HHS Public Access
Author manuscript
Med Care Res Rev. Author manuscript; available in PMC 2020 March 19.

Published in final edited form as:
Med Care Res Rev. 2018 December ; 75(6): 655–720. doi:10.1177/1077558717740444.

Lifetime Consequences of Early-Life and Midlife Access to Health Insurance: A Review

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Abstract

Over the past decade, the number of studies examining the effects of health insurance has grown rapidly, along with the breadth of outcomes considered. In light of growing research in this area and the intense policy focus on coverage expansions in the United States, there is need for an up-to-date and comprehensive literature review and synthesis of lessons learned. We reviewed 112 experimental or quasi-experimental studies on the effects of health insurance prior to people becoming eligible for Medicare on a broad set of outcomes. Over the past decade, evidence related to the effect of increased access to health insurance has strengthened, illuminating that children and vulnerable adults are most likely to see health and economic benefits. We identified promising areas for future study in this active and burgeoning research area, noting benefit design of health insurance and outcomes such as government program participation and self-reported health status as targets.

Keywords

health insurance; review; health and economic outcomes; experimental studies; quasi-experimental studies

Introduction

For more than a century, health insurance has been a part of U.S. policy discussions. However, no national health insurance legislation passed in the United States until 1965, when President Lyndon B. Johnson signed into law the bill enacting Medicare and Medicaid as part of the Great Society Legislation. Since then, Medicare and Medicaid have undergone many changes, and new legislation became law, such as the Children's Health Insurance Program (CHIP) and, more recently, the Patient Protection and Affordable Care Act (ACA). Despite these changes, health insurance continues to be a contentious policy issue.

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Declaration of Conflicting Interests
The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Essential to debates are discussions about the economic and health impacts of insurance. There is a large and vibrant literature about the effects of health insurance on individuals, in part because of ongoing policy debates. To our knowledge, no recent review has aimed to synthesize the results stemming from this large and complex literature. The last comprehensive reviews of the impact of health insurance on economic outcomes and health were published in 2003 and 2009, respectively (Hadley, 2003; McWilliams, 2009). There is a need for a current review that begins with the older literature, includes new findings about health insurance, and incorporates what newer studies have added to the knowledge base.

There are several empirical challenges to quantifying the impact of health insurance on health and economic status. For example, sick people may expect to spend more on health care and, therefore, value health insurance more. A simple observational study comparing individuals who are enrolled in health insurance with those who are uninsured may find that insured individuals are less healthy, not due to health insurance but due to sicker individuals selecting into health insurance. Alternatively, other confounding factors obscure the relationship between health insurance and outcomes. For example, individuals with more education and skills may be more likely to have health insurance, because they participate in the labor force and have jobs that provide health insurance. At the same time, they may be more skilled at maintaining their health. In this circumstance, a comparison of the insured and uninsured would show health insurance is associated with better health due to this omitted characteristic. To answer the question of how health insurance affects health or economic outcomes, researchers must control for the endogeneity of health insurance, that is, that health insurance status is determined by a multitude of factors, many of which are unobserved or unmeasured and also associated with health and economic status.

Researchers use different methods to identify the impact of health insurance on individual outcomes. A randomized control trial is most often considered the gold standard in inference. An experiment ideally designed to measure the causal impact of health insurance across the lifecycle would sample a large number of individuals early in life (or prior to conception) and randomly allocate them to insured and uninsured groups, maintain them in these groups for the remainder of their lives, and observe their periodic and cumulative outcomes. While this exact experiment has not been carried out (and is unlikely to be undertaken for ethical and feasibility reasons), there have been three large-scale experiments to measure the impacts of health insurance in the United States.

The first, the RAND Health Insurance Experiment, was conducted from 1974 to 1982 (Brook et al., 1983; Keeler, 1992; Keeler, Brook, Goldberg, Kamberg, & Newhouse, 1985; Keeler et al., 1987; Manning, Newhouse, Duan, Keeler, & Leibowitz, 1987; Newhouse & RAND Corporation Insurance Experiment Group, 1993). This study randomized 5,809 people aged 61 and younger into one of 14 different health insurance plans. These individuals were tracked for 3 to 5 years, and researchers followed their health care utilization, spending, and health. Plan generosity varied—from a free health care plan to plans with a 95% deductible. In effect, these extremes allowed for the first credible estimation of the causal impact of total insurance with a few caveats.[1] Results from this

[1] An example of such caveats is the limit in family out-of-pocket spending in the 95% deductible plan, unavailable to the uninsured.

experiment constitute some of the best evidence on the impact of health insurance on health. However, this study has well-documented limitations; for example, sample size constrained the study of population subgroups, such as those with substantial health care needs, and uninsured people were excluded from the study population.

More recently, the Oregon Health Insurance Experiment studied the effects of a Medicaid expansion in Oregon. The experiment consisted of a lottery held in 2008 to designate people eligible to apply for the Oregon Health Plan, a public health insurance program (Baicker et al., 2013; Baicker, Finkelstein, Song, & Taubman, 2014; Finkelstein et al., 2012; Wright et al., 2016). Approximately 90,000 people entered the lottery, just more than 35,000 were chosen, and about 30% of them enrolled in Oregon Health Plan. Individuals did not enroll in Oregon Health Plan either because they did not finish the application in time or because they did not qualify for the program. The study focused on a different population than the RAND Experiment—low-income adults—and studied a wider range of outcomes, including both health and economic. Study limitations included a short follow-up time and a study population limited to Oregon residents, thus not nationally representative.

Finally, the Accelerated Benefits Demonstration was conducted from 2007 to 2010 with Social Security Administration funding to evaluate the impact of early access to health benefits for new Social Security Disability Insurance (SSDI) beneficiaries.[2] The demonstration randomized 2,000 new beneficiaries into a control and two treatment groups: One group received immediate health care benefits; another group received health care benefits and additional services, notably help navigate the health care system (Michalopoulos et al., 2011; Michalopoulos, Wittenburg, Israel, & Warren, 2012; Weathers & Stegman, 2012). This experiment provided insights about the impact of insurance for disabled populations, which have significant health care needs.

In addition to randomized experiments, researchers have used several policy changes (so-called “quasi-experiments” or “natural experiments”) to measure the causal impact of health insurance on economic and health outcomes. These quasi-experiments used the potentially exogenous variation across individuals in insurance coverage due to policy change to identify the impact of health insurance on outcomes.[3] Quasi-experimental methods included the use of instrumental variables, difference-in-difference studies, regression discontinuities, and propensity score matching. Key examples included Medicaid eligibility expansions, notably since the 1980s; the 2006 Massachusetts Health Care reform, which aimed for statewide near-universal coverage; and, most recently, the national implementation of the ACA. There also were changes to state programs or mandates that provided exogenous variation in health insurance. For example, changes to Hawaii employer mandates, TennCare (Tennessee), and Badger Care (Wisconsin) have all been used as natural experiments.

2. Typically, new SSDI beneficiaries are eligible for Medicare 2 years after the date of their entitlement to disability benefits.
3. In this context, exogenous refers to the policy changes being external to the health insurance and health care decisions of the populations affected.

New Contributions

While excellent review studies on health insurance exist, the literature in this area continues to grow rapidly, and there are no recent review studies that comprehensively analyze the many outcomes that health insurance may affect. This study reviews and analyzes the literature on how health insurance affects health and economic outcomes in the United States.

As discussed by Wallace and Sommers (2016) in a methodological review of the field, rigorous experimental and quasi-experimental methods have been developed and applied to study the impacts of health insurance while controlling for the endogeneity of insurance status. We took a comprehensive approach to identify health insurance studies using such rigorous methods. To be included, studies were required to use a strategy designed to measure the causal impact of insurance, such as randomized experiments, regression discontinuity design, instrumental variables analysis, or difference-in-difference. Propensity score matching on its own was not considered a strong enough strategy for inclusion.

We included studies with a sample consisting of individuals younger than 65 years to focus on the effects of health insurance before Medicare eligibility. We analyzed a wide range of economic outcomes, including labor force participation, earnings, wages, government program participation, education, savings and asset accumulations, household finances, and delayed care due to costs; and health outcomes, including mortality, self-reported health status, prevalence of risk factors such as obesity and high blood pressure, limitations and functional status, preventable hospitalizations, incidence/prevalence and outcomes of chronic conditions, and mental health status.

This study aims to provide a broad overview of the existing literature and to assess progress since previous reviews. An important contribution of this study is the two tables, one for economic outcomes and one for health outcomes, which summarize the results of more than 100 studies. The tables are organized in panels by the outcomes studied within the categories of "economics" or "health." Table columns show the population studied, study design, key findings, and study citation. In this article, we draw conclusions about the state of knowledge and identify gaps in understanding the effects of health insurance on outcomes for the U.S. population younger than 65 years and for population subgroups. In the "Approach" section, we discuss our search methodology and conceptual framework. "Economic Outcomes" and "Health Outcomes" sections present findings for economic outcomes and health outcomes, respectively, and we conclude with avenues for future research.

Approach

Article Search

There is a large body of work that documents *associations* between health insurance and outcomes. While these studies can be informative to some degree, as Levy and Meltzer (2008) noted, ".63 . . we cannot count on observational studies to provide insight into the causal effect of health insurance." Unfortunately, results from this literature are overwhelmingly more prevalent than the causal literature when using a traditional keyword search approach to identifying studies.

We used the following approach to identify studies that used experimental and quasi-experimental methods to identify the effect of health insurance on a variety of outcomes. We started with a relatively recent pillar of the causal health insurance literature—Levy and Meltzer's (2008) review. The review and articles it cited were added to a database of potentially relevant articles for this review. We then used Google Scholar website's "cited by" option to identify articles that *cited* the review.[4] We searched titles for key words and phrases related to the impact of health insurance on health or economic outcomes in the United States, excluding articles with titles indicative of observational methods.[5] With each new article, we repeated the process of considering references cited by the article (using the article's References section) and that cited the article (using Google Scholar), until several subsequent attempts yielded no new article. This strategy identified 311 articles as of May 5, 2016.

We analyzed each article to assess (a) if it studied relevant health or economic outcomes (b) if it used experimental or quasi-experimental methods and (c) if it targeted the nonelderly U.S. population—187 articles satisfied all three criteria. The majority of excluded articles were rejected because they were observational.

To determine which articles to include in this review, we first classified articles along a matrix of outcome categories, seven each for economic and health outcomes, and populations of interest, for example, children or adults, allowing articles to appear more than once if they studied several outcomes or populations. We removed articles from the analysis that studied outcomes such as job mobility, retirement, dental health, and birth outcomes, which were relevant but did not fit our selected categories. If there were less than five articles in each cell, we included all the articles. If there were more than five, we picked the five most significant studies based on several inclusion criteria. First, we included all experimental studies. Second, we included articles that were published rather than in "working paper" status. Third, we favored articles with the highest number of citations. This last criterion biased us toward inclusion of older articles. Thus, we included newer articles with fewer citations if they used novel approaches. In select cases, we included more than five studies if some studied private and some public insurance because they may have different incentives on outcomes (e.g., labor force participation).[6] It is important to note that although the criteria for inclusion in this review study were defined a priori, application also was based on our judgment and thus may not be replicable. Applying these criteria, we retained 112 articles for analysis, including 67 on the impact of health insurance on

4. As of the writing of this article, 132 articles were identified by Google Scholar as citing the review.

5. For instance, titles including phrases such as "effects of insurance on mortality" and "impact of the Massachusetts health care reform" were included because they were both thematically relevant and did not rule out the use of experimental or quasi-experimental methods. Titles including phrases that suggested an observational approach, such as "association of cancer outcomes and insurance status," were rejected even if they were thematically relevant. Titles including phrases and key words pertaining to access to care or health care utilization were considered not thematically relevant and were rejected.

6. These exclusions were applied to the literature that studied the impact of health insurance on labor market participation, wages and earnings, mortality, and self-reported health status.

economic outcomes, 36 on the impact of health insurance on health, and 9 with both economic and health outcomes.

Conceptual Framework

Our framework to analyze the existing evidence of the effects of health insurance and identify gaps in this active and burgeoning research area draws on an influential model of health production. The seminal *health capital* model introduced by Grossman (1972, 2000) predicts the effects of health care price changes on economic outcomes such as employment and wages. Grossman's model considers individuals as both consumers and producers of health. Health produces direct satisfaction, but health status degrades over time. Because of this, individuals choose to invest in health, even though this investment is costly. In the model, health is determined concurrently with labor supply and wages. Thus, poor health also leads to lower income and wealth.

In addition to protecting against the threat of catastrophic spending on health care, health insurance leads to increased health care consumption by lowering the cost of health care. Because health insurance covers part of the cost of care, individuals may consume more health care or choose higher cost care than they would without health insurance, two examples of moral hazard. Health insurance also may reduce the incentive to engage in healthy behaviors, such as exercise and healthy eating, and reduce the cost of engaging in unhealthy behaviors such as smoking.

In this framework, individuals decide simultaneously about health insurance status, labor supply, wages, and health investments (and thus health). Therefore, when insurance is available, either through the workplace or through public programs such as Medicaid, individuals also may adjust their labor supply or health investments. Consider a simple example where an individual can choose to work and buy consumption goods or to partake in leisure (not work). Figure 1 shows the budget constraint, which is the bundle of choices that the individual can afford at the given wage rate. The dashed lined represents the budget constraint when insurance is unavailable and shows the trade-off between consumption and leisure. The solid line represents the constraint when insurance is available. When insurance is available, it reduces the price of health care that the individual pays, which changes the slope of the budget constraint.[7] At low incomes (high leisure), public insurance may be available, and after working full-time, employer-sponsored insurance (ESI) may be available. Suppose the individual chooses a point on the line segment labeled "A" if health insurance is unavailable, which corresponds roughly to working part-time. If insurance is available, the individual may choose to work more to gain insurance through their employer (a point on Line Segment B), or they may choose to work less to qualify for public insurance (a point on Line Segment C). This simple example also shows why high earners may be unaffected by public health insurance expansions—they earn too much to change their labor supply to qualify for insurance available to low-income individuals.

7. For simplicity, we have assumed that the publicly available insurance and the insurance available through an employer have the same coinsurance rates and that individuals have the same wage with and without insurance.

In this framework, health insurance affects wages through two competing channels. First, employees enrolled in ESI pay the cost of insurance through lower wages. This trade-off is often referred to in the economics literature as a compensating differential, which in this context, is the difference in wages that the same job would offer with and without health insurance. Graphically, the compensating differential of ESI decreases the steepness of Segment B of the budget constraint of Figure 1. Second, health insurance can affect wages if it improves labor productivity through an improvement in health status, leading to higher wages. Graphically, this channel increases the steepness of Segments B and C of Figure 1.

Predictions from Grossman's model and models extending it are supported by much empirical research. Notably, the literature stemming from the RAND Health Insurance Experiment (Newhouse & RAND Corporation Insurance Experiment Group, 1993) found that health insurance increased the *quantity* of health care used. As discussed by Hadley (2003), a key question concerns the effectiveness of the increased medical care utilization for *producing* health. A useful concept to understand the predictions of the Grossman model in that regard is the *health production function*, a hypothetical relationship between medical care use and health. This concept assumes that the quantity of health care services received (the input of the health production function) determines the health status of people (the output). Figure 2 provides a graphical example of a health production function. Note that the shape of the function may depend on a multitude of factors such as age, illnesses, and medical technology. In particular, the slope of the health production function matters greatly. If individuals are at a relatively steep area of the function, as in Point A, health insurance is likely to have a measurable impact on health (e.g., moving from A to B). In contrast, if they are located at a flat area of the curve, as in B, then health insurance may have little effect on health. Heterogeneity in the shape of the health production function and in the response to health insurance means that it is possible for health insurance to have no noticeable effect on outcomes at an aggregate level or for a specific group but have an important impact for other groups. For example, a recent study showed that health care utilization responses to the Oregon Health Insurance Experiment were correlated with individual characteristics such as age and gender (Kowalski, 2016).

The framework shows the impact of health insurance on health behaviors, work and wages, and health. It also shows why there may be heterogeneity when studying the effect of health insurance on these outcomes. Specifically, the effects of health insurance on work and wages as well as health are expected to vary depending on the individual's preferences for leisure and consumption, the current level of health care consumption, and the shape of one's health production function. We used this framework to assist in interpreting results from the reviewed studies, drawing conclusions, and identifying lessons learned.

