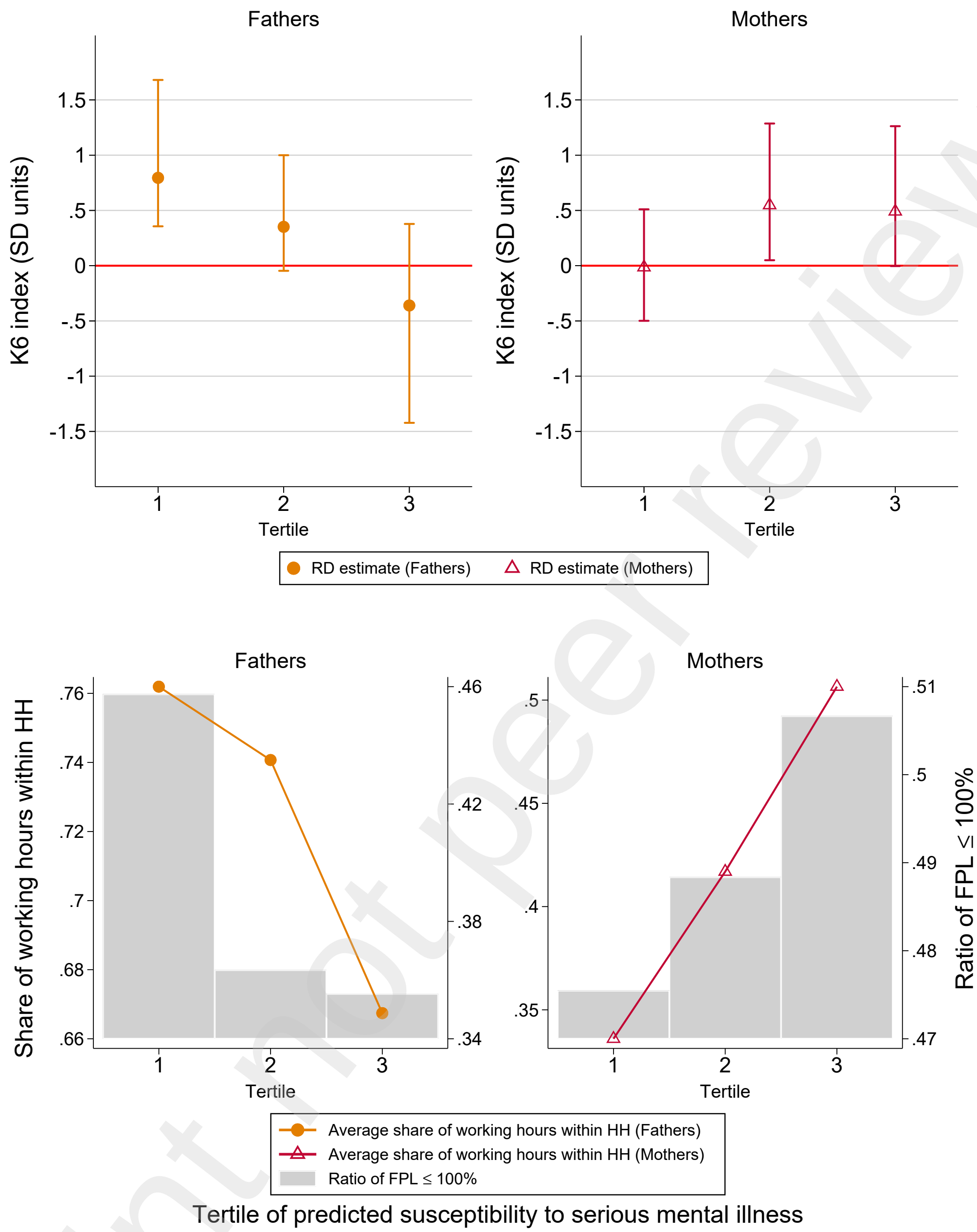


Figure 8: Heterogeneous effects of WIC ineligibility across tertiles of predicted SMI susceptibility

Notes: This figure examines the heterogeneous effects of a child's ineligibility for the WIC program on parental mental health across tertiles of LASSO-predicted SMI susceptibility. Tertiles are constructed within each subgroup of mothers and fathers to balance sample sizes across tertiles. The markers in the upper panel represent MSE-optimal RD estimates of β_1 from equation (1) for each tertile among fathers (left side) and mothers (right side). The bars represent 95 percent robust, bias-corrected confidence intervals with standard errors clustered by survey year and month. The lower panel presents a correlation between these tertiles and two outcomes: the individual share of working hours within households (serving as a proxy for economic responsibility within households) and the percentage of individuals under the FPL. Mean shares of working hours for each tertile are depicted by markers, while the percentage of individuals living in poverty within each tertile is illustrated by thick grey bars.

Table 1: Balance table and main outcome variables by data sources

Panel A. Balance

	Control mean $\widetilde{Age_i} \in [-2, 0)$ (1)	Treated mean $\widetilde{Age_i} \in [0, 2]$ (2)	T−C difference (3)	p-value $H_0: \bar{T} - \bar{C} = 0$ (4)
Male	0.30	0.31	0.01	0.79
Age (in months)	386.82	386.99	0.17	0.96
non-Hispanic whites	0.32	0.32	-0.00	0.95
non-Hispanic blacks	0.20	0.19	-0.01	0.62
Hispanic	0.40	0.42	0.01	0.57
High school graduate or more	0.63	0.59	-0.03	0.17
Single parent	0.36	0.38	0.01	0.61
Medicaid	0.29	0.30	0.00	0.86
HH income < 100% FPL	0.46	0.52	0.06	0.01
Worked for pay last week	0.56	0.58	0.03	0.25
Hours worked (for pay) last week	20.84	22.50	1.66	0.09
Observations	751	1181		

Panel B. Variables by sources

Data sources	Outcome variables
National Health Interview Survey (NHIS)	K6 scale (2002-2014), WG-ANX (2012-2014), WG-DEP (2012-2014), medication nonadherence behaviors (2011-2014), USDA food security scale scores (2011-2012), other means-tested program participation (2002-2014)
Behavioral Risk Factor Surveillance Survey (BRFSS)	PHQ-8 (2006, 2008, 2010), anxiety/depressive disorder (2006, 2008, 2010)
IPUMS NHIS	For each NHIS adult respondent: final vital status (1997-2006), detailed cause of death (1997-2006), year and quarter of death (1997-2006)

Notes: Panel A displays the balance of demographic characteristics between the control group and the treatment group, where the control group is defined as the NHIS low-income sample parents who have a child with the (age in months−61 $\equiv \widetilde{Age_i}) \in [-2, 0)$ at the time of the interview. The treatment group is defined in a similar fashion. The window $[-2, 2]$ is selected following the data-driven approach proposed by Cattaneo et al. (2015), ensuring that the treatment can be considered as-if randomly assigned within the window. See Section 4.2 for further details on the window selection. Columns (1) and (2) report mean characteristics of the control group and the treatment group, respectively. Column (3) reports the raw difference in means between the treatment and control group, and Column (4) reports p-values from the t-tests of $H_0: \bar{T} - \bar{C} = 0$. Panel B summarizes the main outcome variables by data sources, with the years in parentheses indicating the time span of the analysis sample. Further details of each variable can be found in Appendix Section C.

Table 2: Effect of a child aging out of WIC on parental mental health

	(1)	(2)	(3)	(4)	(5)	(6)
	Parents		Mothers		Fathers	
Outcome variable	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate
Panel A. Mental health measures						
K6 scale	2.96	1.22** [0.268, 2.79] (0.0175)	3.27	1.21** [0.00360, 3.12] (0.0495)	2.20	–0.183 [–1.59, 1.14] (0.752)
(obs)		9,144		6,439		2,705
Serious mental illness (K6 ≥ 13)	0.0430	0.0630*** [0.0198, 0.144] (0.00980)	0.0490	0.0512* [–0.00676, 0.139] (0.0753)	0.0283	–0.00343 [–0.0487, 0.0510] (0.965)
(obs)		9,144		6,439		2,705
PHQ-8	4.95	0.535 [–1.76, 3.19] (0.572)	5.30	0.624 [–1.49, 2.66] (0.584)	4.01	–1.53 [–7.73, 3.06] (0.397)
(obs)		2,118		1,537		581
Major depression (PHQ-8 ≥ 10)	0.174	0.0383 [–0.0923, 0.176] (0.542)	0.188	0.0632 [–0.0912, 0.231] (0.395)	0.138	–0.0827 [–0.353, 0.140] (0.397)
(obs)		2,118		1,537		581
WG-ANX	1.44	0.247 [–0.0815, 0.666] (0.125)	1.46	0.401* [–0.0310, 1.01] (0.0653)	1.42	–0.212 [–1.35, 0.974] (0.751)
(obs)		1,080		755		325
WG-DEP	1.27	0.155 [–0.196, 0.764] (0.246)	1.27	0.190 [–0.316, 0.929] (0.335)	1.26	–0.00253 [–1.02, 1.21] (0.868)
(obs)		1,082		755		327
Panel B. Magnitude of effects						
Anxiety disorder	0.176	0.239*** [0.0977, 0.520] (0.00416)	0.195	0.268** [0.0663, 0.614] (0.0149)	0.127	0.0406 [–0.237, 0.404] (0.609)
(obs)		2,216		1,598		618
Depressive disorder	0.233	0.0213 [–0.152, 0.166] (0.928)	0.273	–0.0399 [–0.309, 0.182] (0.613)	0.127	–0.0319 [–0.302, 0.215] (0.742)
(obs)		2,214		1,596		618
Mortality in 5 years	74.2	28.6*** [10.3, 58.5] (0.00516)	42.8	5.60 [–5.24, 22.0] (0.228)	151	59.9** [12.9, 147] (0.0193)
(obs)		9,144		6,439		2,705

Notes: MSE-optimal estimates of β_1 from equation (1) are reported in columns (2), (4), and (6). Means of outcome variable before a child becomes ineligible for WIC are reported in columns (1), (3), and (5). Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. The estimates in the table are based on NHIS, BRFSS, and IPUMS NHIS. All analysis samples are restricted to parents who have a child between the ages of 49 months and 73 months, and whose annual family income is less than 200% of the federal poverty guidelines. Refer to Section 3 for a detailed description of how the sample for each outcome is constructed. The mortality in 5 years in the table refers to the expected number of mental health-related deaths per 100,000 individuals over a 5-year (20-quarter) period. All estimates are from local linear regressions with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. All regressions include survey year fixed effects. Standard errors are clustered by survey year and month. * p<.10 ** p<.05 *** p<.01.

Table 3: Effect of a child aging out of WIC on parents' medication nonadherence behavior

	(1)	(2)	(3)	(4)	(5)	(6)
	Parents		Mothers		Fathers	
Outcome variable	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate
Panel A. Six components						
Skipped med.	0.0831	0.0753** [0.0106, 0.169] (0.0263)	0.0931	0.0989** [0.0102, 0.234] (0.0325)	0.0596	0.0167 [–0.121, 0.193] (0.650)
(obs)		3,481		2,438		1,043
Took less med.	0.0885	0.0755** [0.00351, 0.168] (0.0410)	0.102	0.0916** [0.0126, 0.208] (0.0269)	0.0577	0.0405 [–0.113, 0.198] (0.590)
(obs)		3,480		2,437		1,043
Delayed prescription	0.114	0.118** [0.0167, 0.272] (0.0266)	0.129	0.128* [–0.0101, 0.352] (0.0642)	0.0795	0.0532 [–0.0871, 0.236] (0.366)
(obs)		3,480		2,437		1,043
Lower cost med.	0.166	0.133** [0.0350, 0.296] (0.0130)	0.189	0.191*** [0.0685, 0.414] (0.00620)	0.111	0.0359 [–0.227, 0.229] (0.992)
(obs)		3,480		2,437		1,043
Med. purchased abroad	0.0297	0.00608 [–0.0394, 0.0556] (0.739)	0.0347	–0.00166 [–0.0698, 0.0595] (0.876)	0.0179	0.0467 [–0.0128, 0.124] (0.111)
(obs)		3,480		2,437		1,043
Alternative therapies	0.0671	0.0833** [0.0224, 0.190] (0.0130)	0.0703	0.0784* [–0.000581, 0.210] (0.0513)	0.0596	0.0528 [–0.0622, 0.180] (0.341)
(obs)		3,480		2,437		1,043
Panel B.						
Med. nonadherence index	–0.00600	0.429*** [0.195, 0.841] (0.00167)	0.0498	0.441*** [0.153, 0.978] (0.00727)	–0.137	0.193 [–0.321, 0.769] (0.421)
(obs)		3,480		2,437		1,043
Medicaid enrollees	–0.136	0.150 [–0.229, 0.604] (0.378)	–0.118	0.169 [–0.281, 0.744] (0.376)	–0.217	0.228* [–0.0220, 0.758] (0.0644)
(obs)		1,063		871		192
Medicaid non-enrollees	0.0531	0.480*** [0.143, 1.01] (0.00909)	0.147	0.529** [0.115, 1.21] (0.0178)	–0.118	0.296 [–0.458, 1.10] (0.420)
(obs)		2,413		1,564		849

Notes: The estimates are based on pooled 2011–2014 NHIS data. MSE-optimal estimates of β_1 from equation (1) are reported in columns (2), (4), and (6). Means of outcome variable before a child becomes ineligible for WIC are reported in columns (1), (3), and (5). Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. The sample is restricted to parents who have a single child between the ages of 49 months and 73 months, and whose annual family income is less than 200% of the federal poverty guidelines. The medication nonadherence index is the standardized, equally weighted average of all six components' z-scores. Refer to Section 4.3 for a detailed description of how the index is constructed. With Medicaid row reports the RD estimates for individuals who are enrolled in Medicaid, with the index as the dependent variable. All estimates are from local linear regressions with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. All regressions include survey year fixed effects. Standard errors are clustered by survey year and month. * $p<.10$ ** $p<.05$ *** $p<.01$.

Table 4: Effect of a child aging out of WIC on parents' food insecurity

	(1)	(2)	(3)	(4)	(5)	(6)
	Parents		Mothers		Fathers	
Outcome variable	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate
Couldn't afford balanced meals	0.241	0.267*** [0.109, 0.303] (<0.0001)	0.246	0.292*** [0.152, 0.635] (0.00141)	0.232	0.474*** [0.356, 0.874] (<0.0001)
(obs)		3,869		2,407		1,462
Cut size or skipped meals	0.306	–0.0104 [–0.348, 0.404] (0.882)	0.331	–0.0289 [–0.397, 0.398] (0.997)	0.261	0.179 [–0.405, 0.837] (0.495)
(obs)		1,750		1,094		656
Food security scale scores	1.52	1.73*** [1.28, 3.38] (<0.0001)	1.59	1.47*** [0.819, 3.25] (0.00104)	1.39	2.07*** [1.56, 4.00] (<0.0001)
(obs)		3,870		2,408		1,462
Food insecure	0.254	0.327*** [0.235, 0.672] (<0.0001)	0.266	0.259*** [0.124, 0.581] (0.00254)	0.235	0.424*** [0.331, 0.836] (<0.0001)
(obs)		3,870		2,408		1,462
Very low food security	0.0885	0.0815** [0.00754, 0.203] (0.0348)	0.100	0.0737 [–0.0256, 0.218] (0.122)	0.0684	0.129** [0.0156, 0.280] (0.0285)
(obs)		3,870		2,408		1,462

Notes: The estimates are based on pooled 2011–2012 NHIS data. MSE-optimal estimates of β_1 from equation (1) are reported in columns (2), (4), and (6). Means of outcome variable before a child becomes ineligible for WIC are reported in columns (1), (3), and (5). Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. The sample is restricted to parents who have a single child between the ages of 49 months and 73 months, and whose annual family income is less than 200% of the federal poverty guidelines. All estimates are from local linear regressions with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. All regressions include survey year fixed effects. Standard errors are clustered by survey year and month. * $p<.10$ ** $p<.05$ *** $p<.01$.

Table 5: Characteristics of treated complier and never-taker children

	(1)	(2)	(3)
Outcome variable	Treated compliers	Never-takers	Complier − Never
Male	0.470***	0.586***	–0.116
	(0.0851)	(0.0313)	(0.0823)
non-Hispanic Whites	0.387***	0.344***	0.0436
	(0.0692)	(0.0323)	(0.0648)
non-Hispanic blacks	0.146***	0.165***	–0.0190
	(0.0498)	(0.0288)	(0.0454)
Hispanic	0.434***	0.349***	0.0848
	(0.0546)	(0.0389)	(0.0597)
Child of single mother	0.481***	0.574***	–0.0927
	(0.0645)	(0.0233)	(0.0812)
SNAP	0.601***	0.393***	0.208***
	(0.0504)	(0.0227)	(0.0494)
Medicaid	0.841***	0.739***	0.102*
	(0.0469)	(0.0354)	(0.0595)
Montly family earnings ($)	1,787***	1,979***	–191
	(201)	(92.5)	(230)
Family income-to-poverty ratio	83.9***	97.7***	–13.8*
	(6.56)	(3.02)	(8.03)
Low food security mothers	0.392***	0.251***	0.141**
	(0.0651)	(0.0253)	(0.0706)
Number of doctor visits last year	5.93***	2.67***	3.26*
	(1.68)	(0.466)	(1.67)

Notes: The estimates are based on pooled SIPP data from 2018 to 2020, with the analysis sample comprising children from families whose income-to-poverty ratio is less than 2. Column (1) presents the mean characteristics of treated compliers, derived as estimates of α_1 from equation (3). Column (2) presents the mean characteristics of never-takers, derived as estimates of γ_0 from equation (4). Column (3) reports the differences in mean characteristics between treated compliers and never-takers. Standard errors are reported in parentheses. For Column (3), standard errors are calculated using the bootstrap method with 200 replications, clustered by reference year and month. The employed bandwidth is 7, which approximates the mean of MSE-optimal bandwidths for the outcomes in the table, following the procedure outlined by Calonico et al. (2014). We exclude children of 60 months age, adopting the "donut hole" approach, to account for the treatment misclassification for children aged 60 months. * p<.10 ** p<.05 *** p<.01.

Table 6: Effect of mothers aging out of WIC on main outcomes at the 13-month cutoff

	(1)	(2)	(3)	(4)	(5)	(6)
	Parents		Mothers		Fathers	
Outcome variable	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate
Panel A. Main outcomes						
K6 scale	2.64	0.337 [–0.433, 1.49] (0.280)	2.92	0.648 [–0.446, 2.33] (0.184)	2.07	–0.0248 [–1.56, 1.14] (0.759)
(obs)		8,849		6,029		2,820
PHQ-8	4.53	–1.66* [–3.95, 0.196] (0.0760)	5.10	–2.19 [–5.73, 0.817] (0.141)	3.40	–0.572 [–3.85, 2.21] (0.595)
(obs)		2,210		1,518		692
WG-ANX	1.34	–0.115 [–0.551, 0.305] (0.574)	1.42	–0.325 [–1.15, 0.462] (0.402)	1.19	0.149 [–0.390, 0.549] (0.740)
(obs)		977		645		332
WG-DEP	1.16	0.0222 [–0.241, 0.366] (0.687)	1.20	0.0490 [–0.294, 0.562] (0.539)	1.09	–0.0507 [–0.447, 0.344] (0.799)
(obs)		978		645		333
Anxiety disorder	0.146	–0.00343 [–0.0948, 0.128] (0.768)	0.185	0.0178 [–0.171, 0.270] (0.659)	0.0712	–0.0322 [–0.245, 0.194] (0.821)
(obs)		2,294		1,570		724
Depressive disorder	0.199	–0.0616 [–0.285, 0.137] (0.491)	0.244	–0.0372 [–0.403, 0.355] (0.902)	0.113	–0.105 [–0.442, 0.153] (0.341)
(obs)		2,297		1,573		724
Med. nonadherence index	–0.0315	0.124 [–0.224, 0.555] (0.405)	–0.00860	0.152 [–0.286, 0.715] (0.401)	–0.0827	0.114 [–0.483, 0.740] (0.680)
(obs)		3,218		2,221		997
Food security scale scores	1.34	0.995* [–0.244, 2.83] (0.0992)	1.37	1.43** [0.378, 3.74] (0.0164)	1.29	0.250 [–1.35, 1.85] (0.758)
(obs)		3,809		2,318		1,491
Panel B. Potential confounder						
Medicaid	0.327	–0.0527 [–0.156, 0.0352] (0.215)	0.409	–0.0805 [–0.211, 0.0530] (0.241)	0.157	–0.00978 [–0.194, 0.114] (0.611)
(obs)		8,926		6,088		2,838

Notes: MSE-optimal estimates of β_1 from equation (1), with age recentered relative to the 13-month cutoff are reported in columns (2), (4), and (6). Means of outcome variable before a child becomes ineligible for WIC are reported in columns (1), (3), and (5). Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. All analysis samples are restricted to parents who have a child between the ages of 1 month and 25 months, and whose annual family income is less than 200% of the federal poverty guidelines. All estimates are from local linear regressions with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. All regressions include survey year fixed effects. Standard errors are clustered by survey year and month. * $p<.10$ ** $p<.05$ *** $p<.01$.

Appendix

Namgyoon Oh

A Additional Figures and Tables

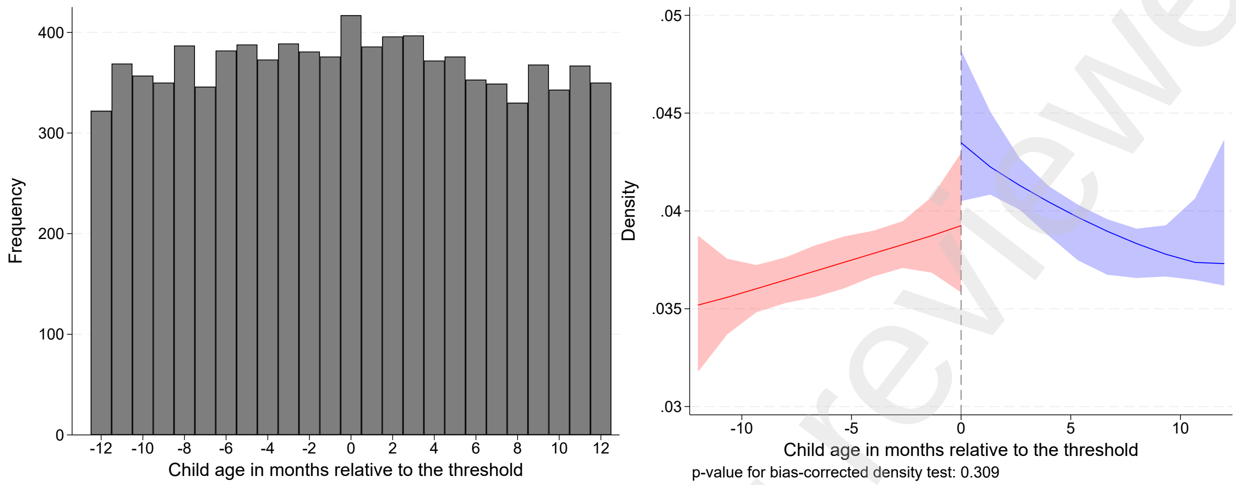
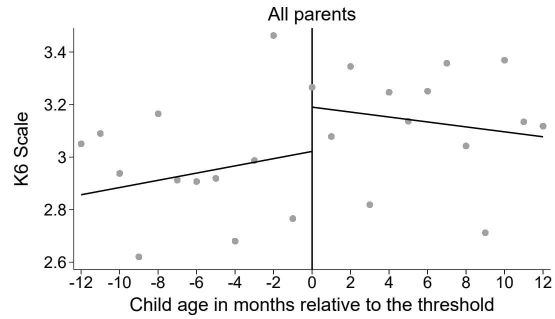


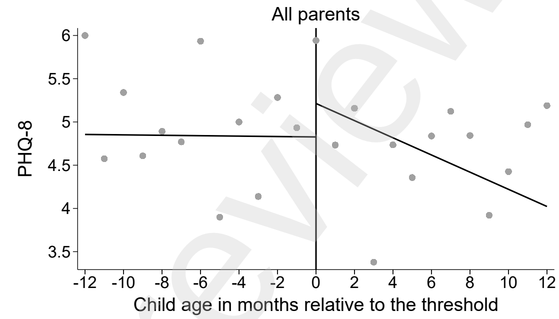
Figure A.1: Child age density at the WIC eligibility threshold

Notes: This figure illustrates the density of child age in months, aimed at demonstrating continuity at the WIC eligibility age threshold—a key identifying assumption for our RD design. The left panel displays a nearly uniform distribution of child age, suggesting no apparent manipulation at the eligibility cutoff. The right panel provides results from the formal density test proposed by Cattaneo et al. (2020, 2022).

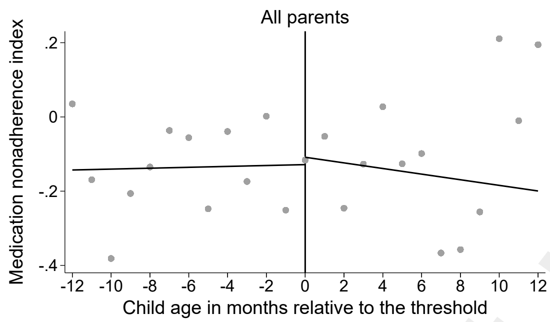
(a) K6 scale



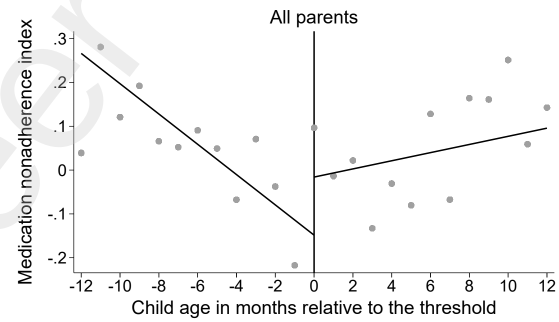
(b) PHQ-8



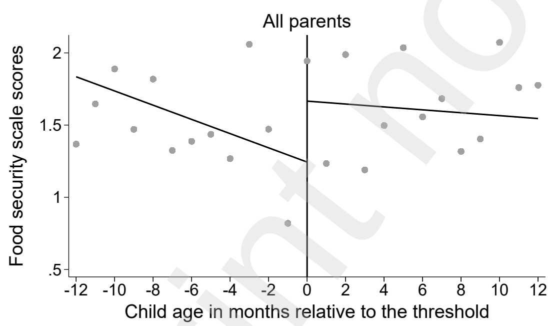
(c) Medicaid enrollees



(d) Non-Medicaid enrollees



(e) Food security scale scores



(f) Food insecure

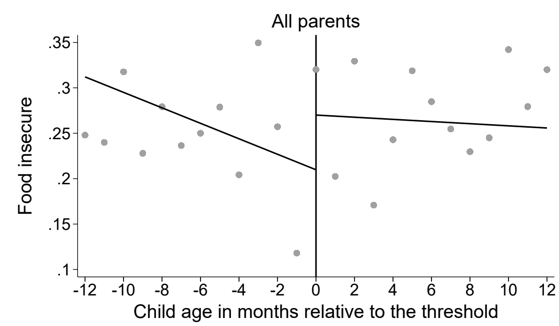
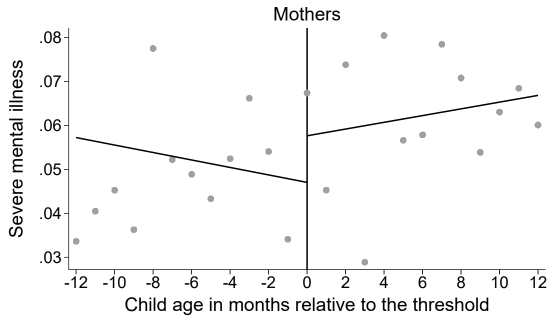


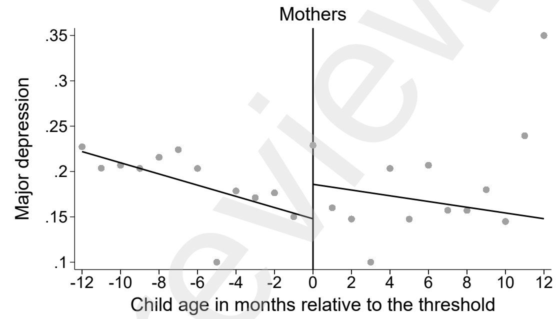
Figure A.2: Plots using the entire sample (Both mothers and fathers)

Notes: This figure shows main outcomes by their child age, relative to the age threshold at which children become ineligible for the WIC program, using the entire sample (both mothers and fathers). Each dot represents the mean value of the outcome variable for the corresponding age group. A global linear fit with a triangular kernel is imposed on either side of the threshold, marked by solid dark lines.

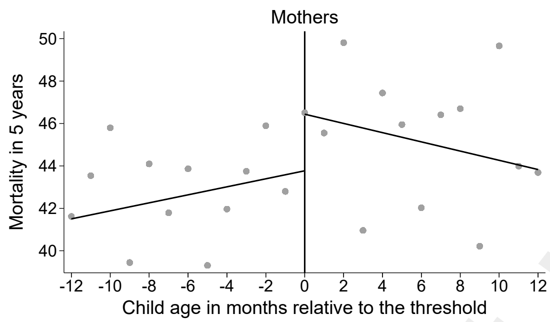
(a) Serious mental illness (K6 ≥ 13)



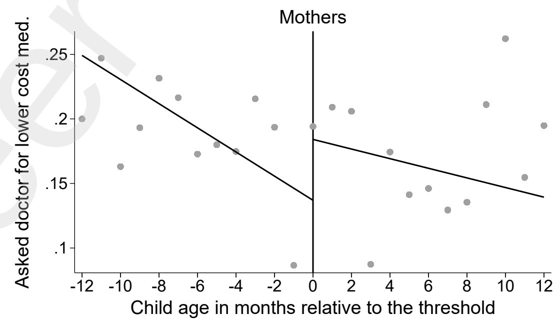
(b) Major depression (PHQ-8 ≥ 10)



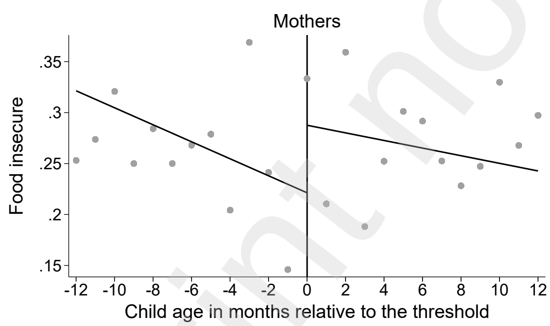
(c) Mortality in 5 years



(d) Asked doctor for lower cost med.



(e) Food insecure



(f) Very low food security

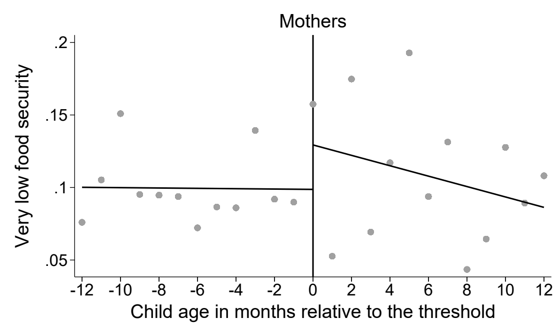
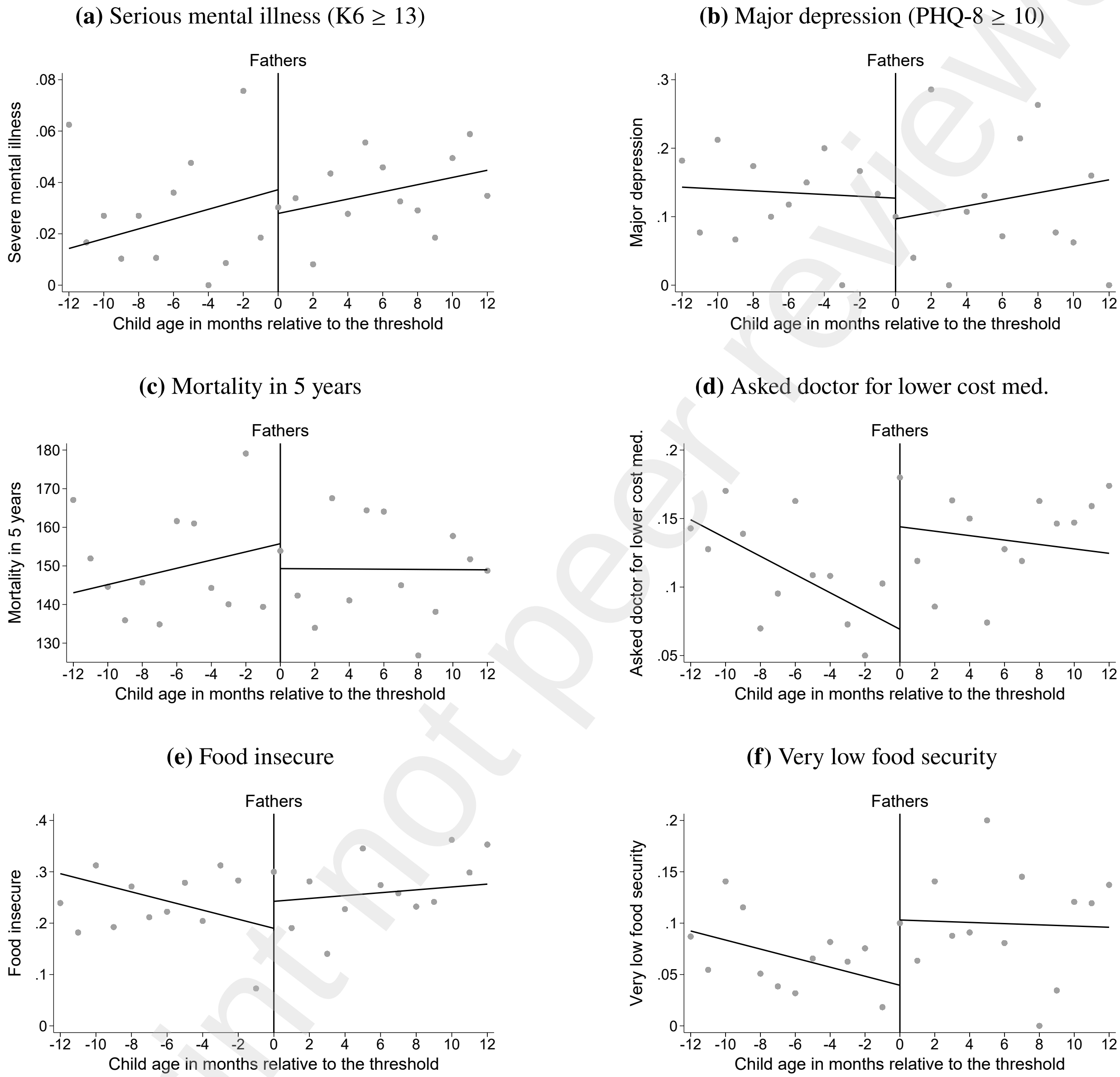


Figure A.3: Additional plots for additional outcomes (Mothers)

Notes: This figure shows main outcomes by their child age, relative to the age threshold at which children become ineligible for the WIC program, using the mothers sample. Each dot represents the mean value of the outcome variable for the corresponding age group. A global linear fit with a triangular kernel is imposed on either side of the threshold, marked by solid dark lines.



(a) Serious mental illness (K6 ≥ 13)

(b) Major depression (PHQ-8 ≥ 10)

(c) Mortality in 5 years

(d) Asked doctor for lower cost med.

(e) Food insecure

(f) Very low food security

Figure A.4: Additional plots for additional outcomes (Fathers)

Notes: This figure shows main outcomes by their child age, relative to the age threshold at which children become ineligible for the WIC program, using the fathers sample. Each dot represents the mean value of the outcome variable for the corresponding age group. A global linear fit with a triangular kernel is imposed on either side of the threshold, marked by solid dark lines.

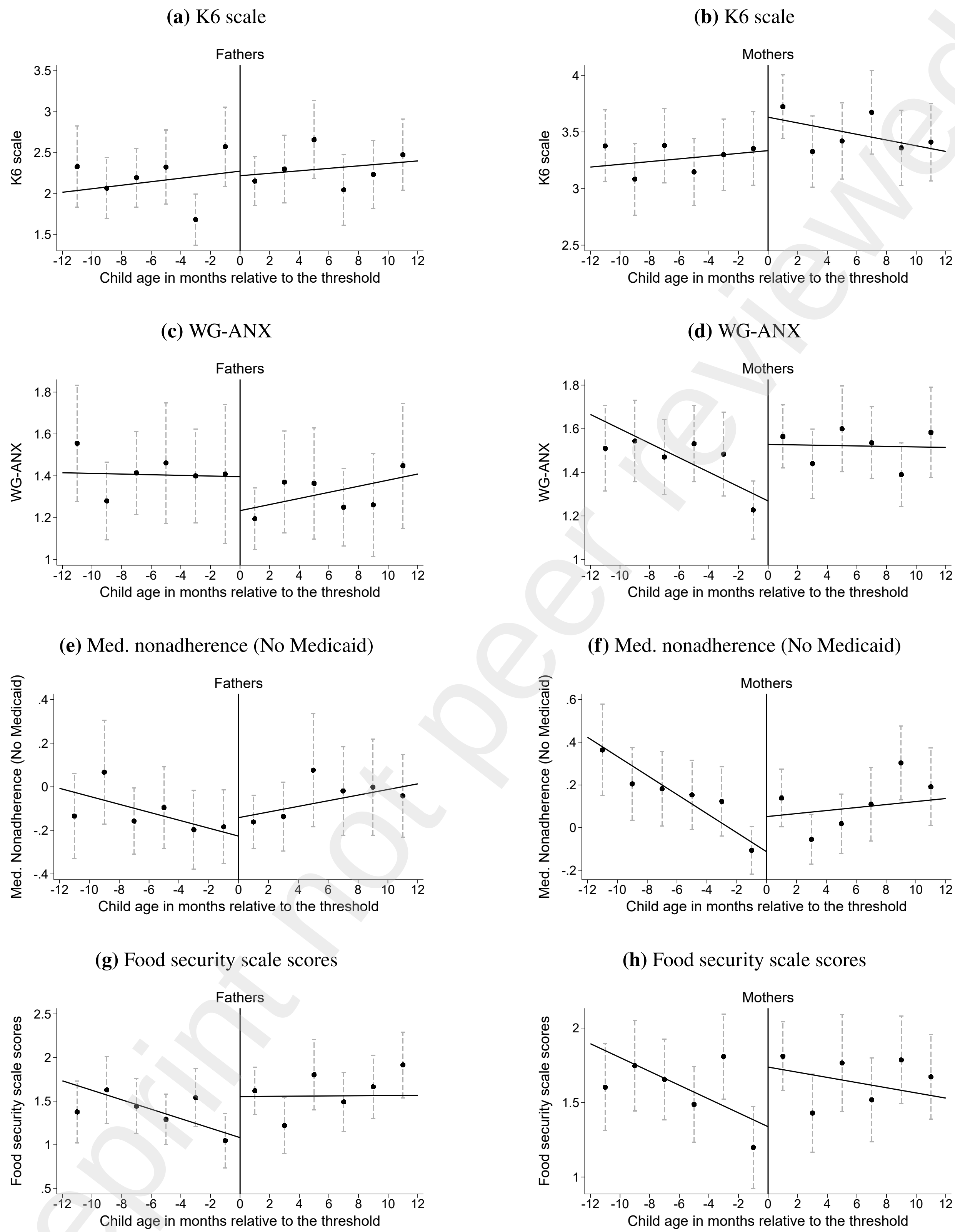


Figure A.5: Main outcomes by a child age relative to the threshold using fewer bins

Notes: This figure displays the main outcomes for fathers (left side) and mothers (right side) by their child age, relative to the age threshold at which children become ineligible for the WIC program. To reduce noise in the original figures, we set the number of bins to six on either side of the cutoff, instead of 12. Each dot represents the mean outcome value within these 2-month bins. A global linear fit with a triangular kernel is imposed on either side of the threshold, marked by solid dark lines. The bars represent 90 percent confidence intervals for the means.