Summary Tables

We summarized study results in two tables. Table 1 reports results for economic outcomes, and Table 2 reports results for health outcomes. The tables are organized in panels by the outcomes studied within the categories of "economics" or "health." Table columns show the population studied, study authors' names with reference to the full citation, a brief study design description, and findings—including cases where health insurance was found to have no impact. In the following sections, we synthesize findings summarized in the tables. We interpreted the state of knowledge using the conceptual framework as a guide and identified gaps in our understanding of the effects of health insurance on the well-being of heterogeneous populations younger than 65 years in the United States.

Economic Outcomes

Because the ACA both renewed interest in the interaction between health insurance and economic outcomes and changed the price of health insurance, the past 5 years have produced a wealth of studies about how health insurance affects individuals. Although there are other reviews of the effect of health insurance on labor market outcomes, all were written before the ACA. Three excellent reviews stand out. Currie and Madrian (1999), Gruber (2000), and Hadley (2003) outlined the effect of health, as well as health insurance, on employment and other labor market outcomes. Hadley noted that the exclusion of observational research leaves few studies to be examined, while Currie and Madrian focused more on identification issues, arguing it is difficult to draw conclusions about the relationship. Gruber's study outlined the complexity of the relationship between labor supply and health insurance in the United States and reviewed both theory and empirical findings. More recently, a review by Wherry, Kenney, and Sommers (2016) focused on a narrow set of outcomes related to poverty. By collecting and analyzing recent work, our review makes an important contribution. In fact, 61 of the 76 articles that study the relationship to economic outcomes identified by our article search were published or released after 2003, the year of the most recent comprehensive review.

Table 1 presents the main findings from studies that used experimental and quasi-experimental methods to study the impact of health insurance on economic outcomes. The studies we reviewed examined seven different types of economic outcomes: labor force participation, earnings, wages, government program participation, education, savings and asset accumulations, household finances, and delayed care due to costs.

Labor Market Participation

Recent health insurance expansions have called attention to the relationship between health insurance and labor market participation, with an abundance of work in response to answer the question of how health insurance affects labor market participation.[8] We identified several distinct groups that were studied in the literature: young adults (younger than 26 years and thus affected by the ACA option to remain on their parents' health insurance plan), working-age adults, adults with lower socioeconomic status, married adults, single mothers, pregnant women, childless adults, and other unique populations (breast cancer patients, for example). Each of these groups may have a different response to health insurance because they value health insurance differently, are on a different portion of the budget constraint (Figure 1), or are on a distinct part of the health production function

8. There is perhaps an even larger body of literature that considers job lock, see Gruber and Madrian (2002) and the many articles that are cited in this review. In addition, self-employment, entrepreneurship, and retirement also have been studied. For the purpose of this study, we focus only on how health insurance affects labor force participation, both on the number of hours worked (intensive margin) and the probability of working (extensive margin).

(Figure 2). For example, pregnant women might place a high value on health insurance to gain access to prenatal care and to lower the cost of childbirth.

Identification of how young adults were affected by health insurance primarily stems from the ACA dependent policy, which stipulated that individuals be allowed to stay on their parent's insurance plan until the age of 26 regardless of student status. The most compelling work indicated that there was no change in the decision of whether to work or not due to this policy (Antwi, Moriya, & Simon, 2013; Heim, Lurie, & Simon, 2014). On the other hand, several studies found that there was a reduction in full-time work as well as hours worked because of the dependent policy (Antwi et al., 2013; Depew, 2015; Dillender, 2014). Gender differences were noted, although studies differed about which gender was affected by the policy and the causes of gender differences (Dahlen, 2015; Dillender, 2014).

More attention has been paid to the effect of health insurance on labor force participation for adults in a broader sense (aged 18–64 years). In addition to the Oregon Health Insurance Experiment, two main sources of variation in insurance have been used to estimate the effect of health insurance on labor supply: changes within a state when employers must provide insurance and changes in public health insurance. We included more than five studies in this section because some studied private insurance, while others studied public health insurance, and the incentives can be very different. For example, because of the income eligibility threshold, expansions in public health insurance may incentivize individuals to work less to qualify for the program. Alternatively, if public health insurance improves health, individuals who qualify may work more. At the same time, ESI is often only offered to full-time workers, possibly incentivizing individuals to work more.

The large body of work studying the effect of health insurance on the adult labor supply has largely found no effect. A study based on the Oregon Health Insurance Experiment found no change in the probability of working (Baicker et al., 2014). One explanation for this is that individuals who qualified for the program were already low income and had no incentive to work less to qualify. Turning to state mandates, most work has focused on either Hawaii or Massachusetts, both of which mandated, with some exceptions, that employers provide health insurance to workers in 1974 and 2006, respectively. Two main studies examined the Hawaii mandate. While Thurston (1997) did not find any evidence of changes in hours worked, Buchmueller, DiNardo, and Valetta (2011) studied the long-run effects of the mandate and found an increase in the probability of working part time, and thus not being affected by the mandate, but no change in overall employment. Studies of the Massachusetts health reform also have largely found small effects, less than 1 hour per week (Kolstad & Kowalski, 2016), or no effect of the state mandate on labor supply (Dillender, Heinrich, & Houseman, 2015; Dubay, Long, & Lawton, 2012). Studies of the ACA found no change in the probability of working part time, either voluntarily or involuntarily (Mathur, Slavov, & Strain, 2016; Moriya, Selden, & Simon, 2016).

Some studies focused on lower socioeconomic-status adults, who are more likely to be affected by changes in public health insurance provisions, in states that expanded Medicaid under the ACA compared with those that did not. However, neither Kaestner, Garrett, Gangopadhyaya, and Fleming (2015), who studied nondisabled adults with a high school degree or less, or Gooptu et al. (2016), who studied individuals with incomes below 138% federal poverty level, found that labor supply changed with ACA implementation.

Several studies examined married adults. Distinguishing married and single adults is important because of intrahousehold effects—married individuals may be able to gain health insurance through their spouse and there may be cross-spouse effects. Indeed, most empirical work suggested that spouses are sensitive to their partner's health insurance coverage. Typically, instrumental variables have been used as a method to deal with the potential endogeneity of a spouse's health insurance (Kapinos, 2009; Royalty & Abraham, 2006). In general, studies have found that intra-household effects were important and having access to health insurance through a spouse decreased labor supply, as measured by full-time work, part-time work, and the number of hours worked. More recent, California's mandate that gay and lesbian partners be treated equally as same-sex partners also has been examined (T. C. Buchmueller & Carpenter, 2012; Dillender, 2015b). Both studies found that gay men did not change their labor supply after the mandate, but that lesbian women were less likely to work.

Although earlier work that studied single mothers was inconclusive, more recent studies showed health insurance increased labor force participation of single mothers. This population is often studied separately because of the history of public health insurance in the United States. Initially Medicaid was tied to Aid to Families with Dependent Children (AFDC) participation, which was only available to single mothers and their children. Moffitt and Wolfe (1992), in a seminal study, found that mothers with expected high medical spending were more responsive to changes in health insurance than mothers with low expected spending, consistent with the framework presented in the "Conceptual Framework" section. Yelowitz (1995) found that single mothers were responsive to changes in Medicaid eligibility, while Ham and Shore-Sheppard using the same data as Yelowitz, with a more flexible specification, found no significant effect on labor force participation. This was similar to what Meyer and Rosenbaum (2001) found. Using more recent Medicaid expansions, both Montgomery and Navin (2000) and Pohl (2014) found that Medicaid expansions increased labor force participation. However, their results differed on the effect on number of hours.

Less well-studied groups were childless adults and pregnant women. Childless adults are a particularly important group because they are most affected by the ACA expansion and so their labor supply responses to health insurance may have meaningful consequences. All three articles that we identified used changes in health insurance status prior to the ACA and found childless adults adjusted their labor supply to gain health insurance and that responses were larger in older adults (Dague, DeLeire, & Leininger, 2014; Garthwaite, Gross, & Notowidigdo, 2014; Guy, Atherly, & Adams, 2012). However, it should be noted that only one of these studies was nationally representative of this population (Guy et al., 2012). The only study that we identified of pregnant women found that increases in Medicaid eligibility decreased the probability of employment, labor force participation, and hours worked (Dave et al., 2015). This is also a distinct group because pregnant women are more likely than other groups to qualify for public health insurance in the United States and thus may be more sensitive to changes in public policy.

Last, we identified four articles that examined special groups that did not fit into the categories outlined previously. For example, Bradley et al. (2007) and Page (2011) studied groups that were less healthy, such as women with a breast cancer diagnosis and individuals who received a kidney transplant. We also identified articles that studied SSDI and Supplemental Security Income (SSI) recipients (Coe & Rupp, 2013) and veterans (Boyle & Lahey, 2016). These studies found that individuals' labor supply was responsive to health insurance, which is to be expected as these individuals are likely in worse health and may value health insurance more.

Overall, recent work suggests that the ACA did not have a large effect on the labor supply of young adults allowed to stay on their parents' plan or working-age adults. However, studies that examined "vulnerable" subgroups of the population such as single mothers, childless low-income adults, pregnant women, or sick adults found health insurance changed labor supply. These effects are consistent with hypothesized effects based on a model of health capital. In addition, studies found married adults changed labor supply in response to a spouse's health insurance.

Wages, Earnings, and Other Labor Market Outcomes

Similar to how we grouped findings about labor market outcomes, we organized studies that examined the effect of health insurance on wages by population studied: individuals who were covered in childhood and in the labor force later in life, young adults, adults, married adults, single adults, single mothers, pregnant women, and childless adults. Many of the articles that studied labor supply also studied wages. As discussed previously, insurance is expected to have differential effects on individuals depending on where they lie on both the health production function and budget constraint.

Several recent studies examined how health insurance during childhood affected later life outcomes. Health insurance during childhood may improve wages through improved health and increased educational attainment. Although Boudreaux, Golberstein, and McAlpine (2016) found that the introduction of Medicaid had no effect on wages later in life, both Brown, Kowalski, and Lurie (2015) and Miller and Wherry (2015) used later expansions of the program and found substantial effects. The Brown et al. article is unique, because the authors had access to administrative IRS data, which included the entirety of individuals who filed a W-2, and examined cumulative earnings as well as taxes paid.

The effect of health insurance on young adults is not well studied, but with the ACA policy extending coverage of dependents, we expect that many researchers will study this topic in the near future. The one article that we did identify that studied young adults found health insurance increased wages for women (Dillender, 2014).

The largest group studied was working adults. However, there was no consensus on the effect of health insurance on wages. Notably, the Oregon Health Insurance Experiment found that being enrolled in Medicaid had no effect on earnings or whether or not the individual was above 100% of the federal poverty level (Baicker et al., 2014). ESI also has been studied using changes in state policy. Similar to the Oregon Health Insurance Experiment, studies using the Hawaii mandate found that wages did not change because of health insurance. However, Kolstad and Kowalski (2016) found that workers in Massachusetts were paid less. One explanation for differences in findings is that individuals who qualify for Medicaid in Oregon and Massachusetts may not be comparable populations and, because of this, the treatment effects may vary (Kowalski, 2016). In the framework presented in the “Conceptual Framework” section, this would occur if the populations affected by the natural experiments either had different shapes of the health production function or were on different parts of the function.

The remaining groups were less well studied, and it is unclear how health insurance affects the wages of these groups. For example, we identified one study that found that married women with health insurance earned less than they would if they took a job without health insurance (Olson, 2002). We also found one article each that studied single adults, single mothers, and pregnant women but found little evidence that health insurance was associated with a change in wages for any group (Dave et al., 2015; Hamersma, 2013; Lluis & Abraham, 2013). Turning to childless adults, we also found little evidence of an effect of health insurance. Dague et al. (2014) studied childless adults in Wisconsin who applied for public health insurance just before and after the program was closed and found that results were sensitive to the specification of the model estimated. Garthwaite et al. (2014) studied public health insurance in Tennessee, which covered childless adults, and found no effect on wages.

The relationship between health insurance and wages and earnings is largely an open question. Current findings depend on the context and the population studied. There is also an important distinction between public and ESI. However, recent work has shown that insurance during childhood may be important.

Government Program Participation

Because of the relationship between health insurance and labor force outcomes, it is a natural hypothesis that health insurance may affect participation in government programs, such as food stamps or welfare. This also would happen if there were complementarities in signing up for public programs. We reviewed studies on the following programs: Aid to Families with Dependent Children/Temporary Assistance for Needy Families (AFDC/TANF), Supplemental Nutrition Assistance Program (SNAP or food stamps), SSDI, workers compensation, and the earned income tax credit (EITC). Rather than group by study sample, we present our results in this section based on the program studied.

Although there is a large literature considering the effects of Medicaid on AFDC participation, most of the work is older. Initially, Medicaid eligibility was tied to participation in AFDC, and it was not until 1984 that the two programs were delinked. Seminal articles by Blank (1989), Winkler (1991), and Moffitt and Wolfe (1992) all considered how Medicaid affected AFDC enrollment. The magnitude of the findings varied, but there was evidence that how women value insurance changed AFDC participation and that private insurance was valued differently than public. Yelowitz (1995) exploited the decoupling of Medicaid from AFDC and found large effects. However, Ham and Shore-Sheppard (2005) argued that Yelowitz evaluated AFDC incorrectly and that Medicaid eligibility had no effect on AFDC participation. The one long-term study (Decker & Selck,

2012) found that the introduction of Medicaid permanently increased AFDC caseloads. There were no studies examining how childhood health insurance affects welfare receipt later in life, and this may be a line of future research to pursue.

Because of the rapidly increasing take up of SNAP, SNAP is especially important for policy makers. On one hand, enrolling in public health insurance may cause individuals to learn about other programs that they are eligible for and increase participation in SNAP. On the other, if health insurance decreases the cost of health care enough, individuals can use the freed-up resources for other consumption goods and might not need to enroll in SNAP. The most compelling evidence about this relationship came from the Oregon Health Insurance Experiment (Baicker et al., 2014), which found that the first scenario dominated. Medicaid had a significant positive impact on the probability of receiving food stamps as well as the amount received, likely due to learning about the program. Yelowitz (1996) also found that Medicaid expansions increased food stamp participation. However, these are contemporaneous effects. In a different approach, Miller and Wherry (2015) found that being insured during childhood decreased the likelihood of food stamp receipt later in life.

The other programs: SSDI and SSI, Workers Compensation, and EITC are less well studied. The Oregon Health Insurance Experiment found that there was no effect of public health insurance on SSDI or SSI receipt, but this is in contrast to other studies that found Medicaid expansions led to increases in SSDI and SSI (Maestas, Mullen, & Strand, 2014; Yelowitz, 1998). The contrast in findings may be due to the composition of the population of Oregon compared with other states, namely Massachusetts, which Maestas et al. (2014) study, or the country as a whole. The relationship between Workers Compensation and health insurance is also still an open question. However, Lakdawalla, Reville, and Seabury (2007) and Dillender (2015a) found that there may be a positive association between health insurance and Workers Compensation. Last, we found one study that evaluated health insurance and EITC receipt. Brown et al. (2015) found that being eligible for Medicaid early in life was associated with smaller EITC payments later in life for both men and women and that women were less likely to receive EITC. With more than 26 million families and individuals receiving the EITC, it is somewhat surprising that few recent studies examine the relationship between health insurance and receipt of EITC.

Overall, unanswered questions remain about how health insurance affects participation in other government programs. Older studies examining the effect of Medicaid on AFDC participation highlighted how health insurance was differentially valued by individuals. Specifically, individuals who expected larger health expenditures and, therefore, valued health insurance more had larger responses to changes in Medicaid eligibility. This aspect is often overlooked in current literature.

Education

In the literature examining the effects of health insurance on education, studies generally focused on two different groups, children and young adults, and on short- and long-run educational effects. Young adults also have been studied in the context that access to health insurance may change the opportunity cost of education for individuals. For example, the

ACA requires that children up to the age of 26 be allowed to stay on the health insurance of their parents regardless of student status.

Several recent studies examined the long-term effects of being insured during childhood on educational attainment, and most found that being insured during childhood improved educational outcomes. Cohodes et al. (2016) found positive effects of Medicaid expansion on high school and college completion. Brown et al. (2015) studied the same Medicaid expansion and found this effect only among women. Miller and Wherry (2015) also used the Medicaid expansions of the 1980s and 1990s and found that prenatal health insurance improved high school graduation rates but that being insured later in childhood had no effect. Additionally, Boudreaux et al. (2016) used the staggered introduction of Medicaid and found that health insurance during childhood had no effect on completed years of schooling for children who grew up in low-income households.