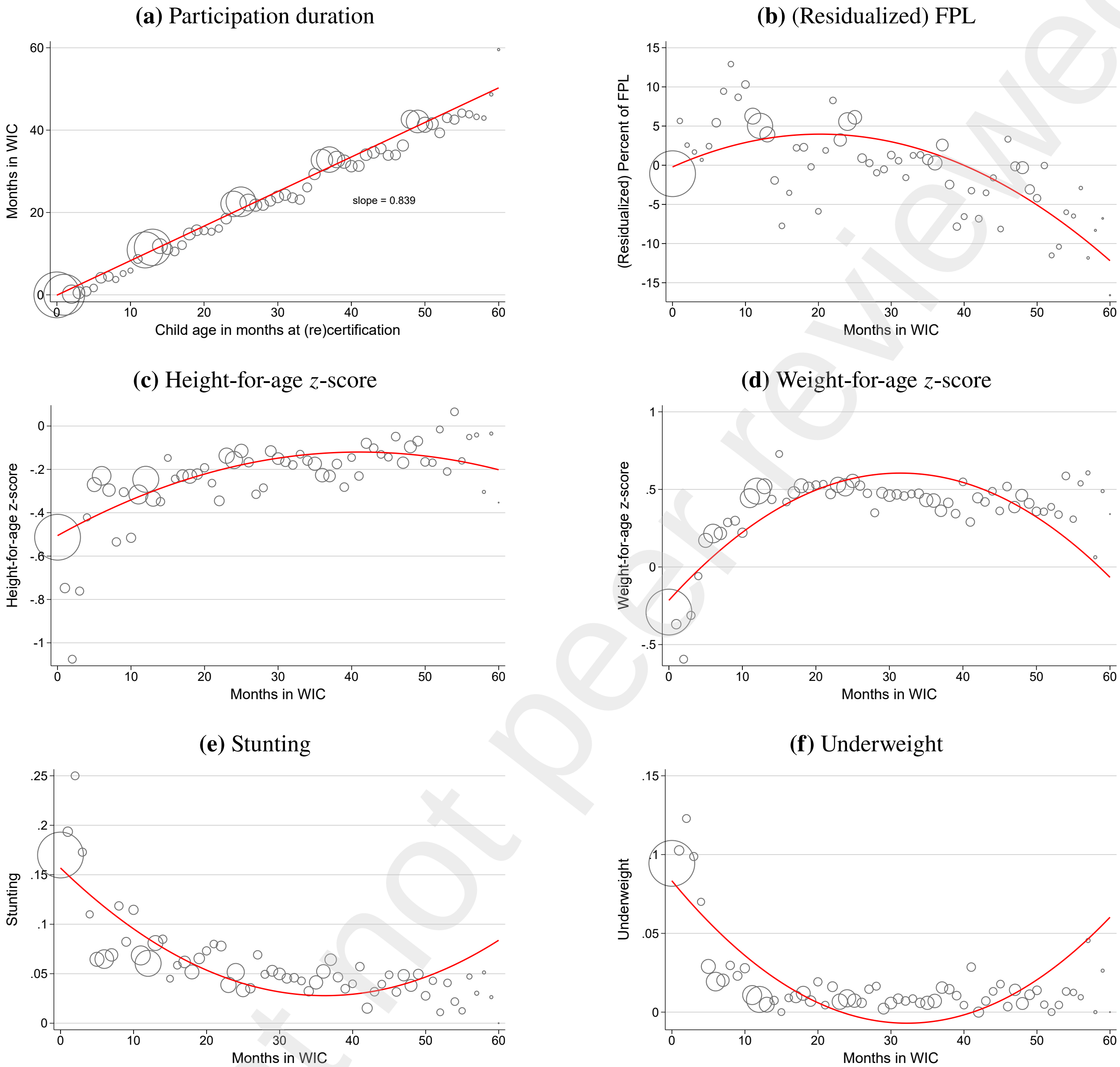


Figure A.6: Characteristics of WIC children participants by participation duration

Notes: Using the PC2018 National Sample Dataset, this figure plots the mean outcomes by age/duration at (re)certification, with circle sizes proportional to the number of observations corresponding to each participation duration. Participation duration is measured from the date of initial WIC certification to the date of re(certification) (or the date of height/weight measurement) by WIC staff. The red solid line in Figure A.6a represents the best linear fit and the red solid curves in the other figures represent the best quadratic fit, all weighted by the number of observations. z-scores are determined using the methodology outlined by World Health Organization (2006), adjusting for the child's gender and age based on the World Health Organization (WHO) child growth standards. Particularly, low height-for-age z-scores are associated with chronic or recurrent malnutrition, indicative of poverty and inadequate nutrition in early life. Child stunting is defined as height-for-age z-scores < -2, and underweight is defined as weight-for-age z-scores < -2. The findings suggest a potential positive impact of WIC on children's nutritional status; however, careful interpretation is required to consider potential selection bias.

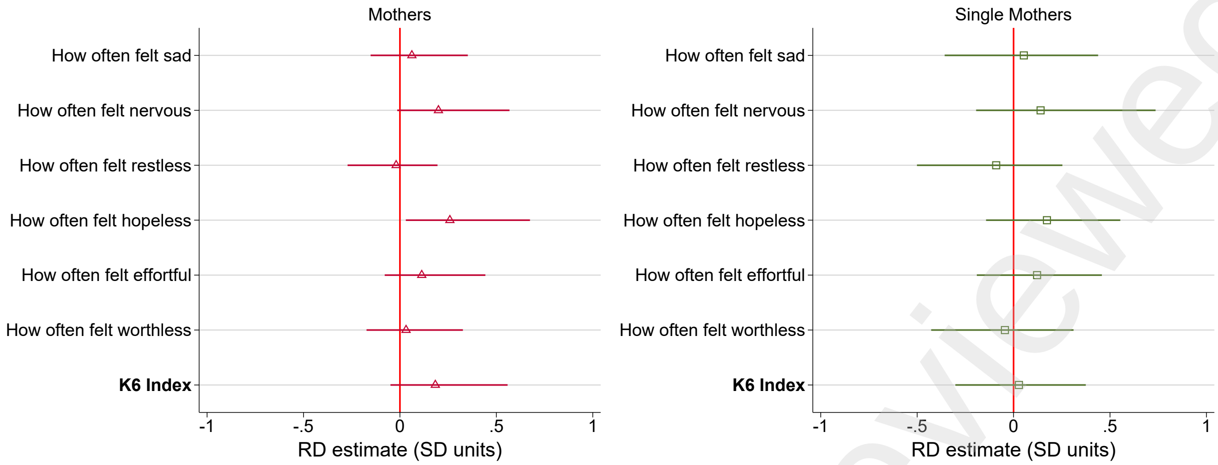


Figure A.7: RD estimates of K6 scale for mothers and single mothers with 90% RBC CIs

Notes: The figure presents MSE-optimal RD estimates of β_1 from equation (1) for mothers (left side) and for single mothers (right side), where each component of the K6 scores is the dependent variable. The bars represent 90 percent robust, bias-corrected confidence intervals with standard errors clustered by survey year and month.

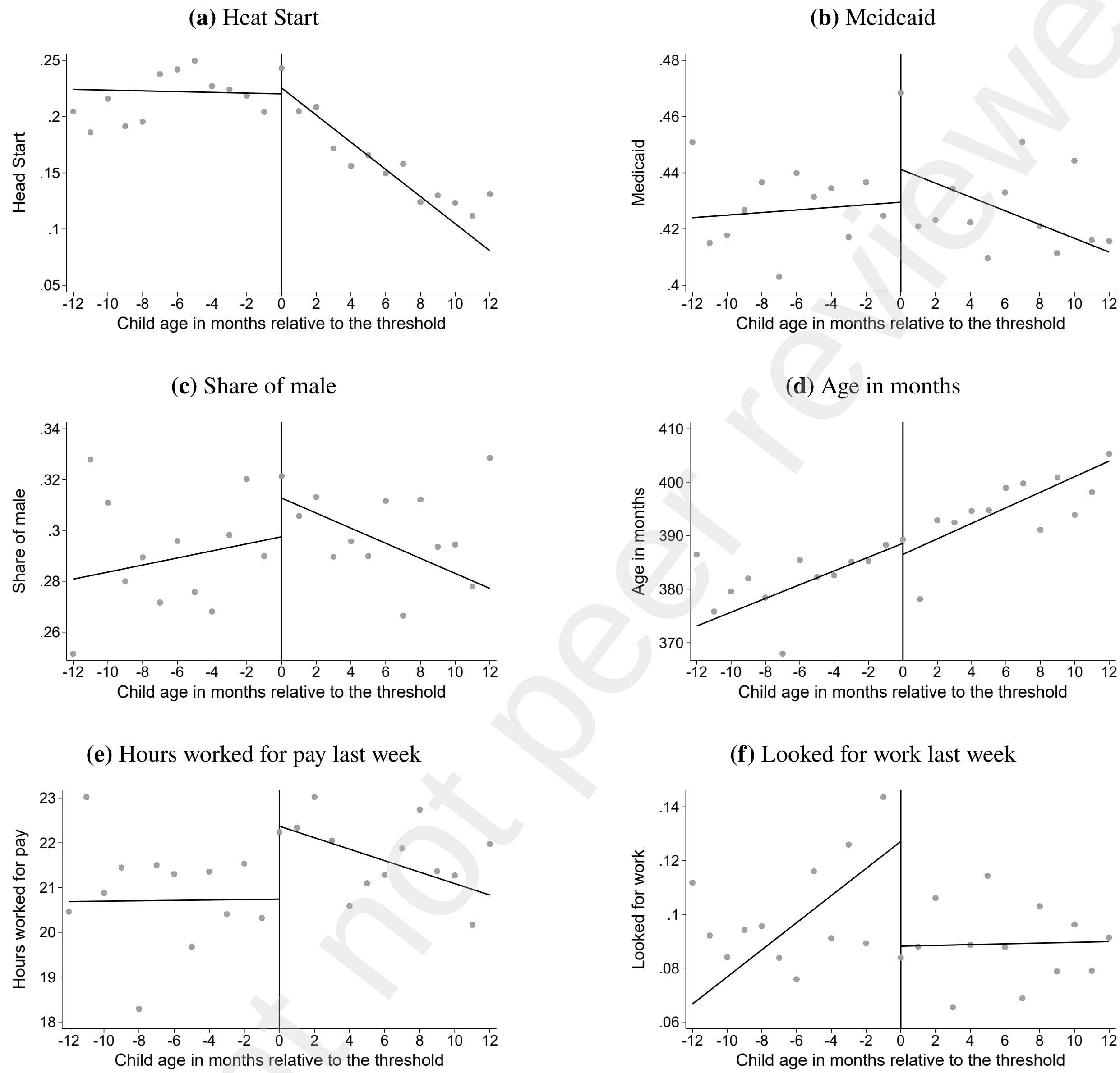


Figure A.8: Selected Placebo outcomes and predetermined covariates

Notes: This figure shows placebo outcomes and predetermined characteristics by their child age, relative to the age threshold at which children become ineligible for the WIC program, using the NHIS 2002–2014 data. The figure is intended to demonstrate changes at the cutoff for variables that, while potentially influenced by WIC, do not directly impact our primary outcomes, thereby serving as placebos. To adequately capture intra-household spillover effects, panel (a) includes all children residing in the households of sample parents, while panel (b) comprises all individuals within these households. Panels (c) through (f) are restricted to our main sample of parents. Each dot represents the mean value of the outcome variable for the corresponding age group. A global linear fit with a triangular kernel is imposed on either side of the threshold, marked by solid dark lines. RD estimates employing mass points adjusted MSE-optimal bandwidths are reported in Appendix Tables A.2 and A.3.

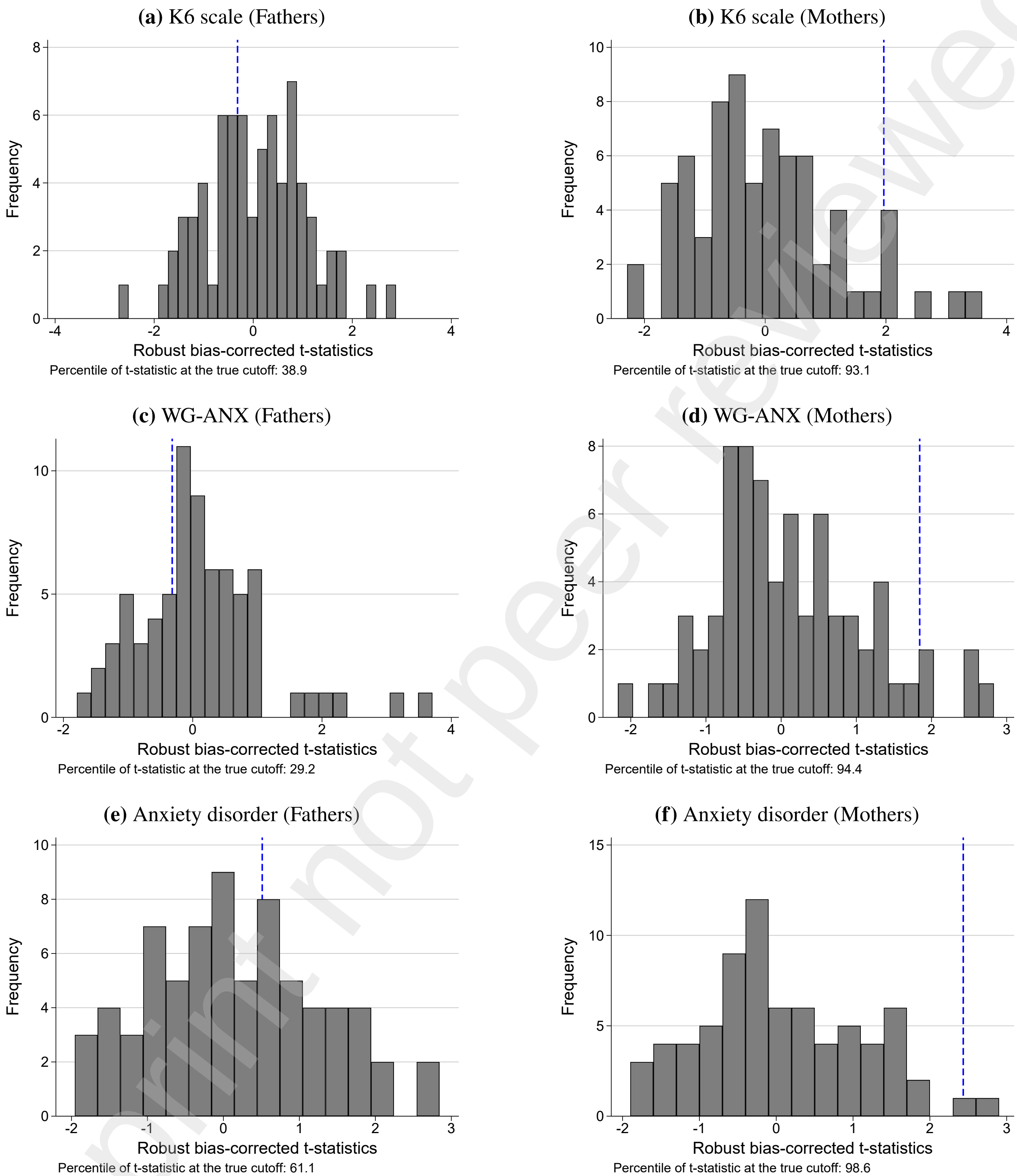


Figure A.9: Empirical distribution of robust, bias-corrected t-statistics at placebo cutoffs

Notes: This figure shows the empirical distribution of robust, bias-corrected (RBC) t-statistics from the RD estimations under our baseline specification, employing 72 placebo cutoffs (from 25 to 96 months) for fathers (left side) and mothers (right side), respectively. The dashed lines indicate the RBC t-statistics at the true cutoff, and their percentiles are reported below each respective figure.

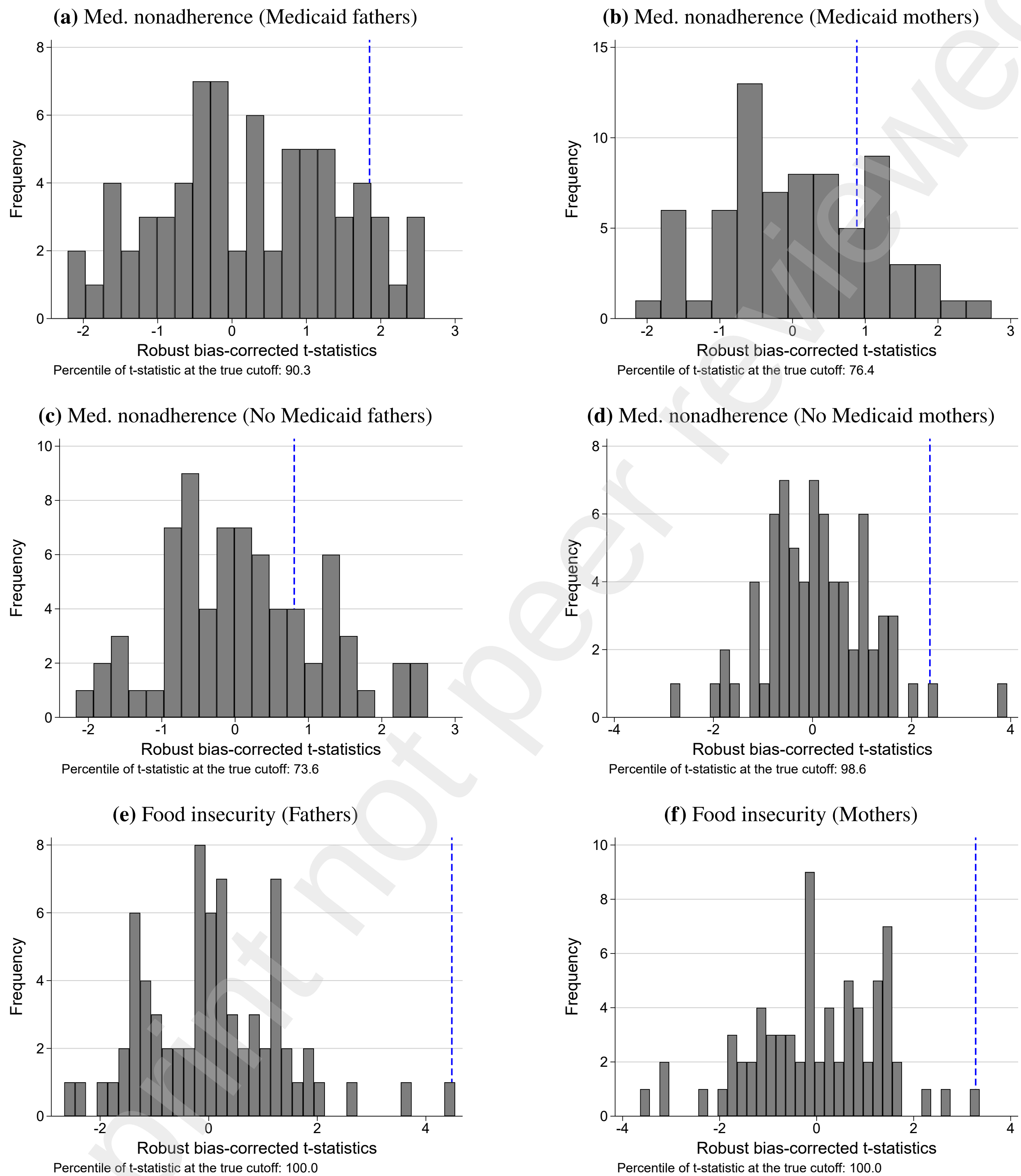


Figure A.10: Empirical distribution of robust, bias-corrected t-statistics at placebo cutoffs

Notes: This figure shows the empirical distribution of robust, bias-corrected (RBC) t-statistics from the RD estimations under our baseline specification, employing 72 placebo cutoffs (from 25 to 96 months) for fathers (left side) and mothers (right side), respectively. The dashed lines indicate the RBC t-statistics at the true cutoff, and their percentiles are reported below each respective figure.

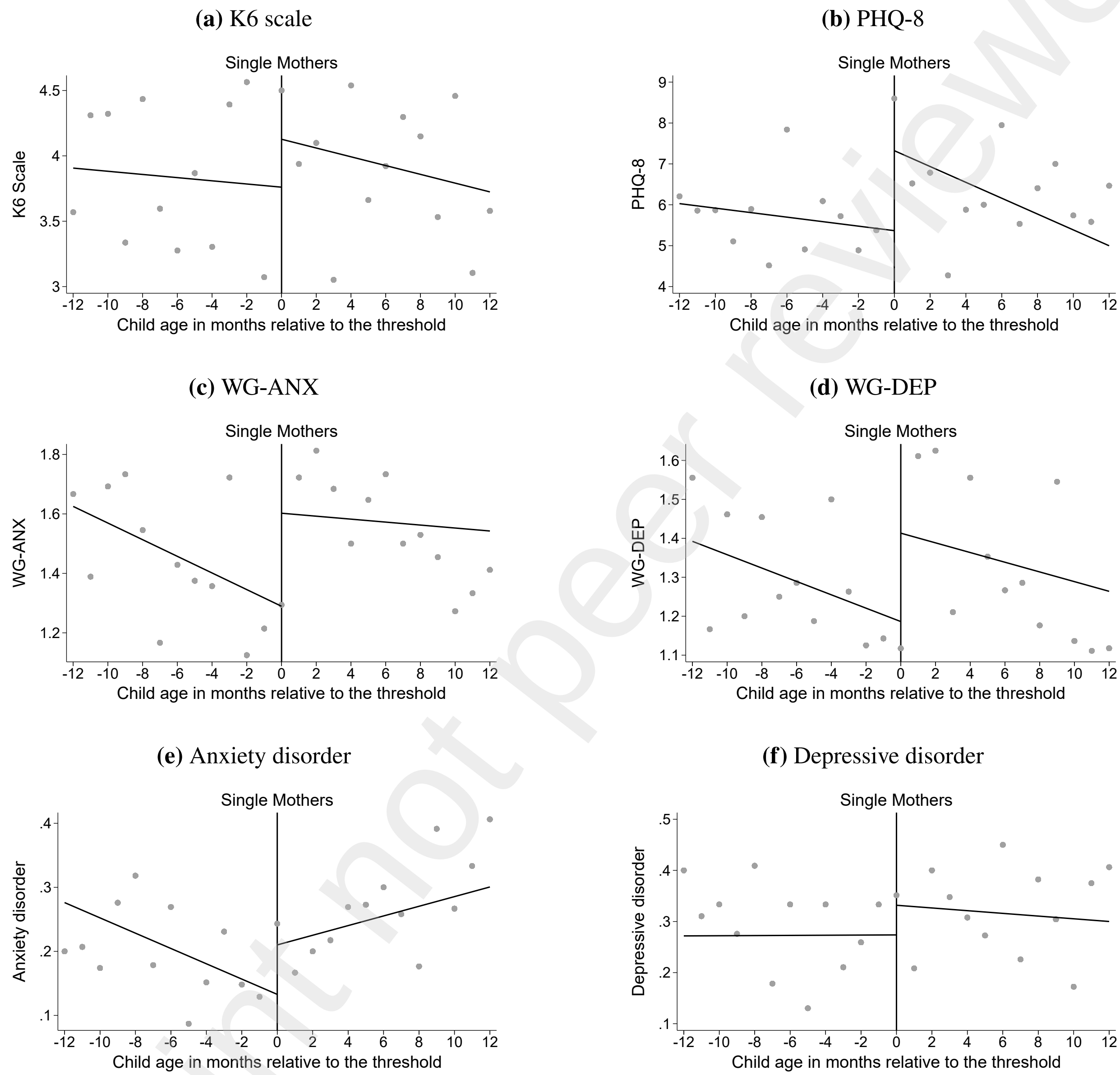


Figure A.11: Main outcomes of single mothers by a child age relative to the threshold

Notes: This figure shows main outcomes by their child age, relative to the age threshold at which children become ineligible for the WIC program, using the single mothers sample. Each dot represents the mean value of the outcome variable for the corresponding age group. A global linear fit with a triangular kernel is imposed on either side of the threshold, marked by solid dark lines. For the inference, I employ mass points adjusted MSE-optimal bandwidths and report RD estimates of β_1 from equation (1) in Table A.19.

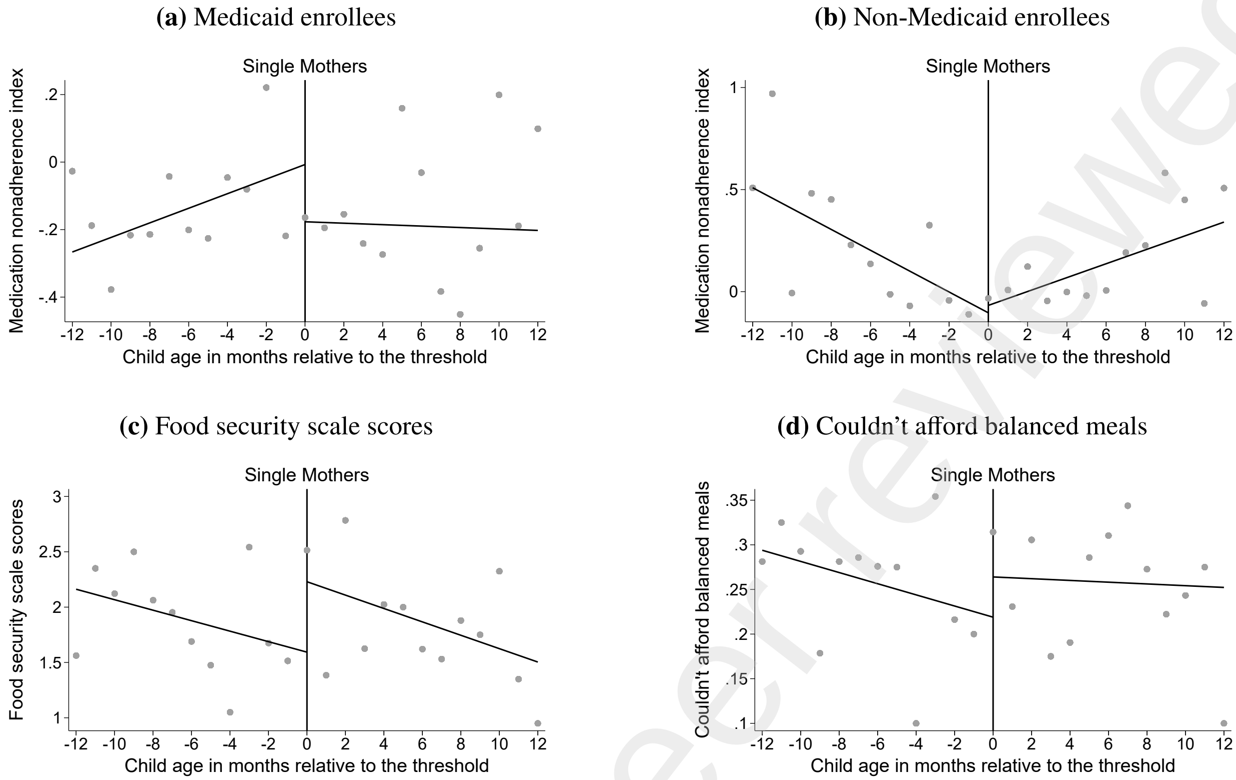


Figure A.12: Main outcomes of single mothers by a child age relative to the threshold (continued)

Notes: This figure shows main outcomes by their child age, relative to the age threshold at which children become ineligible for the WIC program, using the single mothers sample. Each dot represents the mean value of the outcome variable for the corresponding age group. A global linear fit with a triangular kernel is imposed on either side of the threshold, marked by solid dark lines. For the inference, I employ mass points adjusted MSE-optimal bandwidths and report RD estimates of β_1 from equation (1) in Table A.19.

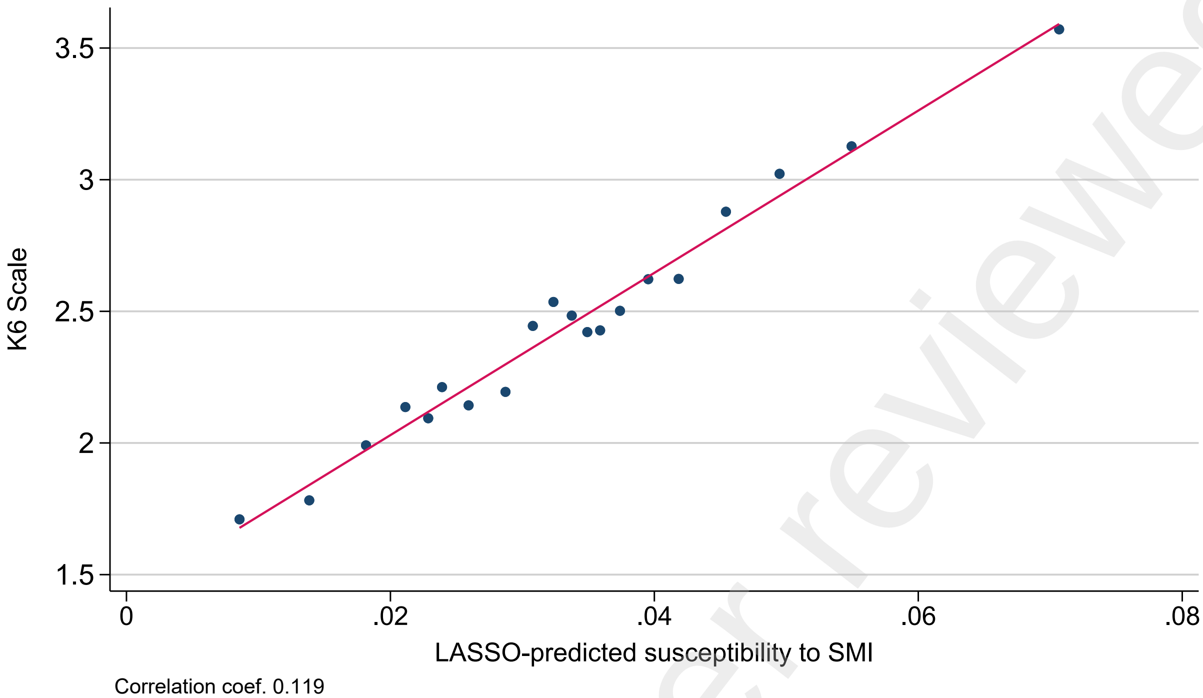


Figure A.13: K6 scale scores by LASSO-predicted susceptibility to SMI

Notes: This figure depicts the correlation between the K6 scale scores and the predicted susceptibility to SMI. Each dot represents the mean K6 score within each ventile of predicted susceptibility to SMI, and the solid line represents the linear best fit across these 20 points, yielding a figure comparable to Figure A.7 of Braghieri et al. (2022). For the prediction, LASSO is implemented following the method outlined by Braghieri et al. (2022), including immutable individual characteristics as the predictors. See Section 7.2 for the exact procedure. The training set consists of all sample adults with complete data for the predictors from the NHIS 2002–2014 data (a total of 362,159 observations).

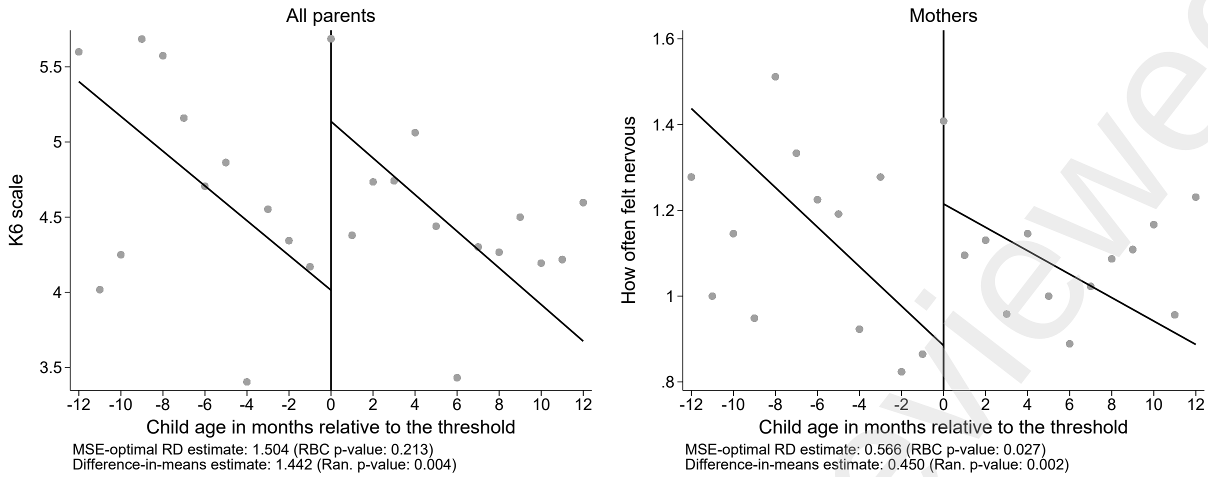


Figure A.14: Checking external validity using BRFSS 2007 and 2009

Notes: This figure assesses the external validity of the K6 results using the 2007 and 2009 BRFSS datasets. 2007 and 2009 were the only years when the K6 questionnaire was included in BRFSS before its major revision. It displays parents' (N=1,485) K6 scores by child age relative to the WIC ineligibility threshold on the left panel, and mothers' (N=1,092) scores on 'how often felt nervous' item from the K6 on the right. Each dot represents the mean value of the outcome variable for the corresponding age group. A global linear fit with a triangular kernel is imposed on either side of the threshold, marked by solid dark lines. Under each figure, both MSE-optimal estimates (with the RBC p-value) and difference-in-means estimates (with the randomization p-value) are reported to account for the smaller sample size compared to the NHIS. All estimates are from our baseline specifications from equations 1 and 2.

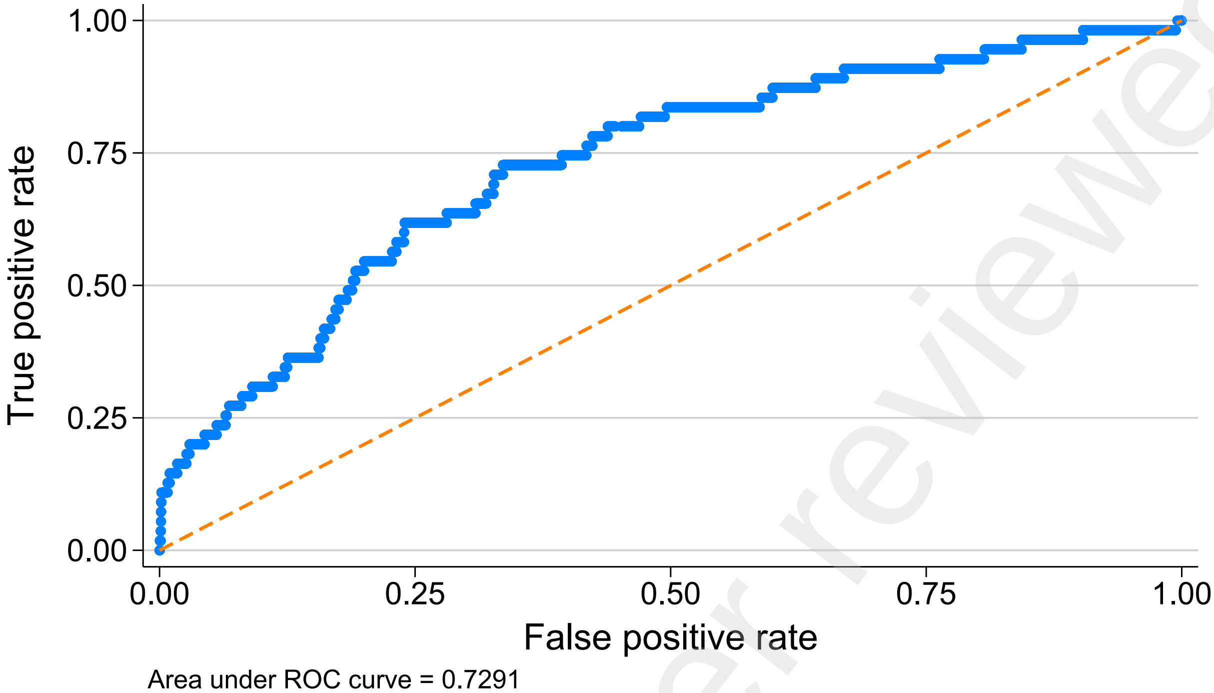


Figure A.15: ROC curve for the binary classifier model of mental health-related mortality

Notes: This figure illustrates the performance of my logistic regression model for predicting mental health-related mortality. The outcome variable is a binary, set to 1 if mental health-related mortality occurs within 20 quarters following the K6 score assessment, and 0 otherwise. The predictor variable represents the estimated probability of mental health-related mortality from the model. The ROC curve is plotted nonparametrically, and the area under the curve (AUC) value is reported below the figure.

Table A.1: Characteristics of control groups at 13-month and 61-month cutoffs

	(1)	(2)	(3)	(4)
Variables	Control mean (cutoff: 13)	Control mean (cutoff: 61)	$\bar{c}_{61} - \bar{c}_{13}$ difference	p-value $H_0 : \bar{c}_{61} - \bar{c}_{13} = 0$
Male	0.30	0.30	0.00	0.34
Age (in months)	345.70	386.82	41.13	0.00
non-Hispanic whites	0.34	0.32	-0.02	0.61
non-Hispanic blacks	0.20	0.20	-0.00	0.95
Hispanic	0.41	0.40	-0.00	0.85
High school graduate or more	0.59	0.63	0.03	0.45
Single parent	0.34	0.36	0.02	0.17
Medicaid	0.31	0.29	-0.02	0.42
HH income < 100% FPL	0.54	0.46	-0.08	0.02
Worked for pay last week	0.54	0.56	0.02	0.41
Hours worked (for pay) last week	19.89	20.84	0.95	0.42
K6 scale	2.75	3.12	0.38	0.10
Med. nonadherence index	–0.13	–0.14	-0.02	0.80
Food security scale scores	1.63	1.15	-0.47	0.13
Observations	705	751		

Notes: Column (1) reports the characteristics of the control group defined as NHIS low-income sample parents who have a child with the (age in months$-13) \in [-2, 0)$ at the time of the interview. Column (2) reports the characteristics of the control group defined as NHIS low-income sample parents who have a child with the (age in months$-61) \in [-2, 0)$ at the time of the interview. The window $[-2, 2]$ is selected following the data-driven approach proposed by Cattaneo et al. (2015), ensuring that the treatment can be considered as-if randomly assigned within the window. See Section 4.2 for further details on the window selection. Column (3) reports the raw difference in means between the two control groups, and Column (4) reports p-values from the t-tests of $H_0 : \bar{T} - \bar{C} = 0$.