There is little work that explains why health insurance improves educational outcomes. One possibility is that children are healthier and better able to pay attention (Cunha & Heckman, 2007). Consistent with this interpretation, one study found that health insurance at birth improved test scores in young children, but that contemporaneous health insurance coverage had no effect (Levine & Schanzenbach, 2009).

How the ACA dependent requirement affects young adult education remains inconclusive. This is partly because there has not been much time to study the effects of the ACA dependent requirement. Dillender (2014) used a triple-difference approach and found that the policy change led to men completing more schooling but did not have an effect on women. However Yaskewich (2015) found that individuals from upper-income households decreased college enrollment due to the young adult requirement, while Depew (2015) found no change in the probability of being a student.

Savings and Asset Accumulation

Health insurance may affect savings and asset accumulation by freeing up resources, allowing families or individuals to save more. At the same time, health insurance protects against catastrophic health spending, and individuals may respond to this reduced risk by saving less. Additionally, public health insurance may discourage savings if asset testing is required to enroll. Thus, the relationship between health insurance and savings/asset accumulation is ambiguous, particularly for public health insurance programs if asset tests are required. Work considering private health insurance has largely found that private health insurance causes households to have more savings (Lee, 2016; Starr-McCluer, 1996).

However, when public health insurance was considered, results differed, and there was suggestive evidence that savings fell. For example, Gruber and Yelowitz (1999) showed that Medicaid significantly decreased savings, and Maynard and Qiu (2009) showed this effect is concentrated in the middle quantiles of wealth. However, Gittleman (2011) called these findings into question by showing that if current Medicaid dollars are used as an instrument, rather than total expected spending, there was no effect of Medicaid on savings. Overall, the role that public health insurance plays in determining savings remains an open question.

Household Finances: Bankruptcy, Poverty, and Food Insecurity

Closely related to savings, we also considered finances. We grouped articles that studied bankruptcy, poverty, and measures of consumption under this umbrella. Because of the differing eligibility of public health insurance for children, parents, and childless adults, we divided populations into general households and those with children.

The Oregon Health Insurance Experiment found that Medicaid was not associated with change in the probability of declaring bankruptcy (Finkelstein et al., 2012). However, as the authors point out, bankruptcy is a very low probability event to begin with. Articles using quasi-experimental approaches have found that public health insurance decreased personal bankruptcies and the probability of being in extreme poverty (Gross & Notowidigdo, 2011; Sommers & Oellerich, 2013).

Articles studying households with children found that health insurance increased nonhealth consumption but did not affect food insecurity. For example, Medicaid and CHIP were associated with increased nonhealth consumption concentrated on retirement and pension savings, as well as a decrease in the likelihood of families spending 10% or more of their disposable income on medical care (Banthin & Selden, 2003; Leininger, Levy, & Schanzenbach, 2010). However, Saloner (2013) found that public health insurance did not decrease food insecurity or housing problems. Similarly, Schmidt, Shore-Sheppard, and Watson (2016) found that Medicaid had no effect on food insecurity in households with children but noted the imprecision of the estimates and called for additional research. It also should be noted that none of the studies considered how private insurance affected household finances.

Delayed Care due to Costs

The last economic outcome we considered was delayed care due to costs. Because insurance subsidizes the cost of health care, it should prevent individuals from delaying necessary care, and in general, this is what empirical work finds. Although private insurance is much more common in the United States, almost all the empirical work has used variation in Medicaid eligibility as exogenous changes in health insurance. We grouped findings by the population studied: households with children, young adults, adults, and childless adults.

It is interesting to note that although public health insurance covers more children than adults, there is relatively little work studying how health insurance affects delayed care due to costs for households with children. All the studies we analyzed found decreases in delayed care due to costs for this population (Busch & Duchovny, 2005; McMorrow et al., 2016; Miller, 2012). In addition, young adults affected by the ACA dependent requirement were less likely to be unable to see a physician due to costs (Wallace & Sommers, 2015).

All the studies that examined the adult population also found a decrease in delayed care, either because of cost or medical debt. The Oregon Health Insurance Experiment found that there was a large decrease, about 3.6 percentage points or 55%, in the probability of refusing treatment due to medical debt in the past 6 months (Finkelstein et al., 2012). Pauly (2005) is the only article that considered private health insurance. Although childless adults are the ones most affected by the ACA, this group has been relatively understudied. We identified one study, Guy (2010), and it found that Medicaid eligibility in both the traditional cost-sharing structure and increased cost-sharing structure decreased the likelihood of going without care due to costs. Overall, the results in this literature are generally consistent and show that health insurance decreased the likelihood of delayed care because of costs.

Health Outcomes

As mentioned in the "Conceptual Framework" and "Delayed Care due to Costs" sections, there is considerable evidence that health insurance increases the *quantity* of health care used, and a key question concerns the effectiveness of the increased medical care utilization for *producing* health. Since the late 1990s, many studies have reviewed the impact of health insurance on health (Andrulis, 1998; Dor & Umapathi, 2014; Freeman et al., 2008; Hadley, 2003; Hoffman & Paradise, 2008; Howell, 2001; Howell & Kenney, 2012; Institute of Medicine Committee on the Consequences of Uninsurance, 2002; Levy & Meltzer, 2004, 2008; McWilliams, 2009; Ross & Mirowsky, 2000; Wallace & Sommers, 2016). Early reviews often lacked discussion of issues related to the endogeneity of insurance and included observational studies. In 2008 and 2009, three reviews emphasized the methodological challenges of measuring the causal impact of insurance and focused on the evidence gathered with experimental and quasi-experimental methods (Freeman et al., 2008; Levy & Meltzer, 2008; McWilliams, 2009), setting the bar for this area of research. These studies concluded that existing evidence supported that insurance improved health, at least in specific populations (such as HIV-positive individuals), but that more research was needed. More recent reviews have focused on specific public insurance programs (Howell & Kenney, 2012), focused on methodological considerations (Wallace & Sommers, 2016), or focused on a small sample of studies (Dor & Umapathi, 2014; Sommers, Gawande, & Baicker, 2017).

Table 2 presents the main findings from identified studies that used experimental and quasi-experimental methods to study the impact of health insurance on health. Of the 45 articles summarized, 26 were published after the three reviews noted previously. The studies we reviewed examined different measures of health: mortality, self-reported health status, prevalence of risk factors, health limitations and functional status, preventable hospitalizations, incidence/prevalence and outcomes of chronic conditions, and mental health diagnosis and outcomes. Many articles addressed a variety of outcomes and appear more than once in the table.

Mortality

Mortality is a widely studied outcome. Most studies found no significant impact of insurance when considering the overall populations targeted by experiments and reforms (Brook et al., 1983; Finkelstein et al., 2012; Kaestner, 2016; Weathers & Stegman, 2012). In older adults, Hadley and Waidmann (2006) found that insurance reduced mortality prior to automatic Medicare enrollment at age 65, but the validity of their instruments has been questioned in other studies (Black et al., 2013; Kronick, 2006; Levy & Meltzer, 2008).

However, health insurance was found to protect against mortality for two specific subgroups: children and high-risk adults. Three articles, using a similar instrumental variables approach, found significant effects of Medicaid eligibility on infant and child mortality (Currie & Gruber, 1996a, 1996b; Howell et al., 2010). The most recent of these studies found that gains in children were limited to external-cause mortality (e.g., accidents) and were not significant in natural-cause mortality (e.g., diseases) (Howell et al., 2010). Insurance eligibility of children was found to significantly reduce mortality for several years following eligibility (Wherry & Meyer, 2015), and more recent evidence showed that these effects may persist in young adulthood (Brown et al., 2015).

The second group for which insurance was found to have a protective effect is high-risk adults. In particular, the RAND Experiment showed no impact of free care on mortality in the overall sample but showed a 10% reduction among individuals classified as having high health risks (Brook et al., 1983). The authors attributed this finding to better blood pressure control among people with hypertension in the free care group. Similarly, studies of HIV-positive populations and trauma patients indicated that insurance prevented mortality for those at high risk of dying (Doyle, 2005; Dozier et al., 2010; Goldman et al., 2001). We note that the trauma studies did not explicitly account for insurance endogeneity but instead assumed that the unexpected and life-threatening nature of the trauma was such that eventual outcomes are plausibly caused by insurance status.

Overall, studies found that health insurance has no significant impact on mortality in the general population but decreases mortality for children and high-risk adults. The results were consistent with the hypothesis that health insurance increases consumption of medical services that improve health among individuals located at a steep portion of the health production function.

Self-Reported Health Status

Self-reported health status was the most commonly studied health outcome, in large part because it has consistently shown to successfully convey valuable information about respondents' health (DeSalvo, Bloser, Reynolds, He, & Miilunpalo et al., 1997) and because it can be measured easily through survey questionnaires, unlike many other health indicators. However, the outcomes studied are quite variable in the literature, making cross-study comparisons difficult. For instance, Sommers, Long, and Baicker (2014) found a 5% decrease in the probability of reporting good, fair, or poor health (as opposed to excellent or very good health) after the Massachusetts reform, while Zhu et al. (2010) found no significant change in the probability of reporting fair or poor health after the same reform. It is unclear whether the difference is attributable to the inclusion of "good" in the category used by Sommers et al. or to other factors.

Perhaps because of such differences in definitions, the findings on self-reported health status are inconclusive: For each study finding a significant association among an age group, another finds no effect. An exception concerns younger adults, for whom studies showed significant improvements after the implementation of the ACA's dependant coverage provision (Barbaresco, Courtemanche, & Qi, 2015; Chua & Sommers, 2014).

Health Limitations and Functional Status

As with mortality, the literature we analyzed found different effects of health insurance on health limitations and functional status by group studied. The Accelerated Benefits Demonstration is relevant for this outcome because it studied the impact of access to health insurance for SSDI beneficiaries, a group with functional limitations preventing work. For that population, early access to Medicare health benefits was found to improve functional status. It was associated with a 21% decline in the probability of having a survey score indicative of meeting the Social Security Administration's disability definition (Weathers & Stegman, 2012).

In the nondisabled population, health insurance had no clear effect on functional status. In childhood and young adulthood, the existing literature found either no or small impact of insurance on several health limitation measures (Barbaresco et al., 2015; Lykens & Jargowsky, 2002; Miller & Wherry, 2015; Newhouse & RAND Corporation Insurance Experiment Group, 1993). Among the nondisabled adult population, Medicaid enrollment was associated with an 8% increase in the amount of reported days not impaired by health in the Oregon Health Experiment (Finkelstein et al., 2012), but these results appeared to contradict the absence of findings in both the RAND Experiment (Brook et al., 1983) and after the most recent expansion of Medicaid (Sommers et al., 2015).

Preventable Hospitalizations

Hospital utilization may be used as a proxy for health status, but there are challenges to interpreting it as such. The price of hospital use and other care are lower for insured individuals; thus, insurance may lead to more (or less) hospital visits and overnight stays without bearing on health. For instance, among adults, the Massachusetts health reform was found to lead to higher all-cause readmissions and readmissions for chest pain and substance abuse (Lasser et al., 2014) that may be explained by a response to the decline in the price in hospital care. Also, several studies found that insurance reduced childhood emergency care (Bronchetti, 2014; Miller & Wherry, 2015), which may be an optimal response to lower relative prices of primary care in nonhospital settings for insured individuals.

Kaestner, Joyce, and Racine (2001) argued that ambulatory care–sensitive hospitalizations are plausibly a better objective health indicator, since they are ". . . sensitive to better primary care and greater medical intervention." As with mortality, studies have found that children benefit from insurance with regard to this indicator of health. Among children aged younger than 15 years, Aizer (2007) found that efforts to increase Medicaid enrollment were associated with significant declines in ambulatory care–sensitive hospitalizations. The benefits appeared to be highest in low-income children. Kaestner et al. (2001) found that the effect of public insurance was strongest for younger children in very low-income areas, a target group of Medicaid expansions. Both studies interpreted these results as indicative of improved child health due to better access to primary care. In contrast, a recent study found no impact of insurance for this indicator in the overall adult population (McCormick et al., 2015).

Incidence/Prevalence and Outcomes of Chronic Conditions

Studies of the impact of health insurance on chronic conditions have investigated a broad array of outcomes: the probability of reporting having a chronic condition, hospitalizations associated with a condition, self-reported health status following the onset of conditions, and objective measurements of condition severity.

The most studied condition was hypertension, which can usually be successfully controlled through adequate lifestyle changes, medication, and follow-up (Chobanian et al., 2003). In the primary prevention context, Boudreaux et al. (2016) found that exposure to Medicaid during childhood significantly reduced the likelihood of having hypertension in adulthood. In the secondary prevention context, most studies found that insurance improved outcomes among adult hypertensives. Results from the RAND Experiment showed that hypertensives in the free plan reduced their diastolic blood pressure levels in comparison with the cost-sharing plans, with highest differences found in low-income people (Brook et al., 1983; Keeler et al., 1985). This finding was consistent with Lurie et al. (1984) and Fihn and Wicher (1988), who estimated that termination from public insurance among individuals with hypertension caused an increase in systolic blood pressure relative to a control group. Insurance was not found to have similar secondary prevention effects for diabetes: Studies did not find a significant impact of insurance on blood glucose control among diabetics (Keeler et al., 1987; Lurie et al., 1984).

Again, some evidence suggests that children may benefit differentially from insurance in terms of primary prevention of chronic conditions. Two studies indicated that Medicaid eligibility in childhood prevented the onset of chronic conditions (Boudreaux et al., 2016; Miller & Wherry, 2015), while a third found a reduction in asthma attacks, albeit significant at the 10% level (Bronchetti, 2014).

Mental Health Status

Mental health status was among the most studied aspects of the impact of health insurance on health. In contrast with other health outcomes, existing evidence revealed no impact of being insured in childhood on mental health (Miller & Wherry, 2015; Newhouse & RAND Corporation Insurance Experiment Group, 1993).

In adulthood, results were mixed. In the overall adult population, RAND Experiment data showed no impact of being in the free health care plan in comparison with the cost-sharing plans on a standardized score (Brook et al., 1983), on worry about one’s children’s health, (Newhouse & RAND Corporation Insurance Experiment Group, 1993), and on worry about one’s own health conditions (except for a category including chronic bronchitis and emphysema; Keeler et al., 1987). In the working-age population with functional limitations, data from the Accelerated Benefits Demonstration project also showed no significant impact of receiving health benefits in comparison with the control group unless these benefits were supported by other services, including help navigating the health care system (Weathers & Stegman, 2012).

Conversely, in the low-income population affected by recent health insurance reforms, most of the literature found that insurance significantly improved mental health status. Studies of the Oregon Health Experiment showed that Medicaid enrollment was associated with a lower probability of positive depression screening, higher mental health scores based on a standardized survey, and increased self-reported days in good mental health (Baicker et al., 2013; Finkelstein et al., 2012). These findings were compatible with those of several quasi-experimental studies investigating the Massachusetts Health Reform (Courtemanche & Zapata, 2014; Lasser et al., 2014; Wees, Zaslavsky, & Ayanian, 2013), Medicaid expansions (McMorrow et al., 2016), and the ACA's dependent coverage provision (Chua & Sommers, 2014).

Prevalence of Risk Factors

Unlike the health outcomes studied in the previous sections, the impact of insurance on risk factors for poor health could go in different directions. On one hand, improved access to medical care could provide patients with better information about their health risks and strategies to minimize them. If that were the case, health insurance would be associated with improved health behaviors and a lower prevalence of risk factors. On the other hand, as discussed in the "Conceptual Framework" section, health insurance also may lead to risky behaviors by reducing the incentives for healthy behaviors and the costs of risky behaviors.

Overall, neither of these effects appeared to dominate: The majority of reviewed studies found no significant impact of insurance on behaviors such as smoking, alcohol consumption, and exercise (Baicker et al., 2013; Barbaresco et al., 2015; Brook et al., 1983; Courtemanche & Zapata, 2014; Keeler et al., 1987). Tellingly, individuals who enrolled in Medicaid after being randomly selected as eligible were more likely to report trying to lose weight but not of having a lower body mass index (Wright et al., 2016). Conversely, the ACA's dependent coverage provision was associated with an increase in the probability of being a risky drinker among young adults but not in the average number of monthly drinks consumed (Barbaresco et al., 2015).