Table A.2: Placebo outcomes and covariate balance test

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All family members		Mothers		Fathers		Single Mothers	
Outcome variable	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate
Panel A. Exits from other programs								
SSI	0.0214	0.0205* [–0.00386, 0.0586] (0.0858)	0.0144	0.0233** [0.00138, 0.0652] (0.0409)	0.00947	–0.0129 [–0.101, 0.0422] (0.419)	0.0273	0.0137 [–0.0320, 0.0935] (0.337)
(obs)		14,712		2,960		1,849		1,036
TANF	0.0552	0.00741 [–0.0308, 0.0670] (0.468)	0.0877	–0.0447 [–0.168, 0.0786] (0.478)	0.0213	0.00395 [–0.0695, 0.113] (0.643)	0.140	–0.135 [–0.405, 0.0856] (0.202)
(obs)		14,697		2,958		1,847		1,036
Other kind of welfare assistance	0.0267	–0.00807 [–0.0367, 0.0217] (0.613)	0.0553	–0.0204 [–0.112, 0.0835] (0.773)	0.0154	–0.0104 [–0.0843, 0.0894] (0.954)	0.105	–0.122 [–0.419, 0.103] (0.236)
(obs)		14,716		2,961		1,849		1,037
Received income from child support	0.0617	0.0119 [–0.0266, 0.0630] (0.426)	0.0763	0.0775 [–0.0266, 0.219] (0.125)	0.00237	0.0241 [–0.0142, 0.0753] (0.181)	0.131	0.196* [–0.0306, 0.532] (0.0807)
(obs)		14,702		2,958		1,848		1,035
SNAP (unit: family)	0.495	–0.0449 [–0.202, 0.239] (0.872)					0.688	–0.0317 [–0.311, 0.360] (0.888)
(obs)		3,152						1,037
Medicaid	0.428	0.0382 [–0.0114, 0.0918] (0.127)	0.308	0.0346 [–0.0526, 0.131] (0.404)	0.150	0.0318 [–0.0575, 0.132] (0.441)	0.423	0.0387 [–0.151, 0.212] (0.743)
(obs)		58,186		11,988		7,369		4,281
Panel B. Child attending Head Start								
	Children in all families						Children in single mother families	
Head Start (unit: age $\leq$ 6)	0.317	0.0729 [–0.0166, 0.183] (0.102)					0.367	0.0467 [–0.0868, 0.222] (0.391)
(obs)		12,720						4,293

Notes: The estimates are based on pooled 2002-2014 NHIS data. The purpose of this table is to examine whether *exits* from other programs coincide with departures from WIC at the WIC ineligibility age cutoff. Given the way the running variable is defined in this table, we are unable to assess discontinuities in program *entries* (i.e. the interpretation of positive values in this table is limited). We do assess discontinuities in program *entries* in Appendix Table A.4, where we redefine the running variable. MSE-optimal estimates of β_1 from equation (1) without survey year fixed effects are reported in columns (2), (4), (6), and (8). Means of outcome variable before a child becomes ineligible for WIC are reported in columns (1), (3), (5), and (7). Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. All analysis samples are restricted to families who have a single child between the ages of 49 months and 73 months, and whose annual family income is less than 200% of the federal poverty guidelines. For the outcome variables SSI–SNAP, the running variable is a child's age as of the previous January, rather than their age at the time of the interview. To mitigate the recall bias issue, only responses from individuals interviewed in the first quarter are used for an estimation (except for Medicaid and Head Start). Refer to Section 3.3 for details. When the survey unit is not specified, the survey question was posed to all family members. All estimates are from local linear regression with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. * $p<.10$ ** $p<.05$ *** $p<.01$.

Table A.3: Placebo outcomes and covariate balance test - continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Parents		Mothers		Fathers		Single Mothers	
Outcome variable	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate
Panel C. Demographics								
Male	0.290	0.0426 [–0.0556, 0.181] (0.299)						
(obs)		9,224						
Age (in months)	382	–4.01 [–24.4, 15.6] (0.668)	368	–8.73 [–31.0, 9.44] (0.296)	414	2.65 [–37.0, 36.2] (0.984)	362	–7.91 [–42.4, 24.2] (0.591)
(obs)		9,186		6,477		2,709		3,244
non-Hispanic whites	0.329	0.0916 [–0.0218, 0.246] (0.101)	0.322	0.0509 [–0.0567, 0.188] (0.293)	0.347	0.103 [–0.104, 0.371] (0.271)	0.284	0.0184 [–0.146, 0.196] (0.773)
(obs)		9,224		6,498		2,726		3,253
non-Hispanic blacks	0.189	–0.00563 [–0.0928, 0.107] (0.888)	0.220	–0.0135 [–0.131, 0.121] (0.942)	0.114	0.0188 [–0.113, 0.195] (0.602)	0.348	–0.0115 [–0.202, 0.214] (0.956)
(obs)		9,224		6,498		2,726		3,253
Hispanics	0.422	–0.0487 [–0.206, 0.0607] (0.286)	0.400	–0.0127 [–0.178, 0.117] (0.681)	0.477	–0.120 [–0.417, 0.0975] (0.224)	0.323	–0.0204 [–0.251, 0.150] (0.623)
(obs)		9,224		6,498		2,726		3,253
Single parent	0.360	0.0293 [–0.0675, 0.148] (0.464)						
(obs)		9,221						
Panel D. Working for pay								
Worked for pay last week	0.559	0.0263 [–0.0839, 0.129] (0.676)	0.463	0.00996 [–0.126, 0.119] (0.958)	0.793	0.0380 [–0.117, 0.215] (0.567)	0.579	0.0345 [–0.147, 0.204] (0.753)
(obs)		9,224		6,498		2,726		3,253
Hours worked (for pay) last week	20.8	2.19 [–2.38, 8.01] (0.289)	16.2	0.831 [–4.21, 5.06] (0.858)	32.3	3.56 [–3.87, 12.9] (0.291)	20.4	2.21 [–5.76, 10.9] (0.545)
(obs)		9,184		6,479		2,705		3,244
Looked for work last week	0.100	–0.0973** [–0.205, –0.0246] (0.0126)	0.107	–0.126** [–0.262, –0.0304] (0.0133)	0.0849	–0.0204 [–0.126, 0.0877] (0.723)	0.146	–0.0910 [–0.242, 0.0427] (0.170)
(obs)		9,224		6,498		2,726		3,253

Notes: The estimates are based on pooled 2002-2014 NHIS data. MSE-optimal estimates of β_1 from equation (1) without survey year fixed effects are reported in columns (2), (4), (6), and (8). Means of outcome variable before a child becomes ineligible for WIC are reported in columns (1), (3), (5), and (7). Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. The sample is restricted to parents who have a single child between the ages of 49 months and 73 months at the time of the interview, and whose annual family income is less than 200% of the federal poverty guidelines. This sample coincides with the sample used for the main analysis. All estimates are from local linear regression with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. * p<.10 ** p<.05 *** p<.01.

Table A.4: Entering other programs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All family members		Mothers		Fathers		Single Mothers	
Outcome variable	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate
SSI	0.0208	0.00626	0.0162	–0.00316	0.00868	–0.00479	0.0314	–0.00180
		[–0.00378, 0.0211]		[–0.0246, 0.0183]		[–0.0311, 0.0244]		[–0.0318, 0.0414]
		(0.172)		(0.773)		(0.811)		(0.797)
(obs)		59,105		12,018		7,328		4,326
TANF	0.0502	0.0103	0.0786	0.0217	0.0182	0.00718	0.151	0.0196
		[–0.0303, 0.0501]		[–0.0285, 0.0912]		[–0.0321, 0.0261]		[–0.115, 0.191]
		(0.630)		(0.304)		(0.840)		(0.625)
(obs)		59,117		12,021		7,326		4,332
Other kind of welfare assistance	0.0246	–0.000589	0.0471	0.00453	0.0104	0.00813	0.0928	–0.00610
		[–0.0211, 0.0230]		[–0.0371, 0.0555]		[–0.0102, 0.0339]		[–0.106, 0.0896]
		(0.932)		(0.696)		(0.293)		(0.870)
(obs)		59,131		12,022		7,330		4,328
Received income from child support	0.0505	0.00458	0.0621	0.0449**	0.00476	0.00366	0.106	0.0705*
		[–0.0247, 0.0377]		[0.00309, 0.109]		[–0.00842, 0.0184]		[–0.0102, 0.195]
		(0.682)		(0.0381)		(0.465)		(0.0773)
(obs)		59,124		12,019		7,329		4,328
SNAP (unit: family)	0.468	0.0410					0.663	–0.0386
		[–0.0542, 0.158]						[–0.205, 0.148]
		(0.339)						(0.751)
(obs)		12,813						4,336

Notes: The estimates are based on pooled 2002-2014 NHIS data. The purpose of this table is to examine whether *entries* to other programs coincide with departures from WIC at the WIC ineligibility age cutoff. Note that discontinuity in program entries is more an outcome of a child aging out of WIC rather than a confounding factor. MSE-optimal estimates of β_1 from equation (1) without survey year fixed effects are reported in columns (2), (4), (6), and (8). Means of outcome variable before a child becomes ineligible for WIC are reported in columns (1), (3), (5), and (7). Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. The sample used is restricted to parents who have a single child between the ages of 49 months and 73 months as of the previous December, and whose annual family income is less than 200% of the federal poverty guidelines. When the survey unit is not specified, the survey question was posed to all family members. All estimates are from local linear regression with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. All regressions include survey year fixed effects. Standard errors are clustered by survey year and month. * $p<.10$ ** $p<.05$ *** $p<.01$.

Table A.5: Robustness checks of Table 2 (Mothers only)

	(1)	(2)	(3)	(4)	(5)	(6)
	K6 scale	K6 ≥ 13	PHQ-8	PHQ-8 ≥ 10	WG-ANX	WG-DEP
Panel A. Specifications						
Baseline(MSE-optimal)	1.21**	0.0512*	0.624	0.0632	0.401*	0.190
	[0.00360, 3.12]	[−0.00676, 0.139]	[−1.49, 2.66]	[−0.0912, 0.231]	[−0.0310, 1.01]	[−0.316, 0.929]
	(0.0495)	(0.0753)	(0.584)	(0.395)	(0.0653)	(0.335)
(bw)	2.84	2.81	5.73	4.89	3.38	3.09
Without Fixed Effects	1.25**	0.0485	0.686	0.0662	0.438**	0.267
	[0.0111, 3.17]	[−0.0126, 0.137]	[−1.45, 2.71]	[−0.0921, 0.236]	[0.0239, 1.04]	[−0.205, 1.00]
	(0.0484)	(0.103)	(0.552)	(0.389)	(0.0402)	(0.195)
(bw)	2.93	2.94	5.74	4.88	3.32	3.15
Add Controls	1.10*	0.0467*	0.483	0.0501	0.377*	0.198
	[−0.0868, 2.97]	[−0.0105, 0.133]	[−1.90, 2.83]	[−0.104, 0.211]	[−0.0701, 0.955]	[−0.262, 0.897]
	(0.0645)	(0.0947)	(0.701)	(0.502)	(0.0907)	(0.283)
(bw)	2.89	2.85	4.99	5.02	3.48	3.21
Quadratic	0.322	0.0243	0.700	0.0451	0.378**	0.133
	[−0.408, 1.96]	[−0.0130, 0.0952]	[−1.49, 2.68]	[−0.123, 0.202]	[0.00924, 0.962]	[−0.212, 0.572]
	(0.199)	(0.137)	(0.575)	(0.634)	(0.0457)	(0.369)
(bw)	12.0	12.0	12.0	12.0	12.0	12.0
Panel B. Bandwidths						
MSE X 2	0.440*	0.0271**	0.569	0.0415	0.347**	0.118
	[−0.00707, 2.65]	[0.00695, 0.131]	[−1.18, 2.55]	[−0.0949, 0.170]	[0.00661, 0.943]	[−0.128, 0.749]
	(0.0512)	(0.0293)	(0.471)	(0.579)	(0.0468)	(0.165)
(bw)	5.69	5.62	11.5	9.78	6.76	6.18
MSETWO	1.24**	0.0516*	1.26	0.0801	0.351	0.298
	[0.0933, 3.18]	[−0.00382, 0.140]	[−1.06, 4.64]	[−0.0813, 0.301]	[−0.139, 0.945]	[−0.421, 1.18]
	(0.0377)	(0.0635)	(0.219)	(0.260)	(0.145)	(0.352)
(bw)	−2.63/+5.44	−2.68/+4.18	−3.26/+4.73	−3.58/+3.95	−2.92/+3.92	−2.54/+4.43
CER-optimal	1.19*	0.0536*	0.887	0.0784	0.290	0.196
	[−0.0234, 3.08]	[−0.00458, 0.141]	[−1.39, 3.02]	[−0.0923, 0.255]	[−0.171, 0.889]	[−0.468, 1.06]
	(0.0535)	(0.0663)	(0.469)	(0.359)	(0.184)	(0.448)
(bw)	2.13	2.11	4.63	3.95	2.73	2.49
CER X 2	0.760**	0.0434*	0.626	0.0379	0.378*	0.184
	[0.165, 3.51]	[−0.00989, 0.149]	[−1.24, 2.54]	[−0.102, 0.200]	[−0.00934, 1.04]	[−0.342, 1.07]
	(0.0313)	(0.0862)	(0.502)	(0.522)	(0.0542)	(0.313)
(bw)	4.27	4.22	9.25	7.90	5.46	4.99
Panel C. Local Randomization						
Diff. in means	1.20	0.0452	2.09	0.0991	0.316	0.310
Ran. p-val	(<0.0001)	0.000800	0.00200	0.0260	0.0136	0.00680
Asymp. p-val	0.0651	0.128	0.191	0.379	0.214	0.252

Notes: The Baseline (MSE-optimal) row reproduces estimates from the main specification. The removed fixed effects are survey year fixed effects. The controls added are age (in years), and indicators for race/ethnicity. The Quadratic row reports global quadratic estimates using the full sample. The MSETWO row in Panel B presents MSE-optimal estimates using different bandwidths (reported in (bw)) on either side of the cutoff. The CER-optimal row presents estimates using bandwidths that minimizes the asymptotic coverage error (CER) rate of the robust, bias-corrected confidence interval. Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. All regressions other than the Without Fixed Effects row include survey year fixed effects. Standard errors are clustered by survey year and month. Panel C reports difference-in-means test statistic with the randomization p-value from a fixed margins randomization based test of the Fisherian sharp null hypothesis and with the asymptotic p-value from a test of the null hypothesis that the ATE is zero. Outcomes are transformed using $p = 1$. The selected window is $[-2, 2]$, which is constant across outcomes, and the number of simulations is 5,000. When there is not enough variability in the data for an estimation, results are not presented. * p<.10 ** p<.05 *** p<.01.

Table A.6: Robustness checks of Table 2 (Fathers only)

	(1)	(2)	(3)	(4)	(5)	(6)
	K6 scale	K6 ≥ 13	PHQ-8	PHQ-8 ≥ 10	WG-ANX	WG-DEP
Panel A. Specifications						
Baseline(MSE-optimal)	–0.183	–0.00343	–1.53	–0.0827	–0.212	–0.00253
	[–1.59, 1.14]	[–0.0487, 0.0510]	[–7.73, 3.06]	[–0.353, 0.140]	[–1.35, 0.974]	[–1.02, 1.21]
	(0.752)	(0.965)	(0.397)	(0.397)	(0.751)	(0.868)
(bw)	4.54	4.65	3.15	4.13	3.30	3.08
Without Fixed Effects	–0.330	–0.0124	–1.77	–0.0853	–0.209	0.00808
	[–1.79, 0.986]	[–0.0622, 0.0411]	[–7.32, 2.01]	[–0.452, 0.201]	[–1.36, 1.01]	[–1.07, 1.30]
	(0.570)	(0.689)	(0.265)	(0.451)	(0.770)	(0.845)
(bw)	4.48	4.71	3.80	3.39	3.33	3.08
Add Controls	–0.164	–0.00536	–1.19	–0.0475	–0.297	–0.0404
	[–1.66, 1.18]	[–0.0520, 0.0487]	[–6.65, 3.36]	[–0.280, 0.167]	[–1.58, 0.971]	[–1.10, 1.24]
	(0.741)	(0.949)	(0.520)	(0.622)	(0.638)	(0.904)
(bw)	4.20	4.71	3.26	4.70	3.40	3.35
Quadratic	–0.191	–0.00895	–0.666	–0.0472	–0.174	–0.157
	[–1.77, 1.05]	[–0.0529, 0.0506]	[–5.25, 1.91]	[–0.301, 0.187]	[–1.04, 0.701]	[–0.793, 0.865]
	(0.616)	(0.965)	(0.361)	(0.649)	(0.705)	(0.932)
(bw)	12.0	12.0	12.0	12.0	12.0	12.0
Panel B. Bandwidths						
MSE X 2	–0.0526	–0.00802	–0.476	–0.0374	–0.177	–0.132
	[–1.49, 0.826]	[–0.0515, 0.0381]	[–6.17, 1.84]	[–0.249, 0.167]	[–1.15, 0.652]	[–0.849, 0.972]
	(0.574)	(0.770)	(0.289)	(0.701)	(0.589)	(0.895)
(bw)	9.08	9.31	6.30	8.26	6.60	6.16
MSETWO	0.642	0.0858**	–1.15	–0.0695	–0.233	0.00520
	[–0.948, 2.72]	[0.00890, 0.199]	[–8.04, 4.13]	[–0.319, 0.143]	[–1.53, 1.10]	[–0.878, 0.942]
	(0.344)	(0.0320)	(0.529)	(0.457)	(0.751)	(0.945)
(bw)	–3.14/+4.01	–2.81/+3.79	–2.69/+5.60	–4.35/+4.13	–3.03/+4.66	–3.75/+4.16
CER-optimal	0.312	0.0301	–1.11	–0.0827	–0.175	–0.00760
	[–1.22, 1.79]	[–0.0238, 0.0906]	[–7.62, 4.13]	[–0.380, 0.178]	[–1.55, 1.23]	[–1.12, 1.26]
	(0.713)	(0.253)	(0.561)	(0.479)	(0.822)	(0.909)
(bw)	3.41	3.49	2.54	3.33	2.67	2.49
CER X 2	–0.162	–0.00789	–0.823	–0.0284	–0.197	–0.0448
	[–1.59, 1.21]	[–0.0497, 0.0527]	[–8.21, 2.80]	[–0.321, 0.162]	[–1.32, 0.967]	[–1.18, 1.38]
	(0.794)	(0.955)	(0.335)	(0.519)	(0.762)	(0.878)
(bw)	6.82	6.99	5.09	6.67	5.34	4.97
Panel C. Local Randomization						
Diff. in means	1.12	0.0734	–2.16	–0.0593	–0.196	–0.00666
Ran. p-val	0.000800	(<0.0001)	0.0244	0.340	0.361	0.925
Asymp. p-val	0.222	0.0548	0.366	0.712	0.755	0.990

Notes: The Baseline (MSE-optimal) row reproduces estimates from the main specification. The removed fixed effects are survey year fixed effects. The controls added are age (in years), and indicators for race/ethnicity. The Quadratic row reports global quadratic estimates using the full sample. The MSETWO row in Panel B presents MSE-optimal estimates using different bandwidths (reported in (bw)) on either side of the cutoff. The CER-optimal row presents estimates using bandwidths that minimizes the asymptotic coverage error (CER) rate of the robust, bias-corrected confidence interval. Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. All regressions other than the Without Fixed Effects row include survey year fixed effects. Standard errors are clustered by survey year and month. Panel C reports difference-in-means test statistic with the randomization p-value from a fixed margins randomization based test of the Fisherian sharp null hypothesis and with the asymptotic p-value from a test of the null hypothesis that the ATE is zero. Outcomes are transformed using $p = 1$. The selected window is $[-2, 2]$, which is constant across outcomes, and the number of simulations is 5,000. When there is not enough variability in the data for an estimation, results are not presented. * p<.10 ** p<.05 *** p<.01.

Table A.7: Robustness checks of Table 3 (Mothers only)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Skipped med.	Took less med.	Delayed filling a prescription	Asked doctor for lower cost med.	Drugs from another country	Alternative therapies	Medication nonadherence index
Panel A. Specs							
Baseline	0.0989**	0.0916**	0.128*	0.191***	–0.00166	0.0784*	0.441***
	[0.0102, 0.234]	[0.0126, 0.208]	[–0.0101, 0.352]	[0.0685, 0.414]	[–0.0698, 0.0595]	[–0.000581, 0.210]	[0.153, 0.978]
	(0.0325)	(0.0269)	(0.0642)	(0.00620)	(0.876)	(0.0513)	(0.00727)
(bw)	2.98	3.47	2.57	2.83	4.27	2.87	2.70
W/o Fixed Effects	0.112**	0.103**	0.138*	0.216***	0.000572	0.0807**	0.492***
	[0.0244, 0.251]	[0.0278, 0.222]	[–0.00331, 0.377]	[0.0976, 0.450]	[–0.0670, 0.0636]	[0.00136, 0.214]	[0.207, 1.05]
	(0.0172)	(0.0117)	(0.0541)	(0.00232)	(0.958)	(0.0471)	(0.00349)
(bw)	3.00	3.42	2.47	2.83	4.45	2.91	2.71
Add Controls	0.100**	0.0847**	0.105**	0.173***	–0.000244	0.0890**	0.452***
	[0.0267, 0.212]	[0.00289, 0.199]	[0.0152, 0.246]	[0.0617, 0.377]	[–0.0782, 0.0663]	[0.0105, 0.221]	[0.159, 0.968]
	(0.0115)	(0.0436)	(0.0265)	(0.00639)	(0.872)	(0.0311)	(0.00637)
(bw)	3.64	3.61	3.59	3.09	3.57	2.96	2.89
Quadratic	0.0608***	0.0576**	0.0539***	0.114***	0.00715	0.0184	0.243***
	[0.0373, 0.203]	[0.0138, 0.183]	[0.0354, 0.209]	[0.0503, 0.285]	[–0.0725, 0.0555]	[–0.0363, 0.121]	[0.148, 0.684]
	(0.00448)	(0.0226)	(0.00580)	(0.00512)	(0.794)	(0.290)	(0.00231)
(bw)	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Panel B. Bandwidths							
MSE X 2	0.0645**	0.0417**	0.0715**	0.112***	0.00572	0.0189*	0.258***
	[0.0305, 0.226]	[0.00533, 0.179]	[0.0209, 0.311]	[0.0920, 0.366]	[–0.0542, 0.0550]	[–0.00172, 0.173]	[0.203, 0.882]
	(0.0101)	(0.0375)	(0.0249)	(0.00106)	(0.989)	(0.0547)	(0.00174)
(bw)	5.97	6.94	5.14	5.66	8.53	5.74	5.41
MSETWO	0.106**	0.0984**	0.135*	0.204***	–0.000524	0.0833**	0.476***
	[0.0213, 0.243]	[0.0203, 0.218]	[–0.00718, 0.396]	[0.0756, 0.464]	[–0.0681, 0.0598]	[0.00226, 0.218]	[0.186, 1.11]
	(0.0194)	(0.0182)	(0.0587)	(0.00644)	(0.898)	(0.0454)	(0.00597)
(bw)	–2.66/+4.94	–3.25/+4.89	–2.02/+4.84	–2.19/+3.81	–4.14/+5.25	–2.54/+4.67	–2.08/+4.34
CER-Optimal	0.0991**	0.117**	0.131*	0.191***	–0.00825	0.0759*	0.435***
	[0.0108, 0.234]	[0.0106, 0.248]	[–0.00877, 0.357]	[0.0697, 0.415]	[–0.0757, 0.0540]	[–0.00278, 0.208]	[0.146, 0.974]
	(0.0316)	(0.0327)	(0.0620)	(0.00595)	(0.743)	(0.0564)	(0.00800)
(bw)	2.37	2.76	2.05	2.25	3.40	2.28	2.15
CER X 2	0.0802**	0.0541**	0.102	0.143***	0.00449	0.0346*	0.337***
	[0.0274, 0.276]	[0.0104, 0.228]	[–0.0375, 0.394]	[0.0793, 0.447]	[–0.0676, 0.0599]	[–0.0163, 0.203]	[0.171, 1.06]
	(0.0168)	(0.0317)	(0.105)	(0.00503)	(0.906)	(0.0953)	(0.00667)
(bw)	4.75	5.52	4.09	4.51	6.79	4.57	4.30
Panel C. Local Ran.							
Diff. in means	0.111	0.132	0.135	0.218	–0.0217	0.0835	0.498
Ran. p-val	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	0.0976	(<0.0001)	(<0.0001)
Asymp. p-val	0.0284	0.0194	0.0375	0.00508	0.559	0.0845	0.00729

Notes: The Baseline (MSE-optimal) row reproduces estimates from the main specification. The removed fixed effects are survey year fixed effects. The controls added are age (in years), and indicators for race/ethnicity. The Quadratic row reports global quadratic estimates using the full sample. The MSETWO row in Panel B presents MSE-optimal estimates using different bandwidths(reported in (bw)) on either side of the cutoff. The CER-optimal row presents estimates using bandwidths that minimizes the asymptotic coverage error (CER) rate of the robust, bias-corrected confidence interval. Robust, bias-corrected 95% confidence intervals are reported in parentheses, and the corresponding p-values are reported in brackets. All regressions other than the Without Fixed Effects row include survey year fixed effects. Standard errors are clustered by survey year and month. Panel C reports difference-in-means test statistic with the randomization p-value from a fixed margins randomization based test of the Fisherian sharp null hypothesis and with the asymptotic p-value from a test of the null hypothesis that the ATE is zero. Outcomes are transformed using $p = 1$. The selected window is $[-2, 2]$, which is constant across outcomes, and the number of simulations is 5,000. When there is not enough variability in the data for an estimation, results are not presented. * p<.10 ** p<.05 *** p<.01.

Table A.8: Robustness checks of Table 3 (Fathers only)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Skipped med.	Took less med.	Delayed filling a prescription	Asked doctor for lower cost med.	Drugs from another country	Alternative therapies	Medication nonadherence index
Panel A. Specs							
Baseline	0.0167	0.0405	0.0532	0.0359	0.0467	0.0528	0.193
	[–0.121, 0.193]	[–0.113, 0.198]	[–0.0871, 0.236]	[–0.227, 0.229]	[–0.0128, 0.124]	[–0.0622, 0.180]	[–0.321, 0.769]
	(0.650)	(0.590)	(0.366)	(0.992)	(0.111)	(0.341)	(0.421)
(bw)	3.61	4.00	4.01	3.73	3.32	4.00	4.12
W/o Fixed Effects	0.0112	0.0464	0.0569	0.0504	0.0383	0.0468	0.190
	[–0.133, 0.188]	[–0.111, 0.205]	[–0.0871, 0.242]	[–0.203, 0.242]	[–0.0206, 0.111]	[–0.0679, 0.193]	[–0.343, 0.779]
	(0.736)	(0.562)	(0.356)	(0.866)	(0.178)	(0.346)	(0.446)
(bw)	3.61	4.06	4.17	3.81	3.35	3.58	4.09
Add Controls	0.00936	0.0262	0.0374	0.0250	0.0600*	0.0591	0.150
	[–0.126, 0.174]	[–0.124, 0.172]	[–0.115, 0.188]	[–0.231, 0.206]	[–0.00765, 0.146]	[–0.0543, 0.208]	[–0.352, 0.683]
	(0.751)	(0.753)	(0.636)	(0.910)	(0.0776)	(0.251)	(0.530)
(bw)	3.83	4.23	4.74	3.70	3.19	3.36	4.33
Quadratic	–0.00492	0.0497	0.0524	0.0762	0.0107	0.0347	0.174
	[–0.170, 0.109]	[–0.128, 0.163]	[–0.127, 0.190]	[–0.144, 0.262]	[–0.0172, 0.101]	[–0.0672, 0.166]	[–0.375, 0.689]
	(0.671)	(0.814)	(0.693)	(0.568)	(0.165)	(0.406)	(0.563)
(bw)	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Panel B. Bandwidths							
MSE X 2	–0.0112	0.0385	0.0373	0.0792	0.0174	0.0219	0.136
	[–0.143, 0.115]	[–0.121, 0.141]	[–0.119, 0.168]	[–0.152, 0.229]	[–0.0144, 0.0932]	[–0.0514, 0.152]	[–0.313, 0.621]
	(0.834)	(0.884)	(0.738)	(0.691)	(0.151)	(0.332)	(0.518)
(bw)	7.22	8.00	8.02	7.46	6.63	8.00	8.24
MSETWO	0.0190	0.0445	0.0527	0.0182	0.0295	0.0493	0.239
	[–0.122, 0.168]	[–0.108, 0.212]	[–0.105, 0.207]	[–0.240, 0.214]	[–0.0116, 0.0962]	[–0.0634, 0.184]	[–0.287, 0.736]
	(0.753)	(0.523)	(0.522)	(0.910)	(0.124)	(0.340)	(0.390)
(bw)	–4.16/+3.18	–3.66/+3.40	–4.44/+4.14	–3.27/+5.07	–4.22/+3.82	–3.57/+5.76	–4.67/+3.05
CER-Optimal	0.0346	0.0521	0.0694	0.00518	0.0935*	0.0693	0.260
	[–0.118, 0.210]	[–0.104, 0.209]	[–0.0657, 0.237]	[–0.273, 0.234]	[–0.00762, 0.206]	[–0.0515, 0.200]	[–0.259, 0.820]
	(0.583)	(0.511)	(0.267)	(0.881)	(0.0687)	(0.247)	(0.309)
(bw)	2.87	3.18	3.19	2.97	2.64	3.18	3.28
CER X 2	–0.0126	0.0306	0.0337	0.0681	0.0228	0.0301	0.144
	[–0.124, 0.185]	[–0.119, 0.168]	[–0.102, 0.205]	[–0.216, 0.235]	[–0.0168, 0.115]	[–0.0697, 0.160]	[–0.355, 0.673]
	(0.698)	(0.738)	(0.514)	(0.935)	(0.145)	(0.441)	(0.543)
(bw)	5.75	6.37	6.39	5.93	5.28	6.36	6.55
Panel C. Local Ran.							
Diff. in means	0.0163	0.0640	0.0956	0.0210	0.0805	0.0886	0.352
Ran. p-val	0.638	0.0400	0.00640	0.595	(<0.0001)	(<0.0001)	(<0.0001)
Asymp. p-val	0.850	0.475	0.303	0.856	0.0590	0.225	0.257

Notes: The Baseline (MSE-optimal) row reproduces estimates from the main specification. The removed fixed effects are survey year fixed effects. The controls added are age (in years), and indicators for race/ethnicity. The Quadratic row reports global quadratic estimates using the full sample. The MSETWO row in Panel B presents MSE-optimal estimates using different bandwidths(reported in (bw)) on either side of the cutoff. The CER-optimal row presents estimates using bandwidths that minimizes the asymptotic coverage error (CER) rate of the robust, bias-corrected confidence interval. Robust, bias-corrected 95% confidence intervals are reported in parentheses, and the corresponding p-values are reported in brackets. All regressions other than the Without Fixed Effects row include survey year fixed effects. Standard errors are clustered by survey year and month. Panel C reports difference-in-means test statistic with the randomization p-value from a fixed margins randomization based test of the Fisherian sharp null hypothesis and with the asymptotic p-value from a test of the null hypothesis that the ATE is zero. Outcomes are transformed using $p = 1$. The selected window is $[-2, 2]$, which is constant across outcomes, and the number of simulations is 5,000. When there is not enough variability in the data for an estimation, results are not presented. * p<.10 ** p<.05 *** p<.01.

Table A.9: Robustness checks of Table 4 (Mothers only)

	(1)	(2)	(3)	(4)	(5)
	Couldn't afford balanced meals	Cut size or skipped meals	Food security scale scores	Food insecure	Very low food security
Panel A. Specs					
Baseline(MSE-optimal)	0.292*** [0.152, 0.635] (0.00141)	–0.0289 [–0.397, 0.398] (0.997)	1.47*** [0.819, 3.25] (0.00104)	0.259*** [0.124, 0.581] (0.00254)	0.0737 [–0.0256, 0.218] (0.122)
(bw)	2.22	4.22	2.11	2.30	3.80
Without Fixed Effects	0.299*** [0.159, 0.646] (0.00118)	–0.0253 [–0.386, 0.400] (0.973)	1.50*** [0.882, 3.30] (0.000702)	0.267*** [0.134, 0.592] (0.00190)	0.0736 [–0.0249, 0.217] (0.119)
(bw)	2.20	4.18	2.12	2.29	3.93
Add Controls	0.301*** [0.165, 0.673] (0.00122)	–0.121 [–0.596, 0.316] (0.546)	1.43*** [0.779, 3.18] (0.00124)	0.262*** [0.124, 0.583] (0.00255)	0.0638 [–0.0404, 0.208] (0.186)
(bw)	2.07	3.20	2.11	2.33	3.78
Quadratic	0.155*** [0.151, 0.462] (0.000111)	–0.127 [–0.411, 0.363] (0.903)	0.706*** [0.604, 2.39] (0.00102)	0.143*** [0.113, 0.448] (0.00101)	0.0181 [–0.0602, 0.199] (0.295)
(bw)	12.0	12.0	12.0	12.0	12.0
Panel B. Bandwidths					
MSE X 2	0.244*** [0.220, 0.705] (0.000189)	–0.0878 [–0.364, 0.281] (0.800)	1.36*** [0.935, 3.28] (0.000424)	0.216*** [0.217, 0.631] (<0.0001)	0.0204 [–0.0421, 0.179] (0.225)
(bw)	4.43	8.44	4.21	4.60	7.61
MSETWO	0.289*** [0.150, 0.600] (0.00110)	–0.121 [–0.689, 0.490] (0.740)		0.254*** [0.116, 0.561] (0.00284)	0.0560 [–0.0592, 0.219] (0.260)
(bw)	–2.21/+4.09	–2.84/+4.25		–2.18/+4.10	–3.07/+3.54
CER-Optimal		–0.0329 [–0.433, 0.414] (0.966)			0.0606 [–0.0494, 0.206] (0.229)
(bw)		3.47			3.13
CER X 2	0.303 [–0.115, 0.667] (0.167)	–0.0803 [–0.386, 0.405] (0.963)	1.52 [–0.571, 2.96] (0.185)	0.276 [–0.168, 0.623] (0.260)	0.0301 [–0.0277, 0.216] (0.130)
(bw)	3.65	6.94	3.46	3.78	6.26
Panel C. Local Ran.					
Diff. in means	0.282	–0.131	1.30	0.241	0.0352
Ran. p-val	(<0.0001)	0.0872	(<0.0001)	(<0.0001)	0.252
Asymp. p-val	0.00249	0.560	0.0157	0.0134	0.640

Notes: The Baseline (MSE-optimal) row reproduces estimates from the main specification. The removed fixed effects are survey year fixed effects. The controls added are age (in years), and indicators for race/ethnicity. The Quadratic row reports global quadratic estimates using the full sample. The MSETWO row in Panel B presents MSE-optimal estimates using different bandwidths (reported in (bw)) on either side of the cutoff. The CER-optimal row presents estimates using bandwidths that minimizes the asymptotic coverage error (CER) rate of the robust, bias-corrected confidence interval. Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. All regressions other than the Without Fixed Effects row include survey year fixed effects. Standard errors are clustered by survey year and month. Panel C reports difference-in-means test statistic with the randomization p-value from a fixed margins randomization based test of the Fisherian sharp null hypothesis and with the asymptotic p-value from a test of the null hypothesis that the ATE is zero. Outcomes are transformed using $p = 1$. The selected window is $[-2, 2]$, which is constant across outcomes, and the number of simulations is 5,000. When there is not enough variability in the data for an estimation, results are not presented. * p<.10 ** p<.05 *** p<.01.

Table A.10: Robustness checks of Table 4 (Fathers only)

	(1)	(2)	(3)	(4)	(5)
	Couldn't afford balanced meals	Cut size or skipped meals	Food security scale scores	Food insecure	Very low food security
Panel A. Specs					
Baseline(MSE-optimal)	0.474***	0.179	2.07***	0.424***	0.129**
	[0.356, 0.874]	[–0.405, 0.837]	[1.56, 4.00]	[0.331, 0.836]	[0.0156, 0.280]
	(<0.0001)	(0.495)	(<0.0001)	(<0.0001)	(0.0285)
(bw)	2.08	2.85	2.11	2.16	2.99
Without Fixed Effects	0.478***	0.126	2.09***	0.430***	0.129**
	[0.366, 0.875]	[–0.449, 0.750]	[1.59, 4.03]	[0.344, 0.842]	[0.0118, 0.284]
	(<0.0001)	(0.623)	(<0.0001)	(<0.0001)	(0.0331)
(bw)	2.07	2.92	2.10	2.15	3.00
Add Controls	0.475***	0.0221	2.08***	0.425***	0.0922**
	[0.357, 0.811]	[–0.514, 0.578]	[1.63, 4.06]	[0.350, 0.828]	[0.0110, 0.221]
	(<0.0001)	(0.909)	(<0.0001)	(<0.0001)	(0.0303)
(bw)	2.35	3.10	2.07	2.14	3.35
Quadratic	0.196***	–0.0959	0.799***	0.157***	0.0466**
	[0.211, 0.593]	[–0.343, 0.412]	[0.636, 2.79]	[0.137, 0.535]	[0.000917, 0.207]
	(<0.0001)	(0.857)	(0.00183)	(0.000944)	(0.0480)
(bw)	12.0	12.0	12.0	12.0	12.0
Panel B. Bandwidths					
MSE X 2	0.343***	–0.00106	1.52***	0.271***	0.0689**
	[0.348, 0.868]	[–0.423, 0.554]	[1.57, 3.96]	[0.342, 0.813]	[0.0135, 0.235]
	(<0.0001)	(0.792)	(<0.0001)	(<0.0001)	(0.0279)
(bw)	4.16	5.69	4.21	4.32	5.99
MSETWO	0.457***	0.158		0.413***	0.129**
	[0.348, 0.829]	[–0.425, 0.831]		[0.332, 0.831]	[0.00186, 0.312]
	(<0.0001)	(0.526)		(<0.0001)	(0.0473)
(bw)	–2.02/+3.82	–2.60/+4.52		–2.03/+4.12	–2.09/+3.83
CER-Optimal	0.329***	0.185			0.131**
	[0.0813, 0.328]	[–0.400, 0.845]			[0.0167, 0.284]
	(0.00114)	(0.484)			(0.0274)
(bw)	1.71	2.34			2.46
CER X 2	0.390***	0.0149	1.75***	0.333***	0.0854*
	[0.189, 1.07]	[–0.458, 0.809]	[1.05, 4.32]	[0.186, 1.02]	[–0.00128, 0.279]
	(0.00504)	(0.587)	(0.00132)	(0.00457)	(0.0521)
(bw)	3.42	4.69	3.46	3.55	4.92
Panel C. Local Ran.					
Diff. in means	0.446	0.121	1.97	0.407	0.122
Ran. p-val	(<0.0001)	0.155	(<0.0001)	(<0.0001)	(<0.0001)
Asymp. p-val	(<0.0001)	0.639	0.000306	0.000138	0.0465

Notes: The Baseline (MSE-optimal) row reproduces estimates from the main specification. The removed fixed effects are survey year fixed effects. The controls added are age (in years), and indicators for race/ethnicity. The Quadratic row reports global quadratic estimates using the full sample. The MSETWO row in Panel B presents MSE-optimal estimates using different bandwidths (reported in (bw)) on either side of the cutoff. The CER-optimal row presents estimates using bandwidths that minimizes the asymptotic coverage error (CER) rate of the robust, bias-corrected confidence interval. Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. All regressions other than the Without Fixed Effects row include survey year fixed effects. Standard errors are clustered by survey year and month. Panel C reports difference-in-means test statistic with the randomization p-value from a fixed margins randomization based test of the Fisherian sharp null hypothesis and with the asymptotic p-value from a test of the null hypothesis that the ATE is zero. Outcomes are transformed using $p = 1$. The selected window is $[-2, 2]$, which is constant across outcomes, and the number of simulations is 5,000. When there is not enough variability in the data for an estimation, results are not presented. * $p<.10$ ** $p<.05$ *** $p<.01$.