In addition to behaviors, studies considered the impact of insurance on blood pressure and obesity, two key heart disease predictors. Again, results were mixed, suggesting no clear impact of health insurance. Overall lower blood pressure among insured individuals was a finding from the RAND Experiment (Brook et al., 1983; Keeler et al., 1985), but this result was not replicated in the Oregon Health Insurance Experiment (Baicker et al., 2013). Regarding weight and obesity, prenatal Medicaid eligibility was associated with a lower probability of obesity in young adulthood (Miller & Wherry, 2015), but childhood and adult eligibility had no effect in most studies (Boudreaux et al., 2016; Brook et al., 1983; De La Mata, 2012; Wright et al., 2016).

Conclusion

The aim of our study was to identify and analyze the existing evidence of the effects of health insurance on health and economic outcomes across a variety of populations and identify gaps in an active and burgeoning research area. We identified 112 experimental and quasi-experimental studies for inclusion in this review. Although randomized control trials are the gold standard, it is important to note that findings are dependent on experimental design and environment—including medical technology, outcomes considered, and who is included in the study. This makes comparing results across studies difficult. Among quasi-experimental studies, the use of a multitude of techniques with different underlying assumptions further complicated comparisons. However, several findings emerged.

The effects of health insurance on economic outcomes were well studied and provided several lessons. Grossman's health capital model provides insight into how health insurance affects labor supply and wages and illustrates how effects will vary across different populations. The literature consistently found no effect on labor supply in the general population and inconsistent effects on wages. However, health insurance affected the labor supply of various groups such as single mothers, pregnant women, and sick adults. We identified government program participation as an understudied area, and in particular, the long-term effects of health insurance on take-up of other government programs later in life. Additionally, variation across states in enrollment processes for Medicaid and other programs is yet to be studied, as well as dynamics between Medicaid and other programs. The evidence suggested that health insurance improved education outcomes, particularly during childhood. Household finances may have improved because of health insurance, but variation in how the outcomes were measured affected findings. Another consistent finding across studies was that insured individuals were less likely to delay care due to costs.

Health insurance has consistently been shown to increase access to and consumption of health care. The production of health may differ from one individual to another based on how effective this additional care is for producing health. Accordingly, the empirical evidence on the relationship between health insurance and several aspects of health highlighted differences across the groups studied. Low-income children were found to benefit from public insurance in several key ways: a reduction in mortality that may persist in young adulthood; a decline in ambulatory care–sensitive hospitalizations, an indicator of overall health; and lower incidence of chronic conditions. The literature also identified substantial benefits of adults from lower socioeconomic status and adults in poor health in terms of improved mortality, functional status, and blood pressure management. Furthermore, insurance was linked to improved mental health status for the low-income adult population affected by health insurance reforms. These documented effects of insurance for specific subgroups contrast with findings for the overall adult population, where results generally were mixed or showed no impact of insurance. Such divergence is consistent with the notion that health insurance benefits are heterogeneous, as was pointed out by previous reviews (Freeman et al., 2008; Levy & Meltzer, 2008; McWilliams, 2009). The most recent evidence has strengthened this notion by focusing attention on high-risk groups.

This review has several limitations. First, while we required studies to use a methodology designed to measure the causal impact of insurance, we did not evaluate the strengths and weaknesses of a given methodology when reviewing findings. Additionally, a limitation of the literature—and this review—is that most studies implicitly treat being insured as a dichotomous state. Because of this, our study provides limited insight about the importance of health insurance design and quality, which are likely to introduce variations in insurance coverage response. An instructive example in that regard is the Social Security Administration Accelerated Benefits Demonstration project, which only showed significant impact on mental health status when health benefits were supported by additional services, including help navigating the health care system (Weathers & Stegman, 2012). Future research may include analyses of health insurance benefit design and its effect on health and economic outcomes. In the same vein, we examined both older studies and more recent research to draw conclusions about the effects of health insurance on outcomes. However, the relationship between health insurance and outcomes has changed over time, perhaps most notably with regard to the productivity of medical care and the important rise of health spending relative to income. Future studies may examine how these changes and other factors affect the relationship between health insurance and health and economic outcomes.

The past decade has produced an abundance of research about the effects of health insurance. An essential finding from recent work is the importance of childhood health insurance on both health and economic outcomes. However, there are still several unanswered or open-ended questions about the effect of health insurance. For example, the relationship between health insurance and government program participation in recent years is not well documented. Also, whether self-reported health status is affected by insurance is an area where research using more consistent measures is needed, given the disagreement found in the recent literature for this outcome. In addition, there should be more work reconciling findings across outcomes. We documented several areas where the effects varied, either because of different populations or methods. Because of this, the field would benefit from more replication studies. We noted several studies that could not be replicated, either because different data sources were used or because the measure of health insurance was not robust. Given the current interest in this area of research, we are optimistic that many of these gaps will be addressed in the coming years.

Acknowledgments

We acknowledge support from Alwyn Cassil of Policy Translation, LLC, in copy-editing this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The research reported herein was performed pursuant to a grant from the U.S. Social Security Administration (SSA) funded as part of the Retirement Research Consortium through the University of Michigan Retirement Research Center Award RRC08098401. The opinions and conclusions expressed are solely those of the author(s) and do not represent the opinions or policy of SSA or any agency of the Federal Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of the contents of this report. Reference herein to any specific commercial product, process or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply endorsement, recommendation or favoring by the United States Government or any agency thereof. Research reported in this publication was also supported by the National Institute on Aging of the National Institutes of Health under Award Number P30AG024968. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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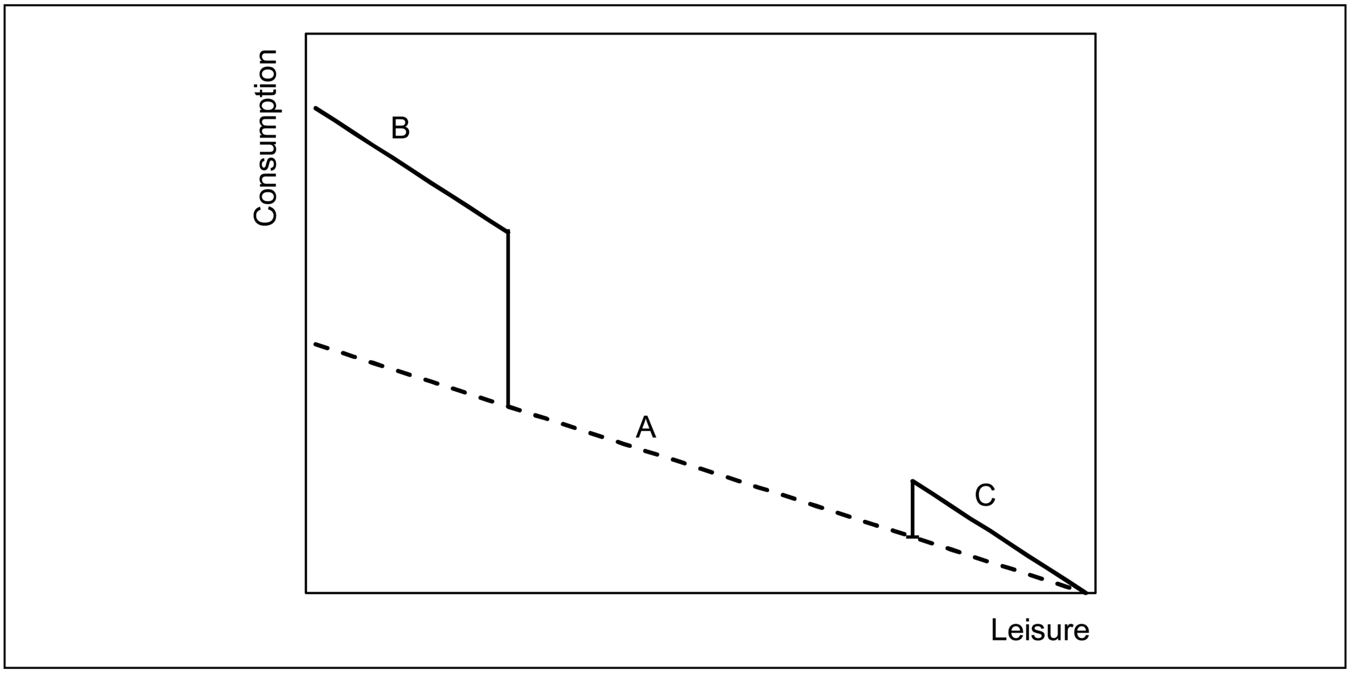

Figure 1.

Trade-off between leisure and consumption by availability of health insurance.

Note. The dashed line represents a budget constraint when health insurance is unavailable. The solid line represents the availability of employer-sponsored insurance (Segment B) and public insurance (Segment C).

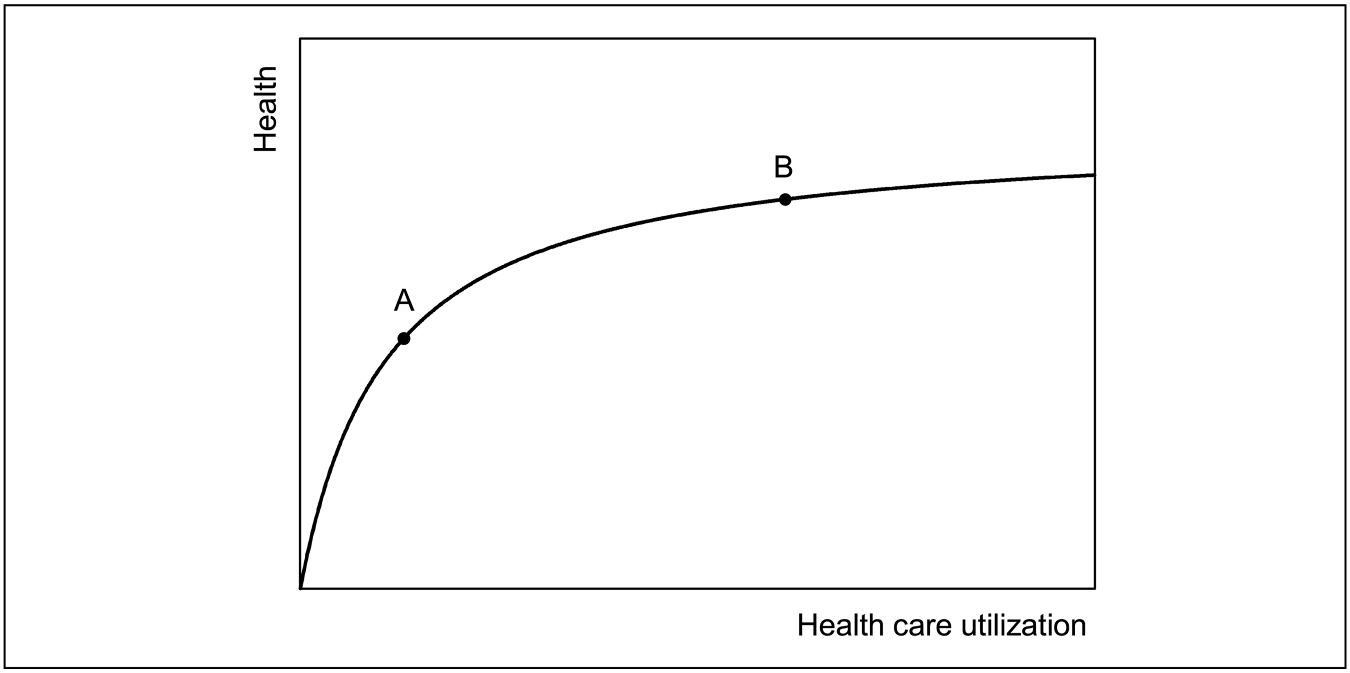

Figure 2.
Health production function and relation to insurance.
Note. If individuals are at a relatively steep area of the function, as in Point A, health insurance is likely to have a measurable impact on health (e.g., moving from A to B). In contrast, if they are located at a flat area of the curve, as in B, then health insurance may have little effect on health.

Table 1.

Main Findings From the Experimental and Quasi-Experimental Literature on the Impact of Health Insurance on Economic Outcomes, by Outcome Category.

1.1 Labor Force Participation.

Population of interest	Study	Study design	Finding
Young adults			
16- to 29-year-olds, except 26	Antwi, Moriya, and Simon (2013)	Difference-in-difference comparing individuals most likely to be affected based on age with those above and below them in age	• No effect on probability of being employed, but reduced prevalence of FT work by 2 ppt (5.8%) and reduced hours of work by about 3% • No change in rates of job change
22- to 35-year-olds, possibly affected by mandates earlier	Dillender (2014)	Triple-difference comparing changes for affected ages after the reforms relative to slightly older ages in states that implement the reform relative to those that do not	• Women saw 1.2-ppt (percentage point) decline in LFP. No change for men. Men saw 1.7-ppt decline in FT employment, but no change for women
19- to 29-year-olds	Depew (2015)	Triple-difference comparing age criteria in states and adoption across states	• No effect on extensive margin for males or females • 3.7-ppt (5.67%) decrease in FT employment for females and 1.9 ppt (2.44%) decrease for males. Females decreased hours by 3.7% and males by 1.9%
24- to 28-year-olds who are not married	Dahlen (2015)	Regression discontinuity design comparing 24- to 26-year-olds with 27- to 28-year-olds	• Aging out of provision increased employment for men by 8 ppt and increased the probability of being in the labor force by 10 ppt. No change for women
19- to 29-year-olds	Heim, Lurie, and Simon (2014)	Triple-difference comparing young adults had access to benefits, age, and pre-post law	• Effects on employment (as measured by filing a tax return and receiving a W-2) were not statistically different from 0
Adults			
Oregon adults, ages 19–64	Baicker, Finkelstein, Song, and Taubman (2014)	Oregon Health Insurance Experiment: IV for being enrolled in Medicaid using lottery as instrument; also show reduced form results	• No evidence of a change in the likelihood of being employed
Working individuals, ages 18–65	Thurston (1997)	Difference-in-difference comparing Hawaii to rest of country	• No evidence of a change in hours worked
Ages 18–65 who were not self-employed	Buchmueller, DiNardo, and Valletta (2011)	Difference-in-difference comparing Hawaii with other states	• Interested in LR effects of the law • Increase in low hour (<20 hours/week) jobs in Hawaii of 1.4 ppt compared with other states, concentrated in quintiles with lowest concentration of ESHI • No effect on probability of employment
Ages 16+	Dubay, Long, and Lawton (2012)	Difference-in-difference comparing Massachusetts with similar states as well as rest of country	• Little or no effect on private-sector employment or hours worked even when looking at results by firm size
Ages 18–64 who were not self-employed	Dillender, Heinrich, and Houseman (2016)	Difference-in-difference comparing outcomes in MA before and after reform with rest of country while controlling for unemployment rates	• No change in PT work for full population, but when constrained to individuals without bachelor's degrees, find a 1.7 ppt (8%) increase in the probability of working PT hours
Employed individuals younger than 65 years	Moriya, Selden, and Simon (2016)	First difference with state and year FE	• No increases in 25–29 hours/week or decreases in 30–34 hours/week in 2014 or 2015. Does not seem to vary significantly across firm size, but employees of large firms did decrease working 30–34 hours/week by 0.25 ppt in 2015 • No significant change in involuntary PT work