Table A.11: Asymptotic MSE calculation based on Pei et al. (2022)

	(1)	(2)	(3)
	Local Linear	Local Quadratic	Local Cubic
K6 Scale	0.382	1.92	
Severe mental illness (K6 ≥ 13)	0.000834	0.00338	0.00951
PHQ-8	0.884	3.07	19.4
Major depression (PHQ-8 ≥ 10)	0.00393	0.0138	0.0439
WG-ANX	0.0286	0.119	0.330
WG-DEP	0.0529	0.210	0.887
Anxiety disorder	0.0128	0.0454	0.119
Depressive disorder	0.00560	0.0151	0.0695
Mortality in 5 years	6.35e-09		
Skipped med.	0.00135	0.00783	0.0302
Took less med.	0.00137	0.00977	0.0344
Delayed filling a prescription	0.00360	0.0128	0.0459
Asked doctor for lower cost med.	0.00409	0.0172	0.0326
Drugs from another country	0.000383	0.00161	0.00566
Alternative theraphies	0.00224	0.00871	0.0337
Medication nonadherence index	0.0346	0.112	0.412
Couldn't afford balanced meals	0.00445	0.0232	0.0712
Cut size or skipped meals	0.0142	0.0431	0.264
Food security scale scores	0.453	0.627	2.44
Food insecure	0.00465	0.0267	0.0725
Very low food security	0.00206	0.00430	0.0118

Notes: Asymptotic MSE of the MSE-optimal RD estimator is calculated for the main outcome variables following Pei et al. (2022). Bias is estimated using local polynomial of order $p + 1$ (e.g., for local linear, order 2). Mass points adjusted MSE-optimal bandwidth is employed. Triangular kernel is used for the bandwidth selection. When there is not enough variability for the calculation, results are not presented.

Table A.12: Effect of a child aging out of WIC by tertiles of LASSO-predicted susceptibility of SMI

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Parents		Mothers		Fathers		Single Mothers	
Outcome variable	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate
K6 index (1st tertile)	–0.189	0.202* [–0.0211, 0.540] (0.0700)	–0.0332	–0.0146 [–0.499, 0.510] (0.983)	–0.304	0.795*** [0.356, 1.68] (0.00258)	0.139	0.229 [–0.485, 1.14] (0.428)
(obs)		3,046		2,151		913		1,087
K6 ≥ 13 (1st tertile)	0.0273	0.0740*** [0.0298, 0.151] (0.00345)	0.0398	0.00538 [–0.0884, 0.113] (0.810)	0.0161	0.0890*** [0.0291, 0.202] (0.00876)	0.0681	0.0483 [–0.114, 0.245] (0.475)
(obs)		3,046		2,151		913		1,087
K6 index (2nd tertile)	0.0267	–0.0132 [–0.490, 0.497] (0.990)	0.0698	0.548** [0.0493, 1.29] (0.0343)	–0.162	0.352* [–0.0467, 1.00] (0.0743)	0.173	0.976*** [0.374, 2.08] (0.00482)
(obs)		3,075		2,134		916		1,074
K6 ≥ 13 (2nd tertile)	0.0447	0.0114 [–0.0874, 0.102] (0.878)	0.0467	0.0748** [0.00386, 0.179] (0.0407)	0.0302	0.108** [0.00294, 0.274] (0.0452)	0.0639	0.185*** [0.0722, 0.378] (0.00392)
(obs)		3,075		2,134		916		1,074
K6 index (3rd tertile)	0.104	0.445** [0.00548, 1.14] (0.0478)	0.124	0.491* [–0.00368, 1.26] (0.0513)	–0.114	–0.360 [–1.42, 0.378] (0.255)	0.227	0.531* [–0.0385, 1.54] (0.0623)
(obs)		2,992		2,140		859		1,049
K6 ≥ 13 (3rd tertile)	0.0577	0.0822** [0.00165, 0.221] (0.0467)	0.0628	0.0872* [–0.0136, 0.257] (0.0780)	0.0376	–0.0256 [–0.179, 0.111] (0.648)	0.0764	0.0683 [–0.0696, 0.280] (0.238)
(obs)		2,992		2,140		859		1,049

Notes: MSE-optimal estimates of β_1 from equation (1) are reported in columns (2), (4), (6), and (8). Means of outcome variable before a child becomes ineligible for WIC are reported in columns (1), (3), (5), and (7). Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. The tertiles are defined as the tertiles of predicted susceptibility to SMI, as determined within their respective subgroups. For the prediction, LASSO is implemented following the method outlined by Braghieri et al. (2022), including immutable individual characteristics as the predictors. See Section 7.2 for the exact procedure. The training set consists of all sample adults with complete data for the predictors from the NHIS 2002–2014 data (a total of 362,159 observations). All analysis samples, however, are restricted to parents who have a child between the ages of 49 months and 73 months, and whose annual family income is less than 200% of the federal poverty guidelines. The K6 index is constructed following the method delineated in Section 4.3. All estimates are from local linear regressions with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. All regressions include survey year fixed effects. Standard errors are clustered by survey year and month. * $p<.10$ ** $p<.05$ *** $p<.01$.

Table A.13: RD estimates for each K6 component and family-wise p-values

	(1)	(2)	(3)	(4)
Outcome variable	Parents	Mothers	Fathers	Single Mothers
How often felt sad	0.167	0.199	–0.0518	0.403
	{0.305}	{0.250}	{1.00}	{0.102}
How often felt nervous	0.321*	0.334	0.0193	0.572**
	{0.0550}	{0.121}	{1.00}	{0.0340}
How often restless	0.191	0.198	–0.00330	0.612**
	{0.305}	{0.485}	{1.00}	{0.0475}
How often felt hopeless	0.0181	0.0448	–0.0521	0.243
	{0.739}	{0.665}	{1.00}	{0.296}
How often felt everything was an effort	0.203	0.248	–0.00910	0.847***
	{0.305}	{0.281}	{1.00}	{0.00640}
How often felt worthless	0.135	0.112	–0.0180	0.159
	{0.305}	{0.485}	{1.00}	{0.296}

Notes: MSE-optimal estimates of β_1 from equation (1) are reported with family-wise p-values under the Holm-Sidak step-down corrections in the curly braces. Six components comprising K6 are grouped as one family, and the p-values are adjusted within each subgroup. The estimates in the table are based on the 2002–2014 NHIS data. All analysis samples are restricted to parents who have a child between the ages of 49 months and 73 months, and whose annual family income is less than 200% of the federal poverty guidelines. All estimates are from local linear regressions with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. All regressions include survey year fixed effects. Standard errors are clustered by survey year and month. * family-wise $p<.10$ ** family-wise $p<.05$ *** family-wise $p<.01$.

Table A.14: RD estimates for each component of nonadherence index and family-wise p-values

	(1)	(2)	(3)	(4)
Outcome variable	Parents	Mothers	Fathers	Single Mothers
Skipped medication	0.0753	0.0989	0.0167	0.0791
	{0.125}	{0.152}	{0.931}	{0.812}
Took less medicine	0.0755	0.0916	0.0405	0.0768
	{0.125}	{0.151}	{0.931}	{0.812}
Delayed filling a prescription	0.118	0.128	0.0532	0.0812
	{0.125}	{0.190}	{0.918}	{0.812}
Asked your doctor for a lower cost medication	0.133*	0.191**	0.0359	0.140
	{0.0874}	{0.0485}	{0.992}	{0.707}
Bought prescription drugs from another country	0.00608	–0.00166	0.0467	–0.0223
	{0.739}	{0.876}	{0.562}	{0.812}
Used alternative therapies	0.0833*	0.0784	0.0528	0.0301
	{0.0874}	{0.190}	{0.918}	{0.812}

Notes: MSE-optimal estimates of β_1 from equation (1) are reported with family-wise p-values under the Holm-Sidak step-down corrections in the curly braces. Six components comprising the medication nonadherence index are grouped as one family, and the p-values are adjusted within each subgroup. The estimates in the table are based on the 2011–2014 NHIS data. All analysis samples are restricted to parents who have a child between the ages of 49 months and 73 months, and whose annual family income is less than 200% of the federal poverty guidelines. All estimates are from local linear regressions with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. All regressions include survey year fixed effects. Standard errors are clustered by survey year and month. * family-wise $p<.10$ ** family-wise $p<.05$ *** family-wise $p<.01$.

Table A.15: Robustness check with the alternative index construction (Anderson, 2008)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Parents		Mothers		Fathers		Single Mothers	
Outcome variable	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate
Panel A. K6 index								
Raw K6 scores	2.96	1.22**	3.27	1.21**	2.20	–0.183	3.85	2.84***
		[0.268, 2.79]		[0.00360, 3.12]		[–1.59, 1.14]		[1.64, 6.55]
		(0.0175)		(0.0495)		(0.752)		(0.00106)
(obs)		9,144		6,439		2,705		3,215
K6 index	–0.0220	0.272**	0.0487	0.263*	–0.194	–0.0460	0.175	0.614***
		[0.0518, 0.635]		[–0.0171, 0.704]		[–0.364, 0.258]		[0.318, 1.46]
		(0.0210)		(0.0619)		(0.739)		(0.00227)
(obs)		9,144		6,439		2,705		3,215
Anderson, 2008	–0.00198	0.303**	0.0715	0.305**	–0.181	–0.0404	0.206	0.668***
		[0.0817, 0.683]		[0.0316, 0.770]		[–0.382, 0.271]		[0.389, 1.56]
		(0.0127)		(0.0334)		(0.740)		(0.00110)
(obs)		9,144		6,439		2,705		3,215
Panel B. Med. nonadherence index								
Med. nonadherence index	–0.00600	0.429***	0.0498	0.441***	–0.137	0.193	0.0725	0.322
		[0.195, 0.841]		[0.153, 0.978]		[–0.321, 0.769]		[–0.233, 1.22]
		(0.00167)		(0.00727)		(0.421)		(0.183)
(obs)		3,480		2,437		1,043		1,220
Anderson, 2008	0.000275	0.388***	0.0544	0.334**	–0.127	0.268	0.0549	0.249
		[0.171, 0.760]		[0.0622, 0.802]		[–0.185, 0.793]		[–0.244, 1.02]
		(0.00197)		(0.0221)		(0.224)		(0.230)
(obs)		3,480		2,437		1,043		1,220

Notes: MSE-optimal estimates of β_1 from equation (1) are reported in columns (2), (4), (6), and (8). Means of outcome variable before a child becomes ineligible for WIC are reported in columns (1), (3), (5), and (7). The outcome variables in Panel A are: (First row) the raw K6 scores; (Second row) the K6 index constructed following the method delineated in Section 4.3; (Third row) the inverse-covariance weighted index, employing parents whose focal child is younger than 61 months old as the reference group (Anderson, 2008). The outcome variables in Panel B are defined as in Panel A. Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. The sample is restricted to parents who have a single child between the ages of 49 months and 73 months, and whose annual family income is less than 200% of the federal poverty guidelines. All estimates are from local linear regressions with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. All regressions include survey year fixed effects. Standard errors are clustered by survey year and month. * p<.10 ** p<.05 *** p<.01.

Table A.16: Effect of a child aging out of WIC on parental psychological distress (August interviews dropped)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Parents		Mothers		Fathers		Single Mothers	
Outcome variable	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate
Panel A. Mental health measures								
K6 scale	2.96	1.33** [0.360, 2.91] (0.0120)	3.29	1.27* [–0.00333, 3.23] (0.0505)	2.17	0.560 [–0.714, 2.17] (0.322)	3.87	2.70*** [1.40, 6.21] (0.00194)
(obs)		8,279		5,806		2,473		2,900
Severe mental illness (K6 ≥ 13)	0.0429	0.0604** [0.0128, 0.142] (0.0188)	0.0501	0.0485 [–0.0142, 0.145] (0.108)	0.0257	0.0166 [–0.0210, 0.0655] (0.313)	0.0700	0.105** [0.0240, 0.258] (0.0181)
(obs)		8,279		5,806		2,473		2,900
PHQ-8	4.93	–0.0984 [–2.50, 2.19] (0.899)	5.32	0.308 [–1.97, 2.38] (0.853)	3.91	–1.89 [–8.95, 3.58] (0.401)	5.66	2.75 [–1.93, 7.43] (0.250)
(obs)		1,951		1,409		542		607
Major depression (PHQ-8 ≥ 10)	0.173	0.0221 [–0.121, 0.183] (0.693)	0.189	0.0594 [–0.114, 0.283] (0.404)	0.130	–0.0763 [–0.338, 0.143] (0.429)	0.218	0.197 [–0.0879, 0.582] (0.148)
(obs)		1,951		1,409		542		607
WG-ANX	1.46	0.235 [–0.143, 0.724] (0.188)	1.48	0.356 [–0.146, 1.01] (0.144)	1.42	–0.163 [–1.30, 1.09] (0.864)	1.50	0.206 [–0.535, 1.19] (0.457)
(obs)		985		680		305		334
WG-DEP	1.27	0.141 [–0.259, 0.790] (0.322)	1.28	0.175 [–0.472, 1.01] (0.475)	1.24	0.0589 [–0.835, 1.11] (0.782)	1.32	0.0972 [–0.601, 0.875] (0.716)
(obs)		986		679		307		334
Panel B. Magnitude of effects								
Anxiety disorder	0.168	0.199** [0.0345, 0.485] (0.0238)	0.188	0.196* [–0.0120, 0.519] (0.0613)	0.116	0.0889 [–0.177, 0.464] (0.380)	0.186	0.127 [–0.110, 0.507] (0.207)
(obs)		2,037		1,462		575		635
Depressive disorder	0.227	–0.0102 [–0.248, 0.177] (0.743)	0.270	–0.0436 [–0.368, 0.194] (0.545)	0.119	–0.00237 [–0.278, 0.272] (0.982)	0.291	0.000461 [–0.356, 0.310] (0.894)
(obs)		2,037		1,462		575		633
Mortality in 5 years	73.7	31.3*** [15.1, 68.5] (0.00218)	42.9	5.71 [–6.00, 22.7] (0.254)	148	68.3** [19.0, 144] (0.0106)	45.9	7.68 [–12.2, 34.2] (0.352)
(obs)		8,279		5,806		2,473		2,900

Notes: All interviews conducted in August are dropped. MSE-optimal estimates of β_1 from equation (1) are reported in columns (2), (4), (6), and (8). Means of outcome variable before a child becomes ineligible for WIC are reported in columns (1), (3), (5), and (7). Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. The estimates in the table are based on NHIS, BRFSS, and IPUMS NHIS. All analysis samples are restricted to parents who have a single child between the ages of 49 months and 73 months, and whose annual family income is less than 200% of the federal poverty guidelines. Refer to Section 3 for a detailed description of how the sample for each outcome is constructed. All estimates are from local linear regressions with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. All regressions include survey year fixed effects. Standard errors are clustered by survey year and month. * p<.10 ** p<.05 *** p<.01.

Table A.17: Effect of a child aging out of WIC on parents' medication nonadherence behavior (August interviews dropped)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Parents		Mothers		Fathers		Single Mothers	
Outcome variable	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate
Skipped med.	0.0817	0.0815** [0.0178, 0.174] (0.0160)	0.0930	0.122*** [0.0383, 0.261] (0.00841)	0.0557	0.0210 [–0.133, 0.201] (0.693)	0.106	0.131* [–0.00546, 0.354] (0.0574)
(obs)		3,165		2,202		963		1,113
Took less med.	0.0870	0.0810** [0.00933, 0.169] (0.0286)	0.101	0.0986** [0.0205, 0.209] (0.0170)	0.0535	0.0420 [–0.125, 0.193] (0.674)	0.115	0.117 [–0.0718, 0.395] (0.175)
(obs)		3,164		2,201		963		1,113
Delayed prescription	0.112	0.128** [0.0228, 0.290] (0.0218)	0.128	0.149** [0.0127, 0.372] (0.0358)	0.0749	0.0532 [–0.0993, 0.239] (0.419)	0.146	0.123 [–0.0898, 0.434] (0.198)
(obs)		3,164		2,201		963		1,113
Lower cost med.	0.167	0.144** [0.0370, 0.323] (0.0136)	0.193	0.207*** [0.0796, 0.457] (0.00532)	0.107	0.0331 [–0.239, 0.237] (0.992)	0.208	0.143 [–0.0848, 0.517] (0.159)
(obs)		3,164		2,201		963		1,113
Med. purchased abroad	0.0311	0.0108 [–0.0317, 0.0630] (0.516)	0.0363	0.0133 [–0.0515, 0.0789] (0.681)	0.0193	0.0180 [–0.0241, 0.0725] (0.326)	0.0302	0.0112 [–0.0229, 0.0597] (0.382)
(obs)		3,164		2,201		963		1,113
Alternative theraphies	0.0694	0.0825** [0.0151, 0.198] (0.0224)	0.0745	0.0725* [–0.0174, 0.213] (0.0961)	0.0578	0.0799 [–0.0472, 0.254] (0.178)	0.0681	0.0103 [–0.111, 0.142] (0.809)
(obs)		3,164		2,201		963		1,113
Med. nonadherence index	–0.00480	0.460*** [0.233, 0.871] (0.000706)	0.0583	0.515*** [0.239, 1.06] (0.00199)	–0.150	0.186 [–0.384, 0.807] (0.487)	0.0890	0.485* [–0.0441, 1.37] (0.0662)
(obs)		3,164		2,201		963		1,113

Notes: The estimates are based on pooled 2011–2014 NHIS data. All interviews conducted in August are dropped. MSE-optimal estimates of β_1 from equation (1) are reported in columns (2), (4), (6), and (8). Means of outcome variable before a child becomes ineligible for WIC are reported in columns (1), (3), (5), and (7). Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. The sample is restricted to parents who have a single child between the ages of 49 months and 73 months, and whose annual family income is less than 200% of the federal poverty guidelines. The medication nonadherence index, which is standardized to have mean zero and SD one, is the equally weighted average of all six components' z-scores. Refer to Section 4.3 for a detailed description of how the index is constructed. All estimates are from local linear regressions with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. All regressions include survey year fixed effects. Standard errors are clustered by survey year and month. * p<.10 ** p<.05 *** p<.01.

Table A.18: Effect of a child aging out of WIC on parents' food insecurity (August interviews dropped)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Parents		Mothers		Fathers		Single Mothers	
Outcome variable	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate	Mean	RD Estimate
Couldn't afford balanced meals	0.237	0.362***	0.245	0.281***	0.225	0.484***	0.264	0.120
		[0.221, 0.747]		[0.113, 0.622]		[0.343, 0.901]		[–0.183, 0.457]
		(0.000307)		(0.00469)		(<0.0001)		(0.402)
(obs)		3,527		2,193		1,334		803
Cut size or skipped meals	0.303	–0.0640	0.330	–0.0860	0.257	–0.00339	0.440	–0.132
		[–0.396, 0.321]		[–0.641, 0.450]		[–0.430, 0.502]		[–0.696, 0.321]
		(0.838)		(0.732)		(0.880)		(0.470)
(obs)		1,590		994		596		379
Food security scale scores	1.49	1.65***	1.57	1.39***	1.36	2.00***	1.88	0.929
		[1.12, 3.36]		[0.659, 3.26]		[1.35, 3.95]		[–1.09, 3.72]
		(<0.0001)		(0.00312)		(<0.0001)		(0.284)
(obs)		3,528		2,194		1,334		804
Food insecure	0.254	0.318***	0.266	0.251***	0.232	0.418***	0.318	0.150
		[0.212, 0.676]		[0.0923, 0.572]		[0.298, 0.816]		[–0.211, 0.599]
		(0.000175)		(0.00665)		(<0.0001)		(0.348)
(obs)		3,528		2,194		1,334		804
Very low food security	0.0825	0.0644	0.0942	0.0510	0.0628	0.0802*	0.143	–0.0230
		[–0.0222, 0.185]		[–0.0620, 0.204]		[–0.00502, 0.195]		[–0.320, 0.283]
		(0.124)		(0.296)		(0.0627)		(0.903)
(obs)		3,528		2,194		1,334		804

Notes: The estimates are based on pooled 2011–2012 NHIS data. All interviews conducted in August are dropped. MSE-optimal estimates of β_1 from equation (1) are reported in columns (2), (4), (6) , and (8). Means of outcome variable before a child becomes ineligible for WIC are reported in columns (1), (3), (5), and (7). Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. The sample is restricted to parents who have a single child between the ages of 49 months and 73 months, and whose annual family income is less than 200% of the federal poverty guidelines. All estimates are from local linear regressions with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. All regressions include survey year fixed effects. Standard errors are clustered by survey year and month. * $p<.10$ ** $p<.05$ *** $p<.01$.