Population of interest	Study	Study design	Finding
			• 25–29 hours/week may have increased for individuals with no more than a HS diploma, but trend predated ACA, for older workers (60–64) slight increase in 25–29 hours/week
Employed in the private sector, nonagricultural	Mathur, Slavov, and Strain (2016)	Difference-in-difference comparing workers most likely to be close to minimum wage and industries likely to be affected with others	• No significant effect on odds of working 25–29 vs. 31 –35 hours
Ages 18–64	Kolstad and Kowalski (2016)	Difference-in-difference using MA reform as exogenous variation in ESHI	• The change in hours is equal to a decrease of 0.96 hours/week
At-risk adult populations			
HS degree or less	Kaestner et al. (2015)	Difference-in-difference comparing states that expanded Medicaid with those that did not and synthetic control approach	• No effects on employment at time of interview, usual hours/week worked or working 30 or more hours/week
Adults with less than 138% FPL	Gooptu et al.(2016)	Difference-in-difference comparing states that expanded Medicaid with those that did not	• No significant effect on transitioning from employed to unemployed out-of-labor force, job switching, or switching from FT to PT
Married adults			
Wives 25 to 54 years old, and husbands were not nonworking, excluding couples on public insurance during the past year	Buchmueller and Valletta (1999)	Observational-multinomial logit hour hours worked and insurance; difference-in-difference comparing across wives' insurance status, but within same hours category—no control for exogeneity of husband's offer of *health insurance*	• Much less likely to work both PT and FT relative to not working in DD specifications • 11-ppt reduction (26%) in FT and receiving insurance if husband does (relative to husbands not offered insurance) This is concentrated mainly on women with children • 1.2-Ppt reduction in PT and receiving insurance if husband does
Married households where both partners are 19 to 64 years old and at least one spouse is employed outside household	Royalty and Abraham (2006)	Difference-in-difference with IV for spouse's *health insurance* with spouse's age and education and difference out effect paid sick leave to isolate effect of spouse's insurance	• 10-point increase in probability of husband having insurance offer is associated with 1-point decrease in wife working FT (35 hours+) and having offer and 1.5-point decrease in wife working 20+ hours/week with offer • 10-point increase in probability of wife having insurance offer is associated with 2.1-point decrease in husband working FT (35 hours+) with offer and 1.9-point decrease in working 20+ hours/week with offer
Excludes couples where husband is not working, wife is younger than 25 or older than 54, Medicare/ Medicaid recipients, self-employed wives	Kapinos (2009)	Difference-in-difference with IV for husband's insurance offer with husband's unions status and firm size and difference out effect having a pension to isolate effect of husband's insurance	• Husband's insurance offer has no effect on hours worked, but wives whose husband has Health insurance offer are 16% less likely to work and suggests effect has been increasing in magnitude overtime; wives whose husband has Health insurance offer are 23% less likely to work FT and effect has been again suggestive evidence that this has been increasing in magnitude overtime
25–64 years of age	Buchmueller and Carpenter (2012)	Difference-in-difference comparing partnered gay men (women) with nonpartnered gay and straight men (women)	• No change in partnership or employment for gay men, but lesbian women were 7.6 ppt (14%) more likely to be in a partnership and 7.1 ppt less likely to be working FT
Couples where both members are 30–65	Dillender (2015b)	Triple-difference comparing before and after states extended legal recognition, between same-sex and married opposite-sex couples	• LFP fell by 7.9 ppt (9%) for women, likelihood of both members being in the LF fell by 12.2 ppt, likelihood of one member in labor force increased by 10.2 ppt, no change in neither member in LF. These are concentrated in women with young children. No changes for men
Single mothers			
Females aged 18–64 with 1+child younger than 18	Winkler (1991)	Use form of state Medicaid generosity as exogenous variation in valuation with two-step estimate to correct for selection in hours decision	• Medicaid generosity decreases employment until control for region and urban/rural • 10% increase in Medicaid generosity causes average female employment probability to fall 0.9–1.3 ppt • 10% increase in Medicaid generosity causes employment probability to fall 0.61 (Miss.) to 2.1 (DC) ppt • Medicaid generosity has no effect on hours worked for female heads

Population of interest	Study	Study design	Finding
Females aged 18–64 with 1+child younger than 18 years	Moffitt and Wolfe (1992)	Use individual valuation of Medicaid and private insurance to account for heterogeneity in health	• Increase in valuation of Medicaid/private insurance increases/decreases AFDC participation, but effect of private insurance is larger • Women with highest values of Medicaid are driving results • Increase in value of Medicaid coverage of $50 (~ 1/3) increases AFDC participation by 2 ppt (5.9%) and reduces employment rates by 5.5 ppt. Results for increasing private insurance valuation are opposite size and almost double in size • If every woman who worked was insured, 3.5- ppt reduction in AFDC and 7.6-ppt increase in employment rate
Females ages 18–55 with children younger than 15 years, not receiving Medicare or military health insurance, not reporting a handicap or ill health, and not a veteran	Yelowitz (1995)	Medicaid expansions of late 1980s and early 1990s as exogenous variation in eligibility	• Decoupling Medicaid and AFDC increased LFP by 0.9 ppt, or 1.4% and reduced AFDC caseload by 3.5%. These results are concentrated on ever married women
See Yelowitz, above	Ham and Shore-Sheppard (2005)	Medicaid expansions of late 1980s and early 1990s as exogenous variation in eligibility	• Increasing Medicaid eligibility had no effect on LFP (working 1+ week in last year) or on the number of hours worked using a Heckman selection model
Females ages 18–65 with at least one child younger than 15 years	Montgomery and Navin (2000)	Medicaid expansions of late 1980s and early 1990s as exogenous variation in eligibility, excluding spending on disabled and elderly	Medicaid expenditures have no effect on employment or hours worked or LFP when controlling for state FE Expansion of Medicaid is important—increase eligibility by 25% increases LFP by 0.034 ppt but no effect on hours
Women aged 19–44 and not in school, not ill, or disabled in previous year	Meyer and Rosenbaum (2001)	Difference-in-difference comparing single mothers with single childless women with variation in changes across time and states in how families are treated	• Medicaid had no significant effect on work as measured by probability of working last week or probability of working at all last year and small negative effects on hours worked
Females aged 18–55 with children	Pohl (2014)	Estimate partial equilibrium static discrete choice model with labor supply and insurance choice for mother and kid using exogenous variation in Medicaid eligibility across states and times; simulate changes when Medicaid is expanded and subsidies are introduced	• Labor supply increases by 4.5% at extensive margin and 2.2% at the intensive margin. These changes are largest for single mothers with medical conditions
Childless adults			
Individuals aged 19–64 with family income ≤ 300% FPL who worked at least 1 week last year	Guy, Atherly, and Adams (2012)	Difference-in-difference comparing individuals in states that expanded access to childless adults with those in states that did not	• Public Health insurance eligibility is associated with a 2.2-percentage point decrease in FT employment, a 0.8-percentage point increase in the likelihood of PT employment, and a 1.4-percentage point increase in the likelihood of not working. Effects are stronger for those who are older (50–64) and in worse health
21- to 64-year-olds with a bachelor's degree or less and not in armed forces	Garthwaite, Gross, and Notowidigdo (2014)	Difference-in-difference comparing TN with other southern states and triple-difference focusing on childless adults	• Increase in employment of 2.5 ppt after disenrollment, which is concentrated among childless adults who saw a decrease of 4.6 ppt (6%). Evidence that change in labor supply is happening along the extensive margin. Results are larger for older individuals (40–64)
Nonelderly, nondisabled, childless adults	Dague, DeLeire, and Leininger (2014)	Regression discontinuity in Wl comparing applications just before freeze with applications just after freeze as well as propensity-score matching difference-in-difference	• Public insurance reduced the likelihood of employment by 2.4–5.9 ppt or 6.1 to 10.6 depending on specification
Pregnant women			
Women who gave birth from 1985– 1996 when they were between 18 and 39	Dave et al. (2015)	Reduced form using variation in public health insurance across states and time as exogenous variation	• 10-ppt increase in Medicaid eligibility is associated with a 2-ppt decrease in probability of being employed in the past year, a 1.8-ppt decrease in LFP in the past year, and no significant change in weeks worked in the past year. It also reduced

Population of interest	Study	Study design	Finding
			weekly hours by 3.9% and conditional weekly hours by 0.9%. These results are concentrated on women with less than a HS degree
Other groups			
Women diagnosed with breast cancer	Bradley et al. (2007)	First difference comparing women who have insurance from their own jobs with women who are insured through their husband	• Having insurance, even if husband was offered insurance, increased probability of working and work more hours 12 and 18 months after diagnosis
Individuals who received a kidney transplant	Page (2011)	Difference-in-difference comparing individuals in low-income treatment group with those in high (more likely to have private insurance)	• 8-ppt decrease in LFP for low-income treatment group 1 year after transplant. Effect jumps to 22.85 after correcting for proxy
SSI and D1 recipients	Coe and Rupp (2013)	Difference-in-difference using state-level variation in the access and affordability of health care for disabled individuals in both the nongroup and the Medicaid markets	• Medicaid buy-in programs have a positive, but small, effect on earning, increasing the likelihood of positive earnings by about 0.2–0.5 ppt. Medicaid generosity seems to have different effects on different program participants: The likelihood of earning among D1-only beneficiaries is lower, by 0.3 ppt, in states with high Medicaid coverage, while SSI-only beneficiaries are more likely to have positive earnings by 0.5 ppt. These effects are larger for sicker individuals
Married couples with male veteran where husband is between 55 and 64, wife was not a veteran, no active military personal	Boyle and Lahey (2016)	Difference-in-difference comparing wives of male veterans and nonveterans before and after VA benefits expansion	• For married men, 2.3% increase in not working, 14.7% increase in PT employment, no change in self-employment • For wives, 3%-4% increase in probability of working, average hours/week increases by about 0.5 hour, no change in hours conditional on working, log earnings increase by 3%. These results are driven by wives with HS degree or less and those with wealth below the median

1.2 Earnings, Wages, and Other Labor Market Outcomes.

Population of interest	Study	Study design	Finding
Children			
Children ages 0–5 not from AZ	Boudreaux, Golberstein, and McAlpine (2016)	Use timing of introduction of Medicaid as exogenous variation in exposure	• No statistically significant effect on income to poverty ratio, decile of family wealth, or economic index for the low income (< 150% FPL target population)
Children whose parents filed taxes every year from 1996- when child turned 18	Brown, Kowalski and Lurie (2015)	Simulated IV using variation in eligibility across states and time as instrument for total years of eligibility	• Each additional year of eligibility from birth to age 18 increases cumulative tax payment by $247 for women, but results are not significant for men. Pooled together, 1 SD increase in Medicaid eligibility increases tax payments by 3.6%. • Each additional year of eligibility from birth to age 18, women earn $656 more from age 19–28, but no significant effect on men's earnings
Individuals born between 1979 and 1993 who are 18+ and not born in AZ	Miller and Wherry (2015)	Simulated IV using variation in eligibility across states and time as instrument for pre-natal eligibility, and at different ranges 1–4, 5–9, 10–14, 15–18	• 10-ppt increase in prenatal eligibility associated with increase in personal income of about $285 (2013 dollars). Using log of income, 10-ppt increase in prenatal eligibility increase average income by 1.3–1.5 ppt. Also ages 5–9 increases log income, but by smaller amount, 0.3–0.4 ppt
Young adults			
Ages 25–35 who were possibly affected by dependent mandates	Dillender (2014)	Triple-difference comparing how outcomes changed for affected ages after the reforms relative to slightly older ages in states that implement the reform relative with those that do not	• No significant change in wages for men when controlling for education. Women saw an increase of 2.2%-2.4% for being previously treated and 2.5%-2.8% for currently treated

Population of interest	Study	Study design	Finding
Adults			
Adults aged 19–64	Baicker et al. (2014)	Oregon Health Insurance Experiment: IV for being enrolled in Medicaid using lottery as instrument; also show reduced form results	• No statistically significant impact of Medicaid on amount of individual earnings or whether individual earnings are above the FPL for 2009 labor market activity
Working individuals, ages 18–65	Thurston (1997)	Difference-in-difference comparing Hawaii to rest of country	• Wages in industries most affected by mandate shrunk relative to other industries in Health insurance, but grew relative to same industries in the United States
Working individuals, ages 18–65, not self-employed	Buchmueller, DiNardo and Valletta (2011)	Difference-in-difference comparing Hawaii with other states	• Interested in LR effects of the law • No detectible difference in wages
Ages 18–64	Kolstad and Kowalski (2016)	Difference-in-difference using MA reform as exogenous variation in ESHI	• Compensating differential is −$1.35/hour which amounts to −$2,812/year
Married adults			
Wives working FT with hourly wage of at least $2.00	Olson (2002)	IV for Health insurance coverage of wife using husband's firm size and union status	• Wives with Health insurance earn about 0.20 log points lower wage than they would if they took a job without Health insurance
Single adults			
Employed FT (30+ hours/week), not married, not receiving Health insurance through other sources	Lluis and Abraham (2013)	Individual-level FE; also instrument for lagged wages using lagged skills and health and for current choice of benefits with past benefits	• Being offered Health insurance is associated with a decrease in wages of 1.8%. Results are sensitive to specification
Single mothers			
Ages 18–55 with no more than a HS degree, up to 5 children younger than 19 years, not receiving disability benefits for themselves	Hamersma (2013)	Individual FE/IV of distance between twice lagged earnings and Medicaid threshold for lagged distance	• Medicaid and SCHIP threshold had no effect on earnings for workers • When studying heterogeneity in response, finds no change in monthly hours, but there is some evidence that workers with earnings below Medicaid threshold experience higher earnings growth when Medicaid threshold is increased. For example, worker who was $300 below threshold is predicted to have improved earnings growth rate of about 15% for $100 increase in Medicaid threshold
Pregnant women			
Women who gave birth from 1985–1996 when they were between 18 and 39	Dave et al. (2015)	Reduced form using variation in public Health insurance across states and time as exogenous variation	• There was no change in log wages conditional on working
Childless adults			
Nonelderly, nondisabled, childless adults	Dague, Decker, Kaestner, & Simon (2014)	RD comparing applications just before freeze with applications just after freeze as well as propensity-score matching difference-in-difference	• Decrease in earnings of $200-$210/quarter (2010$) in RD and increase of $70-$ 120 in propensity score. Larger for older individuals
21- to 64-year-olds with a bachelor's degree or less, not in armed forces	Garthwaite, Gross and Notowidigdo (2014)	Difference-in-difference comparing TN with other southern states and triple-difference focusing on childless adults	• No significant change on wages

1.3 Program Participation.

Population of interest	Study	Study design	Finding
AFDC/TANF			

Population of interest	Study	Study design	Finding
Female headed houses with children	Blank (1989)	Use form of state Medicaid generosity as exogenous variation in valuation	• Medicaid value had no effect on AFDC participation
Female aged 18–64 headed houses with 1+child less than 18	Winkler (1991)	Use form of state Medicaid generosity as exogenous variation in valuation with two-step estimate to correct for selection in hours decision	• Replicate Blank's findings that Medicaid has insignificant effect on AFDC participation when market value of Medicaid was used. However, when expenditures per dollar of state personal income as measure of Medicaid were used, increases participation in AFDC
Female aged 18–64 headed houses with 1+child younger than 18 years	Moffitt and Wolfe (1992)	Use individual valuation of Medicaid and private insurance to account for heterogeneity in health	• Increase in valuation of Medicaid/private insurance increases/decreases AFDC participation, but effect of private insurance is larger • Women with highest values of Medicaid are driving results • Increase in value of Medicaid coverage of $50 (~1/3) increases AFDC participation by 2 ppt (5.9%). Results for increasing private insurance valuation are opposite size and almost double in size • If every woman who worked was insured, 3.5-ppt reduction in AFDC and 7.6-ppt increase in employment rate
Female headed houses (ages 18–55) with children younger than 15 years not receiving Medicare or military health ins., no handicap or ill health, not a veteran	Yelowitz (1995)	Medicaid expansions of late 1980s and early 1990s as exogenous variation in eligibility	• Decoupling Medicaid and AFDC reduced AFDC caseload by 3.5%. These results are concentrated on ever married women
See Yelowitz, above	Ham and Shore-Sheppard (2005)	Medicaid expansions of late 1980s and early 1990s as exogenous variation in eligibility	• Increasing Medicaid eligibility had no effect on AFDC participation
Female headed houses with children	Decker and Selck (2012)	OLS using the timing of Medicaid introduction across states as exogenous variation	• Medicaid introduction increased AFDC caseloads by 3% in first year, 9% in second year, and 13% in third year. Permanent caseloads increased by almost 16% • Medicaid introduction increased chance of female heads participating in AFDC by 6.9 ppt or 16%. Ultimately, increases by about 12 ppt, or 28%
Food stamps			
Adults aged 19–64	Baicker et al. (2014)	Oregon Health Insurance Experiment: IV for being enrolled in Medicaid using lottery as instrument; also show reduced form results	• Winning the lottery increased probability of receiving food stamps by 2.5 ppt (4%) and increases unconditional annual household FS benefits by $73, or $3000 in annual benefits for new beneficiaries. The effects of being on Medicaid are about 4X larger. Probability of being newly covered by SNAP increases in first 3 months and continues to increase in subsequent 3-month increments out to 12–15 months
Nonelderly households	Yelowitz (1996)	Medicaid expansions	• Marginal effect of expanding eligibility was to increase FS participation by 0.58 ppt or 7.5% increase in FS caseload • True effect of expansions was to increase FS participation by 0.22 ppt (Medicaid explains 10% of FS growth)
Individuals born between 1979 and 1993 who are 18+ and not born in AZ	Miller and Wherry (2015)	Simulated IV using variation in eligibility across states and time as instrument for prenatal eligibility, and at different ranges 1–4, 5–9, 10–14, 15–18	• 10-ppt increase in Medicaid prenatal eligibility decreased probability of having FS benefits by 0.6%
SSI and D1			
Adults aged 19–64	Baicker et al. (2014)	Oregon Health Insurance Experiment: IV for being enrolled in Medicaid using lottery as instrument; also show reduced form results	• No statistically significant effect on SSDI or SSI benefit receipt. Possible evidence of increase in probability of receipt of TANF but results are small and not robust
18- to 64-year-olds nonsingle parent households, White or African American not in AZ, not	Yelowitz (1998)	Medicaid expansions; IV is average Medicaid expenditure for blind SSI recipients	• Increasing Medicaid expenditure by $1,000, increases SSI participation by 0.0537 ppt, or 13% of increase in SSI participation

Population of interest	Study	Study design	Finding
including women younger than 45 years			• For low permanent-income group, Medicaid explains about 20% of growth in SSI for this group
Ages 18–64 between October 2004 and September 2009 in MA and other states in NE census division	Maestas, Mullen, and Strand (2014)	Difference-in-difference comparing MA with other states in NE census division	• Disability applications increased by 3% (0.08/1000 working age residents) compared with neighboring states in 2008, but disappears in 2009. This is primarily driven by SSDI-only applications. • Low-insurance counties saw decrease in applications of 0.06 working-age residents in 2007 and 2008, even though SSDI-only applications increased by 0.04 in 2008 • SSDI-only applicants filed on 0.5–1 month later (on average) in low-insurance counties and 1–2 months earlier in high-insurance counties
MEPS sample	Li (2015)	Structural	• Calibrated general equilibrium model suggests that ACA will decrease percentage of working-age people receiving D1 by 0.3 ppt and increase LFP by 0.2 ppt
Workers compensation			
NLSY sample born between 1957 and 1964	Lakdawalla, Reville, and Seabury (2007)	Observational but individual FE, controlling for industry, state, establishment size	• Employer offer of Health insurance is associated with 0.4- to 1-ppt increase in probability of workplace injury • Injured workers in firms that offer Health insurance 14–17 ppt more likely to file a WC claim but actually having Health insurance is associated with 4- to 6-ppt increase in probability of filing a WC claim
TX individuals within 2 years of 26th birthday	Dillender (2015a)	RD exploiting jump in coverage through parents Health insurance after age 26	• No significant change in claims after age 26 but number of bills paid for by WC increases 8.1 %, driven by strain and sprain bills as well as number of occupational disease bills
EITC			
Children whose parents filed in every tax year from 1996-when child turns 18	Brown, Kowalski and Lurie (2015)	Simulated IV using variation in eligibility across states and time as instrument for total years of eligibility	• Each additional year of eligibility from birth to age 18, women receive $109 less in EITC by age 27 and men receive $41 less. Women are 1.7% less likely to collect EITC, but there is no effect on extensive margin for men

1.4 Education.

Population of interest	Study	Study design	Finding
Children			
Fourth and 8th graders	Levine and Schanzenbach (2009)	Simulated IV for eligibility using Medicaid expansions of the 1980s and 1990s as variation with triple differences	• No effect on test scores separately in 4th or 8th grade, but 50-ppt increase in PHI eligibility at birth increases reading test scores by 0.091 SD (3 points)
Individuals born between 1980 and 1990	Cohodes et al. (2016)	Simulated IV for eligibility using Medicaid expansions of the 1980s and 1990s as variation	• 10-Ppt increase in average Medicaid eligibility between 0 and 17 decreases HS dropout rate by 0.4 ppt (4%), increases likelihood of college enrollment by 0.3 ppt (0.5%), and increases 4-year college attainment rate by 0.7 ppt (2.5%). These effects are not driven by eligibility between birth and age 3
Children whose parents filed in every tax year from 1996- when child turns 18	Brown, Kowalski and Lurie (2015)	Simulated IV using variation in eligibility across states and time as instrument for total years of eligibility	• Female eligibles were more likely to have attended college at ages 20–22. At age 20, one additional year of eligibility increased likelihood of having ever attended college by 0.40 ppt. Results for men are not significant
Individuals born between 1979 and 1993 who are 18+ and not born in AZ	Miller and Wherry (2015)	Simulated IV using variation in eligibility across states and time as instrument for prenatal eligibility, and at different ranges 1–4, 5–9, 10–14, 15–18	• 10-ppt increase in prenatal eligibility increased probability of graduating HS by 0.2 ppt (0.2%). Corresponds to coverage raising graduation rate by 7.3%. No significant effects on probability of attending some college or receiving a college degree
Children ages 0–5 not from AZ	Boudreaux, Golberstein and McAlpine (2016)	Use timing of introduction of Medicaid as exogenous variation in exposure	• No statistically significant effect on years of education, income to poverty ratio, decile of family wealth, or economic index for the low income (<150% FPL target population)

Population of interest	Study	Study design	Finding
Young adults			
Ages 17–23	Jung, Hall, and Rhoads (2013)	Observational	• Availability of parental Health insurance increases the probability of being a FT student by 22%, decreases the probability of being a PT student by 2.6%, and decreases the probability of not enrolling in college by 19.4% • When sample consists only of students, the representative student is 6.5% more likely to enroll FT when parental Health insurance is available
Ages 25–35 who were possibly affected by dependent mandates	Dillender (2014)	Triple-difference comparing how completed education changes for affected ages after the reforms relative to slightly older ages in states that implement the reform relative with those that do not	• Men who were 18 years or younger at the time of the reform gain 0.173 years of education on average by the time they are older than 25, were 2.5 ppt more likely to have completed college by the time they are 26, and were 2.8 ppt more likely have attended some college, and increased completing HS by 1.5 ppt. Women saw very little effect on education—increased HS graduation by 1.6 ppt
Ages 19–29	Depew (2015)	Triple-difference comparing age criteria in states and adoption across states	• No change in being a student, married, or having children
Ages 19–22	Yaskewich (2015)	Difference-in-difference comparing Pennsylvania with New Jersey	• College enrollment in NJ was not statistically different than PA for full sample • Upper-income households (300%+ FPL) saw decrease of 8.6–9.3 ppt (14.4% and 27.0%) in college enrollment. Households where the young adult lived at home and the parent worked in a small firm saw larger effects

1.5 Savings and Asset Accumulations.

Population of interest	Study	Study design	Finding
Households where head is not retired and younger than 65	Starr-McCluer (1996)	Jointly estimate wealth and insurance coverage to try to control for selectivity of Health insurance using share of households heads in area who work for organizations with 100+ employees as instrument	• Households with insurance have significantly higher savings than households without coverage
Households with only one family, head ages 18–64, no members older than 64, state uniquely identified in SIPP	Gruber and Yelowitz (1999)	Simulated IV using total Medicaid dollars with eligibility and value of Medicaid as exogenous variations	• $1,000 Increase in Medicaid eligible dollars decreases odds of having positive assets by 0.81%, and wealth holdings fall by 2.51% conditional on having positive net wealth. For the Medicaid eligible population, these values are 4.2% and 12.8%, respectively • Medicaid program lowers asset holdings by between 25 and 32 cents for each dollar of eligibility, which amounts to lowered wealth holdings between $1,293 and $1,654. Expansions between 1984 and 1993 lowered wealth holdings by $567 to $722 • Having an asset test more than doubles the reduction in assets • For each $ 1,000 in eligibility, nondurable expenditures rise by 0.82%. For the eligible population, this is 4.2%, or $538 (1987$)
See, Gruber and Yelowitz, above	Maynard and Qiu (2009)	Simulated quantile IV with eligibility and value of Medicaid as exogenous variations	• $1,000 increase in Medicaid eligible dollars drops median net worth by 5.47% (greater than mean reported in Gruber and Yelowitz) • The effect of Medicaid dollars on assets is U-shaped in net-worth quantiles. No significant effect on lower quantiles (0–0.2) but increase monotonically in magnitude and significance until 0.6 quantile, and then increase in magnitude • Households in very bottom quantiles of net-worth do not respond to asset tests, while those in the middle do
No restrictions other than valid wealth data	Gittleman (2011)	Simulated IV using current Medicaid dollars with eligibility and value of Medicaid as exogenous variations	• Using same instrument as Gruber, Yelowitz, find reduction of wealth holdings of 28.0% for Medicaid eligibles. In aggregate, this is 0.8% reduction in wealth • Using current Medicaid dollars (as opposed to total) find no effect. Also show evidence that G-Y is driven by second-order interactions and depends on time period selected

Population of interest	Study	Study design	Finding
Heads of households aged 19–50 years	Lee (2016)	Triple-difference comparing households with ESHI living with dependent child aged 19–25 to control group with child outside mandated ages	• Households with dependents ages 19–25 and ESHI increased shares of stocks in financial portfolio by 4.2 percentage points after ACA mandate with no significant reduction in shares of bonds or assets in interest-bearing accounts

1.6 Household Well-Being.

Population of interest	Study	Study design	Finding
General households			
Adults aged 19–64	Finkelstein et al. (2012)	Oregon Health Insurance Experiment: IV for being enrolled in Medicaid using lottery as instrument	• No significant effect on probability of declaring bankruptcy, judgments, or liens
Adults ages 21 –64 without an advanced degree	Gross and Notowidigdo (2011)	Simulated IV with Medicaid expansions of 1990s providing exogenous variation	• 10-ppt increase in eligibility for Medicaid reduces personal bankruptcies by 8%
Noninstitutionalized Americans	Sommers and Oellerich (2013)	Propensity-score matching individuals with Medicaid coverage to those without Medicaid coverage (either private insurance or uninsured)	• In 2010, Medicaid kept 2.1 million Americans out of poverty and 1.4 million out of extreme poverty. Without Medicaid, total OOP spending would increase from $376 to $871 per Medicaid enrollee and family income would drop from 149% to 143% of FPL
Citizens in 41 states	Flavin (2018)	Difference-in-difference comparing low-income citizens in states that expanded Medicaid with states that did not	• Moving from nonexpansion state to an expansion state is associated with more than 1/2 *SD* increase in SWB
Households with children			
Households with children younger than 18	Leininger, Levy, and Schanzenbach (2010)	Simulated IV with eligibility under CHIP providing exogenous state-level variation in access to Health insurance	• Eligibility associated with increase in nonhealth consumption of $5,477, which is concentrated in transportation and retirement/ pension savings
Children younger than 9 years	Banthin and Selden (2003)	Difference in difference comparing children of different eligibility groups between 1987 and 1996 (eligibility is simulated)	• 7.4- to 8.7-ppt decrease in likelihood of family spending 10% or more of disposable income on medical care, depending on control group
Noninstitutionalized with incomes below 300% FPL	Saloner (2013)	Simulated IV with eligibility under CHIP providing exogenous state-level variation in access to Health insurance	• CHIP did not decrease food security or housing problems, even for low-income subsample
Reference person 18–64, unmarried with at least one never married child younger than 18 years	Schmidt, Shore-Sheppard, and Watson (2016)	Simulated IV with Medicaid eligibility across states as exogenous variation	• Medicaid did not have a statistically significant impact on food insecurity, but should be researched further

1.7 Delayed Care due to Cost.

Population of interest	Study	Study design	Finding
Households with children			
Nondisabled parents, ages 18–64	Busch and Duchovny (2005)	Simulated IV using variation in eligibility across states and years	• 29-ppt increase in probability that one did not forgo needed care due to cost

Population of interest	Study	Study design	Finding
Children younger than 18 years	Miller (2012)	Difference-in-difference comparing MA with other states in Northeast region	• 9-ppt decrease in forgone medical care because of cost
Nonelderly adults with at least one child and incomes ≤138% FPL	McMorrow et al. (2016)	Use Medicaid threshold that exploit exogeneity across states and time in eligibility	• Reduced delays in care due to cost in past 12 months by 3.1 ppt, unmet need for prescription meds due to cost by 3.1 ppt, and decreased unmet need for mental health care due to cost by 2.0 ppt
Young adults			
Ages 19–34	Wallace and Sommers (2015)	Difference-in-difference comparing those who were affected by dependent mandate with those who were not	• Proportion of young adults unable to see physician because of cost declined by 1.9 ppt
Adults			
Adults aged 19–64	Finkelstein et al. (2012)	Oregon Health Insurance Experiment: IV for being enrolled in Medicaid using lottery as instrument	• Decrease of 3.6 ppt (55%) in probability that refused treatment because of medical debt in past 6 months
Women with incomes ≥125% FPL	Pauly (2005)	Instrument for HI coverage using size of firm and marital status	• Large decrease in going without care needed for health, but hard to interpret because of categorical nature of explanatory and dependent variables
Ages 18–64	Long (2008)	Difference between outcomes before and after MA reform	• Decrease in not getting needed care in the past year, especially for adults with income <300% FPL, decrease in not getting needed care because of cost, which was almost doubled for adults with income <300% FPL
Ages 18–64	Zhu et al. (2010)	Difference-in-difference comparing MA with rest of New England	• Cost-related barriers improved for MA compared with New England for Whites and Blacks but not Hispanics, for individuals above 300% FPL and below 100% FPL
Ages 18–64	Pande et al. (2011)	Difference-in-difference comparing MA with other New England states	• MA residents were 6.6 ppt more likely to forgo care because of cost, which was concentrated on the disadvantage subpopulation
Ages 18–64	Sommers et al. (2015)	First difference comparing pre- and post-ACA as well as difference-in-difference comparing pre- and post-ACA adults above and below 138% of the poverty level	• Inability to afford care decreased 5.5 ppt when comparing pre- and post-ACA but was not statistically significant in difference-in-difference specification
Childless adults			
Ages 19–64	Guy (2010)	Difference-in-difference comparing childless adults eligible for expansions with childless adults not eligible but above 300% FPL	• 10-ppt increase in eligibility for programs with increased cost sharing lead to 0.22-ppt increase in likelihood of not forgoing needed care because of costs. For the traditional cost sharing, the result was an increase of 0.28 ppt

Note. CHIP = Children's Health Insurance Program; ACA = Affordable Care Act; SSDI = Social Security Disability Insurance; AFDC = Aid to Families with Dependent Children; TANF = Temporary Assistance for Needy Families; SSI = Supplemental Security Income; FPL = federal poverty level; HI = health insurance; LFP = labor force participation; PT = part-time; FT = full-time; HS = high school; OLS = ordinary least squares; IV = instrumental variable; FE = fixed effect; SNAP = Supplemental Nutrition Assistance Program; FS = food stamp; MEPS = Medical Expenditure Panel Survey; NLSY = National Longitudinal Survey of Youth; WC = workers' compensation; EITC = earned income tax credit; *SD* = standard deviation; SWB = subjective well-being; LR, long run; RD, regression discontinuity.

Table 2.

Main Findings From the Experimental and Quasi-Experimental Literature on the Impact of Health Insurance on Health, by Outcome Category.