Table A.19: Effect of a child aging out of WIC on single mothers' outcomes

	(1)	(2)	(3)	(4)	(5)
Outcome variable	K6 scale	K6 ≥ 13	PHQ-8	PHQ-8 ≥ 10	WG-ANX
	2.84*** [1.64, 6.55] (0.00106)	0.114*** [0.0410, 0.265] (0.00740)	3.60* [–0.696, 8.04] (0.0995)	0.247* [–0.0436, 0.606] (0.0898)	0.350 [–0.290, 1.29] (0.215)
(obs)	3,215	3,215	664	664	372
Mean	3.85	0.0688	5.69	0.221	1.46
	(6) WG-DEP	(7) Anxiety disorder	(8) Depressive disorder	(9) Mortality in 5 years	(10) Lower cost med.
	0.154 [–0.453, 0.848] (0.551)	0.165 [–0.0657, 0.471] (0.139)	–0.0117 [–0.379, 0.294] (0.803)	7.76 [–10.4, 33.7] (0.301)	0.140 [–0.0709, 0.494] (0.142)
(obs)	373	696	692	3,215	1,220
Mean	1.29	0.197	0.291	45.8	0.201
	(11) Nonadherence index (Medicaid)	(12) Nonadherence index (w/o Medicaid)	(13) Couldn't afford balanced meals	(14) Food security scale scores	(15) Food insecure
	0.505 [–0.400, 1.80] (0.212)	0.276 [–0.355, 1.31] (0.260)	0.137 [–0.142, 0.461] (0.300)	1.05 [–0.883, 3.88] (0.218)	0.169 [–0.166, 0.604] (0.265)
(obs)	546	672	878	879	879
Mean	–0.128	0.249	0.259	1.88	0.313

Notes: Refer to the previous tables and the main text to see how the samples are constructed. MSE-optimal estimates of β_1 from equation (1) are reported. Robust, bias-corrected 95% confidence intervals are reported in brackets, and the corresponding p-values are reported in parentheses. Means of outcome variable before a child becomes ineligible for WIC are reported in the Mean row. The sample is restricted to single mothers who have a single child between the ages of 49 months and 73 months, and whose annual family income is less than 200% of the federal poverty guidelines. All estimates are from local linear regressions with a triangular kernel. Mass points adjusted MSE-optimal bandwidth is employed and it is allowed to vary across outcomes but is fixed on either side of the cutoff. All regressions include survey year fixed effects. Standard errors are clustered by survey year and month. * $p<.10$ ** $p<.05$ *** $p<.01$.

Table A.20: Heterogeneous effects of WIC ineligibility across races

	(1)	(2)	(3)	(4)	(5)	(6)
	non-Hispanic white		non-Hispanic black		Hispanic	
	Mean	Diff. in means	Mean	Diff. in means	Mean	Diff. in means
K6 scale	3.39	1.49 (0.000) {0.136}	3.27	1.88 (0.000) {0.113}	2.56	0.175 (0.578) {0.833}
(obs)		3,028		1,703		3,868
PHQ-8	5.05	0.333 (0.626) {0.852}	5.23	–0.419 (0.733) {0.899}	4.58	3.52 (0.00480) {0.245}
(obs)		1,196		307		400
WG-ANX	1.68	–0.170 (0.389) {0.722}	1.35	1.31 (0.000) {0.0580}	1.30	–0.0844 (0.583) {0.827}
(obs)		373		180		439
WG-DEP	1.42	0.280 (0.126) {0.505}	1.21	1.08 (0.000) {0.133}	1.17	–0.213 (0.109) {0.613}
(obs)		372		180		442
Med. nonadherence index	0.114	0.383 (0.00400) {0.293}	–0.0489	0.806 (0.000) {0.0358}	–0.0526	0.352 (0.000400) {0.111}
(obs)		1,165		608		1,458
Food security scale scores	1.50	2.71 (0.000) {2.67e-07}	1.82	2.43 (0.000400) {0.159}	1.49	0.826 (0.000) {0.177}
(obs)		1,274		517		1,819

Notes: Due to the limited sample size of certain outcome variables, I take the local randomization approach, which enables finite-sample exact inferences, to estimate the effects of WIC ineligibility for each racial subgroup. Difference-in-means estimates are reported in columns (2), (4), and (6). The randomization p-values from a fixed margins randomization based test of the Fisherian sharp null hypothesis are reported in parentheses, and the asymptotic p-values from a test of the null hypothesis that the ATE is zero are reported in curly braces. Outcomes are transformed using $p = 1$. The selected window is $[-2, 2]$, which is constant across outcomes, and the number of simulations is 5,000. Means of outcome variable before a child becomes ineligible for WIC are reported in columns (1), (3), and (5). The estimates in the table are based on the 2002–2014 NHIS data. All of the three subsamples are restricted to parents who have a child between the ages of 49 months and 73 months, and whose annual family income is less than 200% of the federal poverty guidelines.

B Additional Description on Data and Outcome Variables

K6 Scale. In the NHIS, a sample adult (aged 18 or older) is randomly chosen from each participating household to complete the K6 questionnaire. The precise phrasing of K6 questions can be found in Appendix Section C.

While WIC's income eligibility is based on the FPL issued by the Department of Health and Human Services and not the U.S. Census Bureau's poverty thresholds, the family income-to-poverty ratio data in the NHIS references the previous year's thresholds, which are approximately equal to the current FPL (Office of the Assistance Secretary for Planning and Evaluation, 2023). This matches how we construct the BRFSS sample. In addition, adopting a 200% income threshold instead of 185% accounts for measurement error in income and adjunctive income eligibility. In 2020, 2.9% of children participating in WIC came from families with income above 185% FPL (Kline et al., 2020).

PHQ-8. The PHQ-8 questionnaire was introduced and asked to respondents in the years 2006, 2008, and 2010, prior to a major revision in its data collection protocols in 2011.

The BRFSS does not provide data on the family income-to-FPL ratio. Instead, respondents were asked to report their total annual household income within the eight possible categories. To address this, the ratio of annual family income to FPL for each sample parent is computed based on the midpoint income of the reported category. Hest (2019) shows that using the midpoint household income of the reported category in BRFSS as a proxy for a respondent's actual family income is relatively accurate compared to other methods, especially when matching the actual income distribution of our target group, the lower-income populations.

WG-ANX and WG-DEP. The NHIS began administering the WG-ES questions in 2010. However, the universe of the survey questions expanded in 2012, and the questions are posed to a randomly selected subset of sample adults. To ensure comparability across years, data prior to 2012 has been excluded from the analysis.

To further validate the measures, closely following Zablotsky et al. (2022), I reference the 2019 NHIS data, which records WG-ANX, WG-DEP, the seven-item Generalized Anxiety Disorder scale (GAD–7), and PHQ-8 scores for each sample adult. Both GAD-7 and PHQ-8 segment individuals into four categories based on scores: None/Minimal (0-4), Mild (5-9), Moderate (10-14), and Severe (15 or greater). A correlation of 0.663 is observed between the GAD-7 and WG-ANX categorizations, while a correlation of 0.669 is observed between the PHQ-8 and WG-

DEP categorizations. These strong correlations attest to the validity of WG-ANX and WG-DEP.

Medication Consumption Behavior. Among six questions about medication nonadherence behaviors, for questions (i) to (iv), the universe was slightly modified in 2013 from all sample adults to sample adults who confirmed being prescribed medication by a healthcare professional in the past 12 months. If respondents reported not having been prescribed medication by a health professional, their responses to questions (i) through (iv) were assumed to reflect non-affirmative answers. Such an assumption will have a minimal impact, as questions (i) through (iv) are inherently conditional on having been prescribed medication.

Food Insecurity. The questions were posed to all persons in each household. Given the modifications in NHIS's food security questions and the unavailability of food scale scores data from 2013, we exclude the 2013 and 2014 data for consistency.

Other Program Participation. To address the ambiguity in the timing of program exits and entrances, I determine a child's age at both the beginning (January) and end (December) of the referenced year, and use these ages as alternative running variables. If we observe a pronounced drop in affirmative responses among children who were 61 months old in the previous January, this drop can be attributed to exits occurring precisely at the age cutoff. Similarly, if we observe a notable increase in affirmative responses among children who were 61 months old in the previous December, this increase can be attributed to entrances occurring right at the age cutoff. Taking into account potential recall bias, we limit the recall period to (approximately) one year. Given that respondents have to recall their program participation in January, we restrict our analysis of program exits to individuals interviewed in the first quarter of the survey year.

Noth that the question about a child's Head Start attendance references the current period and is asked only to children aged 6 or younger. Note also that the question about Medicaid participation is asked to all persons in a household, and references current period.

C Variables and Survey Questions

Table B.1: Variables and survey questions

Variable	Description	Universe	Source
Kessler Psychological Distress Scale (K6)			
SAD	During the PAST 30 DAYS, how often did you feel ...so sad that nothing could cheer you up? Scale: 1: ALL of the time; 2: MOST of the time; 3: SOME of the time; 4: A LITTLE of the time; 5: NONE of the time; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2002–2012
ASISAD	Same with SAD (name change only)	Same with SAD	NHIS 2013–2014
NERVOUS	During the PAST 30 DAYS, how often did you feel ...nervous? Scale: 1: ALL of the time; 2: MOST of the time; 3: SOME of the time; 4: A LITTLE of the time; 5: NONE of the time; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2002–2012
ASINERV	Same with NERVOUS (name change only)	Same with NERVOUS	NHIS 2013–2014
RESTLESS	During the PAST 30 DAYS, how often did you feel ...restless or fidgety? Scale: 1: ALL of the time; 2: MOST of the time; 3: SOME of the time; 4: A LITTLE of the time; 5: NONE of the time; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2002–2012
ASIRSTLS	Same with RESTLESS (name change only)	Same with RESTLESS	NHIS 2013–2014
HOPELESS	During the PAST 30 DAYS, how often did you feel ...hopeless? Scale: 1: ALL of the time; 2: MOST of the time; 3: SOME of the time; 4: A LITTLE of the time; 5: NONE of the time; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2002–2012
ASIHOPLS	Same with HOPELESS (name change only)	Same with HOPELESS	NHIS 2013–2014
EFFORT	During the PAST 30 DAYS, how often did you feel ...that everything was an effort? Scale: 1: ALL of the time; 2: MOST of the time; 3: SOME of the time; 4: A LITTLE of the time; 5: NONE of the time; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2002–2012
ASIEFFRT	Same with EFFORT (name change only)	Same with EFFORT	NHIS 2013–2014
WORTHLS	During the PAST 30 DAYS, how often did you feel ...worthless? Scale: 1: ALL of the time; 2: MOST of the time; 3: SOME of the time; 4: A LITTLE of the time; 5: NONE of the time; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2002–2012
ASIWTHLS	Same with WORTHLS (name change only)	Same with WORTHLS	NHIS 2013–2014
Eight-item Patient Health Questionnaire (PHQ-8)			
ADPLEASR	Over the last 2 weeks, how many days have you had little interest or pleasure in doing things? Scale: 1–14 days; 77: Don't know/Not sure; 88: None; 99: Refused	Adults aged 18+ years	BRFSS 2006;2008;2010
ADDOWN	Over the last 2 weeks, how many days have you felt down, depressed or hopeless? Scale: 1–14 days; 77: Don't know/Not sure; 88: None; 99: Refused	Adults aged 18+ years	BRFSS 2006;2008;2010
ADSLEEP	Over the last 2 weeks, how many days have you had trouble falling asleep or staying asleep or sleeping too much? Scale: 1–14 days; 77: Don't know/Not sure; 88: None; 99: Refused	Adults aged 18+ years	BRFSS 2006;2008;2010
ADENERGY	Over the last 2 weeks, how many days have you felt tired or had little energy? Scale: 1–14 days; 77: Don't know/Not sure; 88: None; 99: Refused	Adults aged 18+ years	BRFSS 2006;2008;2010
ADEAT	Over the last 2 weeks, how many days have you had a poor appetite or ate too much? Scale: 1–14 days; 77: Don't know/Not sure; 88: None; 99: Refused	Adults aged 18+ years	BRFSS 2006

Table B.1 (cont'd): Variables and survey questions

Variable	Description	Universe	Source
ADEAT1	Over the last 2 weeks, how many days have you had a poor appetite or eaten too much? (Same with ADEAT, grammar correction only) Scale: 1–14 days; 77: Don't know/Not sure; 88: None; 99: Refused	Adults aged 18+ years	BRFSS 2008;2010
ADFAIL	Over the last 2 weeks, how many days have you felt bad about yourself or that you were a failure or had let yourself or your family down? Scale: 1–14 days; 77: Don't know/Not sure; 88: None; 99: Refused	Adults aged 18+ years	BRFSS 2006;2008;2010
ADTHINK	Over the last 2 weeks, how many days have you had trouble concentrating on things, such as reading the newspaper or watching the TV? Scale: 1–14 days; 77: Don't know/Not sure; 88: None; 99: Refused	Adults aged 18+ years	BRFSS 2006;2008;2010
ADMOVE	Over the last 2 weeks, how many days have you moved or spoken so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you were moving around a lot more than usual? Scale: 1–14 days; 77: Don't know/Not sure; 88: None; 99: Refused	Adults aged 18+ years	BRFSS 2006;2008;2010
WG-ANX & WG-DEP			
ANX_1	How often do you feel worried, nervous or anxious? Would you say daily, weekly, monthly, a few times a year, or never? Scale: 1: Daily; 2: Weekly; 3: Monthly; 4: A few times a year; 5: Never; 7: Refused; 8: Not ascertained; 9: Don't know	Randomly selected sample adults	NHIS 2012–2014
ANX_3R	Thinking about the last time you felt worried, nervous or anxious, how would you describe the level of these feelings? Would you say a little, a lot, or somewhere in between? Scale: 1: A little; 2: A lot; 3: Somewhere between a little and a lot; 7: Refused; 8: Not ascertained; 9: Don't know	Randomly selected sample adults	NHIS 2012–2014
DEP_1	How often do you feel depressed? Would you say daily, weekly, monthly, a few times a year, or never? Scale: 1: Daily; 2: Weekly; 3: Monthly; 4: A few times a year; 5: Never; 7: Refused; 8: Not ascertained; 9: Don't know	Randomly selected sample adults	NHIS 2012–2014
DEP_3R	Thinking about the last time you felt depressed, how depressed did you feel? Would you say a little, a lot, or somewhere in between? Scale: 1: A little; 2: A lot; 3: Somewhere between a little and a lot; 7: Refused; 8: Not ascertained; 9: Don't know	Randomly selected sample adults	NHIS 2012–2014
Medication Nonadherence Index			
ARXPR_1	The following questions concern the use of prescription medication DURING THE PAST 12 MONTHS, are any of the following true for you? . . . You skipped medication doses to save money. Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2011–2012
ARXPR_2	The following questions concern the use of prescription medication DURING THE PAST 12 MONTHS, are any of the following true for you? . . . You took less medicine to save money. Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2011–2012
ARXPR_3	The following questions concern the use of prescription medication DURING THE PAST 12 MONTHS, are any of the following true for you? . . . You delayed filling a prescription to save money. Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2011–2012
ARXPR_4	The following questions concern the use of prescription medication DURING THE PAST 12 MONTHS, are any of the following true for you? . . . You asked your doctor for a lower cost medication to save money. Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2011–2012
ARXPR_5	The following questions concern the use of prescription medication DURING THE PAST 12 MONTHS, are any of the following true for you? . . . You bought prescription drugs from another country to save money. Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2011–2012
ARXPR_6	The following questions concern the use of prescription medication DURING THE PAST 12 MONTHS, are any of the following true for you? . . . You used alternative therapies to save money. Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2011–2012
ARX12MO	DURING THE PAST 12 MONTHS, were you prescribed medication by a doctor or other health professional? Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2013–2014

Table B.1 (cont'd): Variables and survey questions

Variable	Description	Universe	Source
ARX12_1	DURING THE PAST 12 MONTHS, were any of the following true for you? . . . You skipped medication doses to save money. Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years, ARX12MO='1'	NHIS 2013–2014
ARX12_2	DURING THE PAST 12 MONTHS, were any of the following true for you? . . . You took less medicine to save money. Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years, ARX12MO='1'	NHIS 2013–2014
ARX12_3	DURING THE PAST 12 MONTHS, were any of the following true for you? . . . You delayed filling a prescription to save money. Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years, ARX12MO='1'	NHIS 2013–2014
ARX12_4	DURING THE PAST 12 MONTHS, were any of the following true for you? . . . You asked your doctor for a lower cost medication to save money. Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years, ARX12MO='1'	NHIS 2013–2014
ARX12_5	DURING THE PAST 12 MONTHS, were any of the following true for you? . . . You bought prescription drugs from another country to save money. Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2013–2014
ARX12_6	DURING THE PAST 12 MONTHS, were any of the following true for you? . . . You used alternative therapies to save money. Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	Sample adults aged 18+ years	NHIS 2013–2014
Food Insecurity (*USDA Adult* 30-*day Food Security*)			
FSRUNOUT	I/We worried whether my/our food would run out before I/we got money to buy more. Was that often true, sometimes true, or never true for you/your family in the last 30 days? Scale: 1: Often true; 2: Someimtes true; 3: Never true; 7: Refused; 8: Not ascertained; 9: Don't know	All family members	NHIS 2011–2012
FSLAST	The food that I/we bought just didn't last, and I/we didn't have money to get more. Was that often true, sometimes true, or never true for you/your family in the last 30 days? Scale: 1: Often true; 2: Someimtes true; 3: Never true; 7: Refused; 8: Not ascertained; 9: Don't know	All family members	NHIS 2011–2012
FSBALANC	I/We couldn't afford to eat balanced meals. Was that often true, sometimes true, or never true for you/your family in the last 30 days? Scale: 1: Often true; 2: Someimtes true; 3: Never true; 7: Refused; 8: Not ascertained; 9: Don't know	All family members	NHIS 2011–2012
FSSKIP	In the last 30 days, did you/you or other adults in your family ever cut the size of your meals or skip meals because there wasn't enough money for food? Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	FSRUNOUT='1'/'2'/ FSLAST='1'/'2'/ FSBALANC='1'/'2'	NHIS 2011–2012
FSSKDAYS	In the last 30 days, how many days did this happen? Scale: 01–30 days; 97: Refused; 98: Not ascertained; 99: Don't know	FSSKIP='1'	NHIS 2011–2012
FSLESS	In the last 30 days, did you ever eat less than you felt you should because there wasn't enough money for food? Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	FSRUNOUT='1'/'2'/ FSLAST='1'/'2'/ FSBALANC='1'/'2'	NHIS 2011–2012
FSHUNGRY	In the last 30 days, did you ever eat less than you felt you should because there wasn't enough money for food? Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	FSRUNOUT='1'/'2'/ FSLAST='1'/'2'/ FSBALANC='1'/'2'	NHIS 2011–2012
FSWEIGHT	In the last 30 days, did you lose weight because there wasn't enough money for food? Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	FSRUNOUT='1'/'2'/ FSLAST='1'/'2'/ FSBALANC='1'/'2'	NHIS 2011–2012
FSNOTEAT	In the last 30 days, did you/you or other adults in your family ever not eat for a whole day because there wasn't enough money for food? Scale: 1: Yes; 2: No; 7: Refused; 8: Not ascertained; 9: Don't know	FSSKIP='1'/ FSLESS='1'/ FSHUNGRY='1'/ FSWEIGHT='1'	NHIS 2011–2012
FSNEDAYS	In the last 30 days, how many days did this happen? Scale: 01–30 days; 97: Refused; 98: Not ascertained; 99: Don't know	FSNOEAT='1'	NHIS 2011–2012