2.1 Mortality.

Population of interest	Study	Study design	Finding*
Children			
Infants	Currie and Gruber (1996b)	Instrumental variable regressions using the simulated fraction of women age 15–44 eligible for Medicaid in each state and year in the event of pregnancy as an instrument for individual eligibility	8.5% decline in the infant mortality rate associated with the increase in Medicaid eligibility between 1979 and 1992
Children aged 1–17	Howell et al. (2010)	Instrumental variable using the fraction of a fixed group of children who would be eligible for health insurance to instrument for individual Medicaid and SCHIP eligibility	2% reduction in external-cause mortality for each 10 percentage points increase in Medicaid/SCHIP eligibility. No impact on natural-cause mortality when considering year fixed effects
Children aged 8–14	Wherry and Meyer (2015)	Regression discontinuity design using discontinuity in number of years eligible for public insurance based on Medicaid eligibility expansion rules and children date of birth	19% reduction in 4-year internal mortality rate of Blacks at ages 15–18 because of increased eligibility at ages 8–14; 7% to 9% reduction in 4-year external mortality rate of Whites at ages 8–14. No robust impact on children mortality rates in other age-race categories and in young adulthood
Children whose parents filed taxes every year from 1996- when child turned 18	Brown, Kowalski and Lurie (2015)	Simulated instrumental variable estimation using variation in eligibility across states and time as instrument for total years of eligibility	5.3% marginally significant reduction in cumulative mortality at age 28 in men for each 4-year increase in Medicaid eligibility in childhood. No impact on cumulative mortality at age 28 in women (although impact at younger ages are significant)
Children (age range not mentioned)	Currie and Gruber (1996a)	Instrumental variable two-stage least square regressions using the fraction of a fixed group of children who would be eligible for health insurance to instrument for individual Medicaid and SCHIP eligibility	0.13-Percentage point reduction in all-cause mortality for each 10 percentage points increase in the fraction of children eligible for Medicaid, corresponding to a relative decline of 3.4% and an estimated 5.1% reduction in child mortality because of rise in eligibility between 1984 and 1992
Adults			
Individuals aged 14–61 at enrollment	Brook et al. (1983)	Randomized experiment: Comparison of individuals randomly assigned to one of 14 insurance plans, with copays ranging from 0% (free health care) to 95%, and followed 3 to 5 years during the RAND Health Insurance Experiment	10% reduction in probability of mortality among high-risk individuals due to being in the free plan versus cost-sharing plans. No impact in the overall sample
SSDI beneficiaries aged 18–54	Weathers and Stegman (2012)	Randomized experiment: Comparison of newly enrolled SSDI beneficiaries randomly assigned to receiving health benefits packages (treatment) with individuals who remained in the 24-month waiting list for Medicare benefits (control) during the Accelerated Benefits demonstration project	No impact of treatment on mortality rates
Adults aged 19–64	Finkelstein et al. (2012)	Randomized experiment: Instrumental variable comparison of Oregonians enrolled in Medicaid after selection in a 2008 lottery drawing (treatment) and Oregonians who signed up for the lottery but were not selected (control) using lottery selection as an instrument for coverage	No impact on mortality 16 months after the lottery
Adults aged 20–64	Sommers, Baicker, and Epstein (2012)	Difference-in-difference comparing childless adults with income below 100% of the federal poverty line in Arizona, Maine, and New York, which expanded Medicaid to cover low-income childless adults in 2001 and	19.6 per 100,000 reduction in mortality, corresponding to a relative decline of 6.1 %; 41.0 reduction for non-Whites vs. 14.0 reduction for Whites; 30.4 reduction at ages 35–64 vs. no reduction at ages 20–34; 22.2 reduction in counties with poverty rate > 10% vs. 1 1.3 in counties with poverty rate < 10%

Population of interest	Study	Study design	Finding*
		2002 (treatment), with neighboring nonexpansion states (control) before and after the expansions	
	Sommers, Long, and Baicker (2014)	Difference-in-difference comparing mortality rates in Massachusetts counties (treatment) with propensity-score matched counties in other states before and after the Massachusetts health reform	8.2 per 100,000 reduction in all-cause mortality, corresponding to a relative decline of 3.9%; relative decline of 4.5% in health care-amenable mortality; larger reduction among Hispanics and non-Whites (significant at the 10% level)
	Kaestner (2016)	Replication of Sommers, Long and Baicker (2014) using randomization inference methods to estimate significance levels of treatment effects	No impact on mortality
Adults aged 51–64	Hadley and Waidmann (2006)	Instrumental variable approach using a spouse's prior union membership, immigrant status and involuntary job loss as instruments for insurance coverage	2.8-percentage point (42%) reduction in mortality from ages 51–61 to 63–64 could be expected if actual insurance coverage was replaced by full insurance at those ages
HIV-risk groups			
HIV-positive patients (age range not mentioned)	Goldman et al. (2001)	Two-equation parametric model of insurance and mortality using a set of policy variables including the generosity of Medicaid and measures of the generosity of Aids Drug Assistance programs as an instrument for insurance	71% to 85% reduction in 6-month mortality among HIV patients because of insurance
Gunshot trauma patients (age range not mentioned)	Dozier et al. (2010)	Comparison of in-hospital mortality rates of insured and uninsured individuals following gunshot trauma	Uninsured patients had higher odds of mortality (*OR* 2.2)
Car accident patients (age range not mentioned)	Doyle (2005)	Comparison of mortality rates of insured and uninsured individuals with auto insurance following car accidents	Uninsured patients had a 1.5 percentage points higher mortality rate; corresponding to a 39% relative increase over the mean mortality rate of 3.8%

2.2 Self-Reported Health Status.

Population of interest	Study	Study design	Finding*
Children			
Prenatal and children aged 0–18	Miller and Wherry (2015)	Instrumental variable estimations using the simulated fraction of individuals who would be eligible given eligibility policy to instrument for individual Medicaid eligibility	Eligibility at ages 5–9 associated with an increased probability of reporting very good or excellent health at ages 19–35. Prenatal eligibility and eligibility at ages 1–4, 10–14 and 15–18 have no effect
Children aged 0–8	Currie, Decker, and Lin (2008)	Instrumental variable estimation using the fraction of a fixed group of children who would be eligible for health insurance to instrument for individual Medicaid and SCHIP eligibility	Eligibility at ages 2, 3, and 4 associated with a reduced probability that parents report their child's health as less than excellent at ages 9–17 (ages 2 and 4 significant at the 10% level). No impact of eligibility at ages 0, 1, and 5–8
Children aged 0–13 at enrollment	Newhouse and RAND Corporation Insurance Experiment Group (1993)	Randomized experiment: Comparison of individuals randomly assigned to one of 14 insurance plans, with copays ranging from 0% (free health care) to 95%, and followed 3 to 5 years during the RAND Health Insurance Experiment	No impact of being in the free plan versus cost-sharing plans on a parent-assessed standardized health perception score
Children aged 0–17	Miller (2012)	Difference-in-difference comparison of trends in Massachusetts (treatment) with other Northeast region states (control) before and after the Massachusetts health reform	5.5 to 6 percentage points increase in the likelihood that child's health is reported as excellent (relative increase of 10%)
Children aged 5–18	De La Mata (2012)	Regression discontinuity design using thresholds in income eligibility for Medicaid across states	No impact of contemporary, l-year lagged, and 5-year lagged eligibility on the probability of reporting excellent health

Population of interest	Study	Study design	Finding*
Children aged 9–17	Currie, Decker and Lin (2008)	See above	No impact of contemporary eligibility on the probability that parents report child health as less than excellent
Young adults			
Adults aged 19–25	Chua and Sommers (2014)	Difference-in-difference comparison of adults aged 19–25 (treatment) with adults aged 26–34 (control) before and after the implementation of the Affordable Care Act's dependent coverage provision	6.2% increase (95% Cl = [3.2, 9.3]) in the probability of reporting excellent physical health
Adults aged 23–25	Barbaresco, Courtemanche, and Qi (2015)	Difference-in-difference comparison of adults aged 23–25 (treatment) with adults aged 27–29 (control) before and after the implementation of the Affordable Care Act's dependent coverage provision	Increased probability of reporting excellent health. No impact on the probability of reporting very good health and the number of self-reported days not in good physical health
Adults			
Young women (age range not mentioned) with incomes ≥ 125% FPL	Pauly (2005)	Instrumental variable linear probability models using the size of the firm in which household members work and marital status as instruments for private insurance coverage of nonpoor young women	No impact on the probability of reporting fair or poor health
Individuals aged 14–61 at enrollment	Brook et al. (1983)	Same as (Newhouse & RAND Corporation Insurance Experiment Group, 1993) above	No impact of being in the free plan versus cost-sharing plans on a standardized health perception score
SSDI beneficiaries aged 18–54	Weathers and Stegman (2012)	Randomized experiment: Comparison of newly enrolled SSDI beneficiaries randomly assigned to receiving health benefits packages (treatment) with individuals who remained in the 24-month waiting list for Medicare benefits (control) during the Accelerated Benefits demonstration project	10.8 percentage points reduction in the probability of reporting poor health for the AB group (health benefits) compared with control after 12 months; no additional impact of being in the AB Plus group (health benefits package and additional services) compared with the AB group
Adults aged 18–64	Zhu et al. (2010)	Difference-in-difference comparison of trends in Massachusetts (treatment) with New England states (control) before and after the Massachusetts health reform	No impact on the probability of reporting fair or poor health
	Sommers, Gunja, Finegold, and Musco (2015)	Difference-in-difference comparison of adults with income below 138% of the federal poverty line in Medicaid expansion states (treatment) and in nonexpansion states (control) before and after the Affordable Care Act's first enrollment period in October 2013	No impact on the probability of reporting fair or poor health
Adults aged 19–64	Finkelstein et al. (2012)	Randomized experiment: Instrumental variable comparison of Oregonians enrolled in Medicaid after selection in a 2008 lottery drawing (treatment) and Oregonians who signed up for the lottery but were not selected (control) using lottery selection as an instrument for coverage	13 percentage points increase in the probability of reporting good, very good, or excellent health 16 months after the lottery, corresponding to 25% of the control group mean; 1.3 days increase in the reported number of days in good health in the past 30 days
	Sommers, Baicker and Epstein (2012)	Difference-in-difference comparison of childless adults with income below 100% of the federal poverty line in Arizona, Maine, and New York, which expanded Medicaid to cover low-income childless adults in 2001 and 2002, (treatment) to neighboring nonexpansion states (control) before and after the expansions	2.2 percentage points increase in the probability of reporting "excellent" or "very good" health, corresponding to a relative increase of 3.4%. 2.5 Percentage points increase among the population aged 35–64, against no significant impact in the population aged 19–34. No significant impact on non-White and Hispanic populations
	Baicker et al. (2013)	Same as (Finkelstein etal., 2012) above	7.8 percentage point increase in the probability of reporting health as the same or better than last year 25 months after the lottery. No significant impact on Medical Outcomes Study 8-Item Short-Form Health Survey physical-component score
	Wright et al. (2016)	Randomized experiment: Difference-in-difference comparison of Oregonians selected for Medicaid in a 2008 lottery drawing (treatment) and Oregonians who signed up for the lottery but were not selected (control)	13-percentage point higher probability of reporting good, very good, or excellent health 1 year after the lottery drawing among the individuals who enrolled in Medicaid than in the control group (local average treatment effect); 14.9-percentage point higher probability of reporting

Population of interest	Study	Study design	Finding*
			that health is stable or improving, rather than declining; similar results among patients with an elevated cancer risk based on family history
Adults aged 20–64	Sommers, Long and Baicker (2014)	Difference-in-difference comparison of adults in Massachusetts counties (treatment) and in propensity-score matched counties in other states before and after the Massachusetts health reform	1.8 percentage points decrease in the probability of reporting good, fair, or poor (vs. excellent or very good) health, corresponding to a 5% relative decrease
Adults aged 21 –65	Lurie, Ward, Shapiro, and Brook (1984)	Difference-in difference comparison of medically indigent Californians aged 21 to 65 who were terminated from Medi-Cal in 1983 (treatment) with beneficiaries who were not terminated because of the nature of their medical needs (control) at termination and 6 months after	Terminated indigents showed an 8.0-point decline in their general-health perceptions score, against 0.7 point in the control group
Adults aged 45–64	Dor, Sudano, and Baker (2006)	Instrumental variable and endogenous treatment effects models using state-year marginal tax rates, unionization rates, and unemployment rate as instruments for insurance coverage	Insurance participation increases health score index composed of self-reported health status, physical limitations measures, and pain
Adults aged 51 –64	Hadley and Waidmann (2006)	Instrumental variable estimation using a spouse's prior union membership, immigrant status, and involuntary job loss as instruments for insurance coverage	7.4–percentage point (17%) increase in the probability of reporting very good or excellent health and no limitations in activities of daily living and instrumental activities of daily living at ages 63–64 could be expected if actual insurance coverage was replaced by full insurance from ages 51–61 to 63–64
Medically stable veterans (age range not mentioned)	Fihn and Wicher (1988)	Difference-in difference comparison of medically stable veterans who were discharged from receiving outpatient services from the Seattle Veterans Affairs Medical Center in 1983 (treatment) with beneficiaries who met the criteria but were not discharged (control) at termination and an average 16 months after discharge	41% of discharged patients said their general health status was "much worse" at follow-up, versus 8% of nondischarged patients
High-risk groups			
Trauma patients aged 64 years and younger	Hadley (2007)	Logistic regression of short-term health outcomes of insured and noninsured individuals following a trauma	Uninsured individuals were more likely to report a much worse health status 3.5 months following condition onset (9.8% vs. 6.7% uninsured; *OR* 0.86)

2.3 Health Limitations and Functional Status.

Population of interest	Study	Study design	Finding*
Children			
Prenatal and children aged 0–18	Miller and Wherry (2015)	Instrumental variable estimations using the simulated fraction of individuals who would be eligible given eligibility policy to instrument for individual Medicaid eligibility	No impact of prenatal eligibility and eligibility at ages 1–18 on the probability of health limitations at ages 19–35
Children aged 0–13 at enrollment	Newhouse and RAND Corporation Insurance Experiment Group (1993)	Randomized experiment: Comparison of individuals randomly assigned to one of 14 insurance plans, with copays ranging from 0% (free health care) to 95%, and followed 3 to 5 years during the RAND Health Insurance Experiment	No impact of being in the free plan versus cost-sharing plans on a standardized role-functioning score that indicates play, school, and usual activities limitations due to poor health
Children aged 0–17	Lykens and Jargowsky (2002)	Regression models using geographic variations in the estimated proportion of children eligible during Medicaid expansions as the variable of interest	0.03 and 0.06 days reductions in reported number of bed days and restricted activity days in the previous 2 weeks, respectively, for each 10 percentage points increase in Medicaid eligibility (both significant at the 10% level). Reduction in the average number of acute health conditions for non-Hispanic Whites and Hispanics (the latter significant at the 10% level). No effect on school loss days and acute conditions of Blacks

Population of interest	Study	Study design	Finding*
Children aged 5–18	De La Mata (2012)	Regression discontinuity design using thresholds in income eligibility for Medicaid across states	No impact of contemporary, l-year lagged, and 5-year lagged eligibility on the number of school days missed due to illness
Young adults			
Adults aged 23–25	Barbaresco, Courtemanche, and Qi (2015)	Difference-in-difference comparison of adults aged 23–25 (treatment) with adults aged 27–29 (control) before and after the implementation of the Affordable Care Act's dependent coverage provision	No impact on the number of self-reported days with physical limitations
Adults			
Individuals aged 14–61 at enrollment	Brook et al. (1983)	Same as (Newhouse & RAND Corporation Insurance Experiment Group, 1993) above	No impact of being in the free plan versus cost-sharing plans on (a) a standardized physical-functioning score that indicates the degree of limitations in personal self-care, mobility, or physical activity and (b) a standardized role-functioning score that indicates limitations at work, school, or conducting housework activities due to poor health
SSDI beneficiaries aged 18–54	Weathers and Stegman (2012)	Randomized experiment: Comparison of newly enrolled SSDI beneficiaries randomly assigned to receiving health benefits packages (treatment) with individuals who remained in the 24-month waiting list for Medicare benefits (control) during the Accelerated Benefits demonstration project	1 1.0 percentage points decline in the probability of having an SF-36 score indicating likely meeting the Social Security Administration's definition of disability for the treatment groups compared with the control group, corresponding to 21 % of the control group mean
Adults aged 18–64	Courtemanche and Zapata (2014)	Difference-in-difference ordered probit regression comparing adults in Massachusetts (treatment) and in states that did not conduct health reforms (control) before and after the Massachusetts health reform	Reduction in the probability of activity-limiting joint pain and days with health limitations
	Sommers et al. (2015)	Difference-in-difference comparison of adults with income below 138% of the federal poverty line in Medicaid expansion states (treatment) and nonexpansion states (control) before and after the Affordable Care Act's first enrollment period in October 2013	No impact on the proportion of the last 30 days in which activities were limited by poor health
Adults aged 19–64	Finkelstein et al. (2012)	Randomized experiment: Instrumental variable comparison of Oregonians enrolled in Medicaid after selection in a 2008 lottery drawing (treatment) and Oregonians who signed up for the lottery but were not selected (control) using lottery selection as an instrument for coverage	1.6 additional reported days during which poor physical or mental health did not impair usual activity in the past 30 days, corresponding to 8% of the control group mean
Adults aged 51 –64	Hadley and Waidmann (2006)	Instrumental variable approach using a spouse's prior union membership, immigrant status, and involuntary job loss as instruments for insurance coverage	7.4-percentage point (17%) increase in the probability of reporting very good or excellent health and no limitations in activities of daily living and instrumental activities of daily living at ages 63–64 could be expected if actual insurance coverage was replaced by full insurance from ages 51–61 to 63–64

2.4 Preventable Hospitalizations.

Population of interest	Study	Study design	Finding*
Children			
Prenatal and children aged 0–18	Miller and Wherry (2015)	Instrumental variable estimations using the simulated fraction of individuals who would be eligible given eligibility policy to instrument for individual Medicaid eligibility	Prenatal eligibility reduces hospitalizations related to endocrine, nutritional and metabolic diseases, and immunity disorders in adulthood (at ages 19–35). Eligibility at ages 1–4 reduces all-cause hospitalizations excluding pregnancy-related visits; eligibility at ages 5–18 has no effect on adult hospitalizations

Population of interest	Study	Study design	Finding*
Children aged 0–15	Aizer (2007)	Instrumental variable estimations using zip codes and the timing and placement of outreach efforts to increase Medicaid take-up in California in the late 1990s as an instrument for insurance	1.8% to 2.9% decline in ambulatory care-sensitive hospitalizations for each 10% increase in Medicaid enrollment
Children aged 0–17	Dafny and Gruber (2005)	Instrumental variable estimations using simulated eligibility stemming from changes in the proportion of children eligible for Medicaid across states during Medicaid expansions as an instrument for eligibility	8.4% and 8.1 % increases in total hospitalizations and unavoidable hospitalizations for each 10 percentage points increase in eligibility, respectively; no significant increase in avoidable hospitalizations
	Bronchetti (2014)	Instrumental variable approach using cross-state variations in Medicaid and State CHIP eligibility expansions following 1996 as an instrument for eligibility	Reduction in hospital emergency care among first- and second-generation immigrant children; negligible effects among native children
	Wherry et al. (2015)	Regression discontinuity design using the discontinuity in the cumulative number of years a child is eligible for Medicaid based on date of birth	Years of Medicaid eligibility at ages 0–17 are associated with fewer hospitalizations and emergency visits at age 25 for Blacks; larger effects in low-income neighborhoods and for utilization associated with chronic conditions. No impact on non-Blacks
Children aged 2–9	Kaestner, Joyce, and Racine (2001)	Difference-in-difference estimations comparison of ambulatory care-sensitive hospitalizations in low-income children (treatment) with high-income children (control) before and after Medicaid eligibility extensions in 1 1 states	Reduction in the incidence of both asthma and nonasthma ambulatory care-sensitive hospitalizations among children aged 2–6 in very-low-income areas; reduction in incidence of asthma ambulatory care-sensitive hospitalizations among children aged 2–6 and 7–9; no impact on nonasthma ambulatory care-sensitive hospitalizations at ages 7–9
Adults			
Adults aged 18–64	Lasser et al. (2014)	Difference-in-difference logistic regressions comparing Massachusetts (treatment) with New York and New Jersey (control) before and after the Massachusetts health reform	Increase in the odds of 30-day all-cause readmission (*OR* 1.02); readmission for nonspecified chest pain and coronary atherosclerosis (*OR* 1.15); and readmission for substance-related and alcohol-related disorders (*OR* 1.07). Decrease in 30-day readmission for mood disorders, schizophrenia, and other psychotic disorders (*OR* 0.9 1)
	McCormick et al. (2015)	Difference-in-difference comparison of Massachusetts (treatment) with New York, New Jersey, and Pennsylvania (control) before and after the Massachusetts health reform	No impact on the rates of hospital admissions for ambulatory care-sensitive conditions in the overall population, nor in disparities by race and ethnicity

2.5 Incidence/Prevalence and Outcomes of Chronic Conditions.

Population of interest	Study	Study design	Finding*
Children			
Prenatal and children aged 0–18	Miller and Wherry (2015)	Instrumental variable estimations using the simulated fraction of individuals who would be eligible given eligibility policy to instrument for individual Medicaid eligibility	0.4- to 0.5-percentage point reduction in the probability of reporting one or more chronic conditions in adulthood (at age 19–35) for each 10 percentage points increase in eligibility at ages 5–9. Prenatal eligibility and eligibility at ages 1–4, 10–14, and 15–18 have no effect on reported chronic conditions. Prenatal eligibility is associated with fewer hospitalizations related to diabetes and obesity; eligibility at ages 1–18 had no effect
Children aged 0–5	Boudreaux, Golberstein and McAlpine (2016)	Regression model approach using the fraction of months a person was exposed to Medicaid during early childhood, estimated using cross-state variation in timing of Medicaid adoption, as a variable of interest	For low-income individuals, full exposure to Medicaid during childhood decreased hypertension and a chronic condition index composed of hypertension, heart disease, diabetes, and obesity in adulthood (ages 25–54). No impact on heart disease and diabetes.

Population of interest	Study	Study design	Finding*
Children aged 0–17	Bronchetti (2014)	Instrumental variable approach using cross-state variations in Medicaid and State CHIP eligibility expansions following 1996 as an instrument for eligibility	2 percentage points reduction in the likelihood of asthma attacks in the last 12 months (significant at the 10% level)
Adults			
Nonelderly aged younger than 64 years	Hadley (2007)	Logistic regression of short-term health outcomes of insured and noninsured individuals following the onset of chronic conditions	Lower proportions of insured individuals reported a much worse health status 3.5 months following condition onset (10.1 % vs. 12.3% uninsured; *OR* = 0.74)
Individuals aged 14–61	Brook et al. (1983)	Randomized experiment: Comparison of individuals randomly assigned to 1 of 14 insurance plans, with copays ranging from 0% (free health care) to 95%, and followed 3 to 5 years during the RAND Health Insurance Experiment	1.4-mmHg reduction in diastolic blood pressure due to being in the free plan versus cost-sharing plans for individuals with diastolic blood pressure > 83 mm Hg or taking hypertension drugs at enrollment
	Keeler et al. (1985)	Same as (Brook et al., 1983) above	1.8-mmHg reduction in diastolic blood pressure due to being in the free plan versus cost-sharing plans for hypertensives; larger difference for low-income than high-income hypertensives (3.5 vs. 1.1-mmHg reductions)
	Keeler et al. (1987)	Same as (Brook et al., 1983) above	No impact of being in the free plan versus cost-sharing plans on blood glucose in the high-risk group
Nonpoor young women (age range not mentioned)	Pauly (2005)	Instrumental variable linear probability models using the size of the firm in which household members work and marital status as instruments for private insurance coverage	No impact on the probability of reporting a chronic condition
Adults aged 18–64	Lurie et al. (1984)	Difference-in difference comparison of medically indigent Californians aged 21 to 65 who were terminated from Medi-Cal in 1983 (treatment) with beneficiaries who were not terminated because of the nature of their medical needs (control) at termination and 6 months after	Six months after termination from coverage, hypertensives showed a diastolic blood pressure increase of 10.0 mmHg, against a 5.0-mmHg decrease in the control group. There was no significant differential impact in blood glucose control among diabetics
Adults aged 19–64	Baicker et al. (2013)	Randomized experiment: Instrumental variable comparison of Oregonians enrolled in Medicaid after selection in a 2008 lottery drawing (treatment) and Oregonians who signed up for the lottery but were not selected (control) using lottery selection as an instrument for coverage	3.9 percentage points increase in the probability of a diabetes diagnosis 25 months after the lottery, corresponding to 348% of the control group mean. No impact on hypertension and hypercholesterolemia diagnoses
Adults aged 45–64	Dor, Sudano and Baker (2006)	Instrumental variable and endogenous treatment effects models using state-year marginal tax rates, unionization rates, and unemployment rate as instruments for insurance coverage	Insurance participation increases a health score index composed of self-reported health status, physical limitations measures, and pain, but not differentially so for patients with chronic conditions
Medically stable veterans (age range not mentioned)	Fihn and Wicher (1988)	Difference-in difference comparison of medically stable veterans who were discharged from receiving outpatient services from the Seattle Veterans Affairs Medical Center in 1983 (treatment) with beneficiaries who met the criteria but were not discharged (control) at termination and an average 16 months after discharge	1 1.2 and 5.6 mmHg increase in systolic and diastolic blood pressure of discharged hypertensives at follow-up; 7.5-fold increase in number of hypertensives with uncontrolled blood pressure among the discharged group. No significant increase in the control group

2.6 Mental Health Status.

Population of interest	Study	Study design	Finding*
Children			

Population of interest	Study	Study design	Finding*
Prenatal and children aged 0–18	Miller and Wherry (2015)	Instrumental variable estimations using the simulated fraction of individuals who would be eligible given eligibility policy to instrument for individual Medicaid eligibility	No impact of prenatal eligibility and eligibility at ages 1 –18 on Kessler 6 scores and mental health-related adult hospitalizations at ages 19–35
Children aged 0–13 at enrollment	Newhouse and RAND Corporation Insurance Experiment Group (1993)	Randomized experiment: Comparison of individuals randomly assigned with 1 of 14 insurance plans, with copays ranging from 0% (free health care) to 95%, and followed 3 to 5 years during the RAND Health Insurance Experiment	No impact of being in the free plan versus cost-sharing plans on a standardized mental health score
Young adults			
Adults aged 19–25	Chua and Sommers (2014)	Difference-in-difference comparison of adults aged 19–25 (treatment) with adults aged 26–34 (control) before and after the implementation of the Affordable Care Act's dependent coverage provision	4 percentage points increase (95% Cl = [0.6, 7.5]) in the probability of reporting excellent mental health
Adults			
Individuals aged 14–61 at enrollment	Brook et al. (1983)	Same as (Newhouse & RAND Corporation Insurance Experiment Group, 1993) above	No impact of being in the free plan versus cost-sharing plans on a standardized mental health score
	Keeler et al. (1987)	Same as (Newhouse & RAND Corporation Insurance Experiment Group, 1993) above	Being in the free plan versus cost-sharing plans increases likelihood of being worried about phlegm production, chronic bronchitis, or emphysema. No impact on the likelihood of worrying about 10 other conditions
Parents aged 64 years and younger at enrollment	Newhouse and RAND Corporation Insurance Experiment Group (1993)	See above	No impact of being in the free plan versus cost-sharing plans on parental worry about child's physiological conditions
SSDI beneficiaries aged 18–54	Weathers and Stegman (2012)	Randomized experiment: Comparison of newly enrolled SSDI beneficiaries randomly assigned to receiving health benefits packages (treatment) with individuals who remained in the 24-month waiting list for Medicare benefits (control) during the Accelerated Benefits demonstration project	Positive mean impact of being in the AB Plus group (health benefits package and additional services) compared with control on the mental health score derived from the Qualitymetrics SF-36 health instrument; 9.1 percentage points decline in the probability of having a score indicating clinical depression. For both measures, no impact of being in the AB group (health benefits package only) in comparison with the control group
Adults aged 18–64	Wees, Zaslavsky, and Ayanian (2013)	Difference-in-difference comparison of trends in Massachusetts (treatment) with other New England states (control) before and after the Massachusetts health reform	1.5 percentage points increase in the probability of reporting that mental health was good for at least 28 of the last 30 days. Increases were 0.2 percentage point higher among individuals with incomes below 300% of the federal poverty line; and 0.1 percentage point and 0.4 percentage point higher among White residents than Black and Hispanic residents, respectively
	Courtemanche and Zapata (2014)	Difference-in-difference ordered probit regression comparing adults in Massachusetts (treatment) and in states that did not conduct health reforms (control) before and after the Massachusetts health reform	Reduction in the reported days not in good mental health
Adults aged 18–64	Lasser et al. (2014)	Difference-in-difference logistic regressions comparing Massachusetts (treatment) with New York and New Jersey (control) before and after the Massachusetts health reform	Decrease in 30-day readmission for mood disorders, schizophrenia, and other psychotic disorders (*OR* 0.91)
Parents aged 18–64	McMorrow, Kenney, Long, and Goin (2016)	Linear probability models using changes in Medicaid eligibility thresholds for low-income parents across states during Medicaid expansions as the variable of interest	2.3 percentage points increase in the probability of having no or mild psychological distress based on the Kessler scale; 2.1 percentage points decrease in the probability of moderate psychological distress; no impact on the probability of severe psychological distress
Adults aged 19–64	Finkelstein et al. (2012)	Randomized experiment: Instrumental variable comparison of Oregonians enrolled in Medicaid after selection in a 2008 lottery drawing (treatment) and Oregonians who signed up for	7.8 percentage points increase in the probability of negative depression screening 16 months after the lottery, corresponding to 10% of the control

Population of interest	Study	Study design	Finding*
		the lottery but were not selected (control) using lottery selection as an instrument for coverage	group mean; 2 days increase in the reported number of days in good mental health in the past 30 days
	Baicker et al. (2013)	Same as (Finkelstein et al., 2012) above	9.2 percentage points decrease in the probability of positive depression screening 25 months after the lottery; 1.2-point increase in the Medical Outcomes Study 8-Item Short-Form Health Survey mental-component score

2.7 Prevalence of Risk Factors.

Population of interest	Study	Study design	Finding*
Children			
Prenatal and children aged 0–18	Miller and Wherry (2015)	Instrumental variable estimations using the simulated fraction of individuals who would be eligible given eligibility policy to instrument for individual Medicaid eligibility	1.7 percentage points reduction in the likelihood of obesity at ages 19–35 for each 10 percentage points increase in prenatal eligibility, corresponding to an 8% decrease over the sample mean. Eligibility at ages 1–18 has no effect on adult body mass index and the probability of obesity
Children aged 0–5	Boudreaux, Golberstein and McAlpine (2016)	Regression model approach using cross-state variation in timing of Medicaid adoption to measure the fraction of months a person was exposed to Medicaid during early childhood	No impact of exposure to Medicaid during childhood on body mass index at ages 25–54
Children aged 5–18	De La Mata (2012)	Regression discontinuity design using thresholds in income eligibility for Medicaid across states	One-year lagged eligibility associated with an increased probability of being obese. No impact of contemporary and 5-year lagged eligibility
Young adults			
Adults aged 23–25	Barbaresco, Courtemanche, and Qi (2015)	Difference-in-difference comparison of adults aged 23–25 (treatment) with adults aged 27–29 (control) before and after the implementation of the Affordable Care Act’s dependent coverage provision	Increase in the probability of being a risky drinker. Decrease in body mass index. No consistent impact on smoking status, drinks per month, obesity, exercise, and pregnancy
Adults			
Individuals aged 14–61 at enrollment	Brook et al. (1983)	Randomized experiment: Comparison of individuals randomly assigned with one of 14 insurance plans, with copays ranging from 0% (free health care) to 95%, and followed 3 to 5 years during the RAND Health Insurance Experiment	0.7 mmHg diastolic blood pressure reduction due to being in the free plan versus cost-sharing plans in the overall sample (significant at the 10% level). No impact of being in the free plan versus cost-sharing plans on smoking status, weight, and cholesterol
	Keeler et al. (1987)	Same as (Brook et al., 1983) above	No impact of being in the free plan versus cost-sharing plans on blood glucose, level of physical activity, and monthly alcohol consumption in the overall group
Adults aged 18–64	Courtemanche and Zapata (2014)	Difference-in-difference ordered probit regression comparing adults in Massachusetts (treatment) and in states that did not conduct health reforms (control) before and after the Massachusetts health reform	Reduction in body mass index. No impact on smoking and minutes of exercise per week
Adults aged 19–64	Baicker et al. (2013)	Randomized experiment: Instrumental variable comparison of Oregonians enrolled in Medicaid after selection in a 2008 lottery drawing (treatment) and Oregonians who signed up for the lottery but were not selected (control) using lottery selection as an instrument for coverage	No impact on blood pressure, cholesterol, glycated hemoglobin, and Framingham risk score measures 25 months after the lottery
	Wright et al. (2016)	Randomized experiment: Difference-in-difference comparison of Oregonians selected for Medicaid in a 2008 lottery drawing	9.1-percentage point higher probability of reporting trying to lose weight 1 year after the lottery drawing among the individuals who enrolled in Medicaid than in the control group (local average treatment effect; significant

Population of interest	Study	Study design	Finding*
		(treatment) and Oregonians who signed up for the lottery but were not selected (control)	at the 10% level). No significant impact of being selected for Medicaid on the probability of smoking, heavy drinking, having a body mass index larger than 25 kg/m^2

Note. CHIP = Children's Health Insurance Program; SSDI = Social Security Disability Insurance; *OR* = odds ratio; CI = confidence interval; FPL = federal poverty level. References cited in tables: