Effect of expanding the Earned Income Tax Credit to Americans without dependent children on psychological distress (Paycheck Plus): a randomized controlled trial

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Abstract

Anti-poverty policies have the potential to improve mental health. We conducted a randomized trial to investigate whether a fourfold increase in the Earned Income Tax Credit (EITC) for low-income Americans without dependent children would reduce psychological distress relative to the current federal EITC available to this population. Between 2013 and 2014, 5,968 participants were recruited; 2,997 were randomly assigned to the treatment group and 2,971 were assigned to the control group. Survey data were collected 32 months post-randomization (N=4,749). Eligibility for the program increased employment by 1.9 percentage points and after-bonus earnings by 6% ($635 per year) on average over the three years. Treatment was associated with a marginally statistically-significant decline in psychological distress relative to the control group (-0.30 points; 95% CI, -0.63 to 0.03; p=0.076). Women in the treated group experienced a half-a-point reduction in psychological distress (-0.55; 95% CI, -0.97 to -0.13; p=0.032) and noncustodial parents reported a 1.36 point reduction (95% CI, -2.24 to -0.49; p = 0.011) in psychological distress. An expansion of a large anti-poverty program to individuals without dependent children reduced psychological distress for women and noncustodial parents – the groups who benefitted the most in terms of increased after-bonus earnings.

Keywords:

Randomized controlled trial; social experiment; earned income tax credit; psychological distress.

The United States suffers from high levels of income inequality and health disparities.[1,2] Income has long been recognized as a powerful determinant of mental health.[3,4] Many low-income individuals in the United States have difficulty paying rent or putting food on the table despite working two or more jobs, and the stress produced from this material hardship is hypothesized to adversely impact mental health.[3-5] These confluent health and economic stressors are tightly interrelated, with poverty leading to poor mental health, and poor mental health in turn restricting economic opportunities.[6]

Given that material hardship influences the course of mental illness, it is possible that psychological distress can be intervened upon not just with therapy and pharmaceuticals, but also potentially with anti-poverty policies.[6,7] However, the effect of anti-poverty policies on mental health in high-income countries has not received the same rigorous evaluation as pharmaceutical treatments. In a recent meta-analysis of social policy randomized-controlled trials (RCTs), some anti-poverty policies were found to be causally linked to improvements in anxiety and depression.[8] The subset of RCTs that showed no association between anti-poverty policies and mental health indicators tended to either produce little economic benefit or to be statistically underpowered.

To better understand whether it is possible to intervene on mental health with actionable social policy, we added a validated psychological distress measure to Paycheck Plus – a parallel-group RCT testing the economic impact of a more generous Earned Income Tax Credit (EITC) in the US.[9] The EITC is the largest federal in-work tax credit for low-and-middle income families in the US, and has proven to be a highly effective tool in reducing poverty, particularly for low-income households with dependent children.[10] Increases in income, both in the form of earnings from increased employment and from the tax credit itself have the potential to improve health. However, the existing EITC benefit is much smaller for workers who do not have dependent children than for other EITC recipients.[11] Workers without dependent children in the United States have less access to safety net programs than

those with dependent children. They also have disproportionately experienced declining wages and widening health disparities in the past decades.[1] An expansion of the EITC has the potential to contribute to reversing declines in health and survival among the poorest Americans.[12]

The trial evaluates the impact of expanding access and increasing the generosity of the EITC for low-income workers without dependent children on income, employment, and psychological distress providing an assessment of whether a generous anti-poverty policy can improve mental health.

METHODS

Study Design and Participants

Paycheck Plus is a parallel-group RCT implemented and evaluated in New York City (NYC), NY and Atlanta, GA. The trial operated in NYC between 2013 and 2016 and data collection is still underway in Atlanta. This study focuses on the NYC where data collection is complete. The Paycheck Plus Health Study was funded by the National Institute on Aging and added health questions to the NYC study site. Paycheck Plus originated from a partnership between MDRC (a non-profit social policy evaluation organization) and the New York City Mayor's Office for Economic Opportunity (NYC Opportunity). Because the bonus payment for the 2015 tax season would be based on earnings in the previous year, recruitment happened a full year before that first payment. Between September 27, 2013 and February 18, 2014, eligible adults were recruited in NYC through a partnership with Food Bank for New York, which runs the largest network of Volunteer Income Tax Assistance (VITA) serving the population who qualified for Paycheck Plus. VITA workers were blinded to the recipients' treatment status. To be eligible, participants had to be single, not claiming a dependent child on their tax form, age (21 to 64), to have earnings less than $30,000 in the prior year, and not receiving or applying for Supplemental Security Income or Social Security Disability Insurance. The

primary outcomes of the trial were employment and earnings.[9,13] Subsequent to receiving funding from the National Institute on Aging, health-related quality of life[14] and psychological distress were added as primary outcomes for a separate health study.

The study was approved by the institutional review boards at MDRC and Columbia University. All participants gave consent for participation in the study. The study is registered with ClinicalTrials.gov, NCT03226548.

Randomization

Between September 27, 2013 and February 18, 2014, 5,968 participants were randomly assigned in 1:1 ratio to one of the two groups where those treated were subsequently provided with additional information on the demonstration. The program group was comprised of those individuals eligible for Paycheck Plus while the control group represented members who were ineligible, but could still receive existing tax credits and benefits. Randomization was conducted via a secure web-based program by Decision Information Resources, Inc. using random number allocation and was concealed. The intervention was not masked from participants, staff at VITA or data collectors due to the nature of the intervention. Trial statisticians were also not blinded to allocation.

Procedures

Paycheck Plus was structured to be as similar to the federal EITC program as possible while increasing EITC payments from up to $510 in the control group to up to $2,000 in the treated group and extending the income eligibility range from $15,000 in the control group to $30,000 in the treated group (**Figure 1**). The bonus was available to the treatment group for three years and payable upon filing tax returns in 2015, 2016 and 2017. Participating in and qualifying for Paycheck Plus came with

an "income disregard"; the bonus received by treated participants would not exclude them from receiving other government benefits or future EITC payments.

<Figure 1 about here>

Two rounds of survey data were collected: (1) baseline characteristics at the time of randomization (between September 27, 2013 and February 18, 2014); and (2) psychological distress about 32 months post randomization (June 23, 2016 to December 18, 2016, **Appendix Section 1**). Baseline data were collected for all enrolled participants (N=5,968), and post-treatment data at 32 months were collected from a randomly selected subset of the overall sample via telephone survey (n=4,749, 80% of the baseline sample). 115 participants were ineligible because of death, incarceration, or lack of fluency in English or Spanish. An additional 17 participants were not eligible because of missing consent forms at the beginning of the project. The baseline survey included demographic and socioeconomic characteristics, criminal justice history, background on tax returns, and EITC receipt from the prior year. The overall response rate for the post-treatment data was 69% (n=3,289), with 72% of the treatment group responding and 67% of the control group (**Appendix Section 2**).

Outcome

Our primary outcome was the 6-item Kessler Psychological Distress Scale (K6), a validated measure of psychological distress which was developed for National Health Interview Survey to assess the severity of psychological distress.[15] The K6 offers an alternative to lengthy diagnostic tools by providing a measure of overall levels of distress, rather than a specific diagnosis.[15] It assesses feelings of sadness, nervousness, restlessness, hopelessness, "everything is an effort," and worthlessness in the last 30 days. Respondents select the level which best corresponds to their mental health on a scale ranging from 0 (none of the time) to 4 (all of the time). The scale has robust psychometric properties

in adult populations and has been validated for the general population in the U.S and elsewhere.[15,16] The scale has been shown to perform consistently across demographic and socioeconomic groups in the U.S.[15,17] Answers for each item were summed, with total score ranging from 0 (no psychological distress symptoms) to 24 (six psychological distress symptoms all of the time).

Statistical Approach

Our models were pre-specified based on our best estimate of statistical power. *A priori* power calculations suggested that we had ample statistical power to detect a clinically meaningful effect size of 5% change in psychological distress (the minimal detectible effect size with an alpha of 0·05 and a beta of 0·8 was < 1%).

We rely on the experimental design of the Paycheck Plus demonstration to produce unbiased estimates of the effect of increasing and expanding the EITC on psychological distress. The primary analysis was by intention-to-treat (ITT) with participants analyzed within the groups to which they were randomized, irrespective of their compliance. While ITT analyses do not provide an estimate of the efficacy of the intervention, they more closely estimate the "real world" effectiveness of enacting the Paycheck Plus program as a policy. The effect on psychological distress (a continuous outcome) was analyzed using ordinary least square regressions. To reduce the noise associated with random error in treatment assignment, models were adjusted for a list of pre-defined covariates: age, gender, education level, ethnicity, earnings in the year before enrollment, employment status, history of incarceration and timing of data collection. Pre-specified subgroup analyses based on the targets of the trial[9,13] were conducted by stratifying our sample by the following individual characteristics: gender, age (35 and younger *vs* older than 35), formerly incarcerated, non-custodial parents, disadvantaged men (defined as non-custodial fathers with open child support cases with child support owed or in

arrears or formerly incarcerated) and by annual earnings in the year prior to program entry (no earnings *vs* $1-10,000 *vs* above $10,000).

In supplementary analyses, we accounted for the attrition in the follow-up survey using multiple imputations and compared the results from our complete case analyses and from the imputed datasets. Following standard procedures,[18] we imputed separately the treatment and control groups, creating five copies of the dataset with the missing values replaced by imputed values which are sampled from their predictive distribution based on the observed data. Our model was fitted in each of the imputed datasets and averaged together to provide an overall estimate. Standard errors are calculated using Rubin's rules to account for the variability across the five datasets.[18]

Data analyses were conducted with SAS version 9.4.

RESULTS

Between September 27, 2013 and February 18, 2014, 5,968 New York residents were recruited to take part in the trial. 2,997 were allocated to the treated group receiving Paycheck Plus and 2,971 to the control group. A random subsample (80% of the baseline sample, n=4,749) was eligible for a follow-up survey conducted between June 23, 2016 to December 18, 2016. With a response rate of 69% overall and 132 participants excluded, our analytical sample was composed of 3,289 respondents,

1,701 assigned to the treated group and 1,588 to the control group for intent to treat analyses (**Figure 2**).

<Figure 2 about here>

Baseline characteristics were similar between the treated and control groups (**Table 1**). 59% of the sample were males and 53% were aged 35 or younger at randomization. 87.8% were Hispanic or African-American. 24.2% had attended college and 18% had been incarcerated in the past. 45.2% of respondents were working at baseline, and of those 23.8% were working 30 hours or more per week. 60.7% had filed a tax return in the previous tax year. However, only 45.8% had heard of the EITC and only 19% had received the EITC in the past year. There were no statistically-significant differences between the treated and control groups at baseline, indicating that randomization was successful.

<Table 1 about here>

Among those eligible for the bonus in the treated group - meaning they had earnings between $1 and $30,000 - 65% received a tax credit in the first year, 58% in the second year, and 57% in the third year of the trial. On average, participants in the treated group who received a bonus in a given year received $1,400. Treated participants who met the work and income requirements realized an ITT increase in after-bonus earnings of 6% over the three years of study. This corresponds to an ITT increase of $635 per year. Paycheck Plus reduced the incidence of severe poverty by 3.4 percentage points but had no effect on overall poverty rate between the treatment and control group. Over the three-year period, the program increased employment by 1.9 percentage points. Effects on

employment rates and earnings were larger among women and more disadvantaged men, with the positive earnings impacts for more disadvantaged men being driven by noncustodial parents. The program had no effects on secondary social outcomes such as marital status and living arrangements or criminal justice involvement (**Appendix Section 3**; the detailed socio-economic effects of Paycheck Plus have been reported elsewhere).[9,13]

Respondents had overall low levels of psychological distress. The mean K6 score was 5.38 (SD: 4.87) in the control group and 5·06 (SD: 4.68) in the treated group. We observe a marginally statistically-significant decline of 0.30 points of the score (95% CI: -0.63 to 0.03, p=0.072) in the treated group compared to the control group for the full sample (**Table 2**).

<Table 2 about here>

For pre-specified sub-group analyses, we observed a reduction of 0.55 points on psychological distress scale for women (95% CI -0.97 to -0.13, p=0.032) and 1.36 points (95% CI, -2.24 to -0.49, p=0.011) for noncustodial parents. These subgroup differences in psychological distress match the impact of the programme on socioeconomic outcomes (**Appendix Section 3, Appendix Figure 3**). Participants who responded the most to the intervention and those who had the greatest need for assistance seem to have benefitted the most from the intervention in terms of mental health. For all other subgroup analyses apart from previously incarcerated respondents, the coefficients were also negative (a reduction in psychological distress), but not statistically-significant (**Figure 3**).

<Figure 3 about here>

Analyses on the imputed datasets led to essentially to similar results (**Appendix Section 4**).

DISCUSSION

Paycheck Plus is the first experimental evaluation of an expansion of the EITC to low-income Americans without dependent children. In this RCT, ITT estimates of increases in EITC credits produced modest increases in earnings and employment for the cohort overall. Likewise, the improvements in K6 scores were marginally statistically-significant and modest. However, the intervention produced larger improvements in earnings and employment for women and earnings for non-custodial parents, and was subsequently associated with significant reductions in psychological distress among these groups. These results are in line with previous work showing improvements in health-related quality of life among women eligible to Paycheck Plus.[14]

To provide a sense of the size of the impact of Paycheck Plus on psychological distress, we estimated that the effect of being eligible to Paycheck Plus on psychological corresponded to a Cohen's d of 0.11 and 0.38 for women and noncustodial parents respectively.[19] These effects are small but notable given the modest employment and earnings effects of the program.

Two findings warrant further discussion. First, psychological distress was already low in this population, with a control mean K-6 score of 5.38. For context, severe psychological stress is generally defined as scores equal or over 13 and moderate psychological distress has been defined as scores above equal or over 10.[20] A lower score leaves less room for improvement as part of the trial, potentially rendering the psychological distress score less sensitive to changes in income and employment. This lower score may be partially explained by our cohort, which is a young and relatively healthy population. Mental health problems are associated with the development of socioeconomically-patterned physical illnesses.[21] These findings underscore the importance of

intervening early in the life course on factors such as employment and income that drive social deprivation.[22]

Second, the absence of impact on psychological distress in the overall sample might be additionally explained by the modest effects of Paycheck Plus on earnings and employment.[9,13] Participants in the treated group who received the bonus in a given year received on average an additional $1,400 in bonus payments. While $1,400 may be a relatively small amount of money, it can provide much-needed relief for people with higher expenses, such as those who are non-custodial parents.

Small increases in income can translate into reductions in overall psychological stress for those who are disproportionately suffering from financial hardship. Psychological stress activates limbic structures in the brain, potentially producing emotional instability and changes in affect.[23] Poverty-associated psychological stress is also linked to neuronal damage to the orbitofrontal cortex, an area of the brain that is believed to be involved in emotional regulation.[24] The damage is thought to arise in part because psychological stress activates the flight or fight response. The subsequent release of glucocorticoids during the stress response diverts nutrients from the brain to the muscles, thereby increasing the fragility of neurons in the central nervous system.[25] Fortunately, studies of both brain activation and neural tissue loss suggest that these effects may be partially reversible when the stressor is removed.[26] Our study shows that a generous anti-poverty program might serve as a powerful tool to mitigate the mental health effect of poverty-associated stress. Biological data is currently being collected at the Atlanta site of the Paycheck Plus trial and will enable us to further explore the biological underpinnings of the link between anti-poverty interventions and health.

Our findings raise questions that merit deeper exploration in future studies. First, given that the overall impact on the K6 score was marginally statistically significant, it would be useful to repeat the study with an even more generous bonus. Even the sizable increase in EITC benefits for single adults with non-custodial children that was considered in this trial remains small relative to the benefit conferred on families with children. Additionally, while the analysis by incarceration status did not reach conventional levels of statistical significance, those who were previously incarcerated were the only group associated with an increase in psychological distress. Given the difficulty that those with a criminal record face in finding employment, it is conceivable that employment incentives built in the EITC could be an added source of stress. These findings suggest that future studies are needed to determine whether former inmates require tailored workforce interventions.

Finally, less than half of our sample was aware of the EITC at baseline and the take-up of the intervention among eligible respondents ranged between 57% and 65% depending on the follow-up year. Experimental evidence produced in partnership with the IRS shows that informational mailers can significantly improve awareness and take-up of the EITC.[27] Further research is needed along those lines to understand best practices to encourage program take-up, as well as potential effects on health outcomes.

Strengths of the trial include a sufficiently large sample of low-income adults without dependent children, the target population of potential expansions of the existing EITC. Unlike other social experiments, Paycheck Plus is multi-faceted, impacting both income and employment. Its duration is also long enough for the hypothesized effects on psychological distress to manifest. The trial was conducted to rigorous standards, even if the design and conduct of social experiments cannot always fully adhere to guidelines from the medical literature.[8] Although the EITC is unique to the US, Paycheck Plus combines a substantial change in the generosity of a key anti-poverty policy with a

robust evaluation design. It therefore has relevance to other high-income countries considering a re-design of their in-work tax credits.[28]

Limitations of the trial include the relatively small impact on earnings and employment associated with a sizable increase in EITC benefits. Those working low-income jobs tend to confront significant stressors, and these stressors have been shown to interfere with one's executive function.[29] These problems may be particularly acute when the benefits of taking an action are perceived as relatively modest. A second limitation of our study lies in its generalizability. Those who volunteer for studies tend to be healthier than the population from which they were drawn. Generalizability is also affected by presenting results from a single location. Third, the response rate in the follow-up survey was 69%. We conducted sensitivity analyses using multiple imputation to account for missing data, which yielded very similar results to our complete cases analyses. However, multiple imputation relies on observed data and does not address potential attrition due to unobserved characteristics. We considered sources of potential bias for our trial. Selection bias was unlikely thanks to random allocation at baseline, which was concealed, precluding the possibility to predict the next allocation. It was not possible to mask participants, staff and data collector to the group assignment due to the nature of the intervention. We reported the findings from all pre-specified subgroup analyses.

This trial adds much needed experimental evidence to the growing body of literature showing that anti-poverty policies have the potential to improve the health outcomes of low-income households. The experimental literature on this topic remains limited in the United States.[8] The negative income tax experiments of the 1970s tested the effect of increases in tax credits for low-income Americans, without the employment incentives included in the design of the EITC and Paycheck Plus. These trials were associated with no or limited health impacts.[30,31] Conditional cash transfers have also been tested experimentally in New York and Memphis, by providing cash rewards for engaging in health-promoting activities such as attending school, gaining employment and

accessing preventive health care. The program was associated with poverty reductions but had modest health effects on both parents and their children.[32]

Regarding the EITC specifically, the available quasi-experimental evidence has focused on the potential benefits to low-income families, showing the economic benefits of receiving the EITC may translate into general physical health benefits.[12,33-40] However, there was a need for further study of the impact of EITC on mental health, particularly using a gold standard RCT approach. The expansion of the credit to adults without dependent children has bi-partisan support as it increases income without affecting the receipt of other key benefits such as Medicaid and does not negatively impact employment.[10] A tripling of the EITC for low-income adults without dependent children has been proposed by President Biden as part of this $1.9 trillion stimulus bill. Together with previous findings on health-related quality of life,[14] our results suggest that it is possible to "move the dial" on health and mental health with a generous expansion of the EITC. The finding that expanding the EITC to workers without dependent children is likely to benefit their health should be taken into account by policymakers and included in analyses of the cost-effectiveness of this policy.

In conclusion, our RCT demonstrates that a generous expansion of the EITC for adults without dependent children in the US has the potential to reduce psychological distress among low-income workers who have typically been left out of previous EITC expansions.

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Tables

Table 1. Baseline Characteristics of the Study Population, Paycheck Plus Health Study (2013-2016)

	N (%)		
	Overall	Treatment	Control
Male	3,521 (59.0)	1,747 (58.3)	1,776 (59.8)
Age			
35 and younger	3,163 (53.0)	1,621 (54.1)	1,544 (52.0)
Older than 35	2,805 (47.0)	1,375 (45.9)	1,426 (48.0)
Race/ethnicity			
Hispanic	1,790 (30.0)	887 (29.6)	903 (30.4)
Black/non-Hispanic	3,401 (57.8)	1,735 (57.9)	1,669 (57.6)
White/non-Hispanic	716 (12.2)	374 (12.5)	353 (11.9)
Education			
High school diploma or equivalent	3,222 (54.0)	1,579 (52.7)	1,642 (55.3)
Some college	1,432 (24.2)	758 (25.3)	689 (23.2)
Ever incarcerated	1,074 (18.1)	515 (17.2)	561 (18.9)
Currently working	2,685 (45.2)	1,373 (45.4)	1,333 (44.9)
Working full-time	1,420 (23.8)	704 (23.5)	716 (24.1)
Earnings in the past year			
$0	1,754 (29.4)	896 (29.9)	861 (29.0)
$1-$6,666	1,683 (28.2)	836 (27.9)	843 (28.4)
$6,667 - $17,999	1,754 (29.4)	881 (29.4)	873 (29.4)
$18,000 or more	775 (13.0)	380 (12.7)	393 (13.2)
Filed a tax return in previous tax year	3,622 (60.7)	1,819 (60.6)	1,806 (60.8)
Has heard of the EITC	2,733 (45.8)	1,375 (45.9)	1,357 (45.7)
Has received the EITC in the past	1,133 (19.0)	560 (18.7)	573 (19.3)
Sample size	5,968	2,997	2,971

Abbreviations: EITC: Earned Income Tax Credit.

Notes: Baseline data were collected at the time of randomization (between September 27, 2013 to February 18, 2014). Working full-time refers to working 30 hours or more per week.

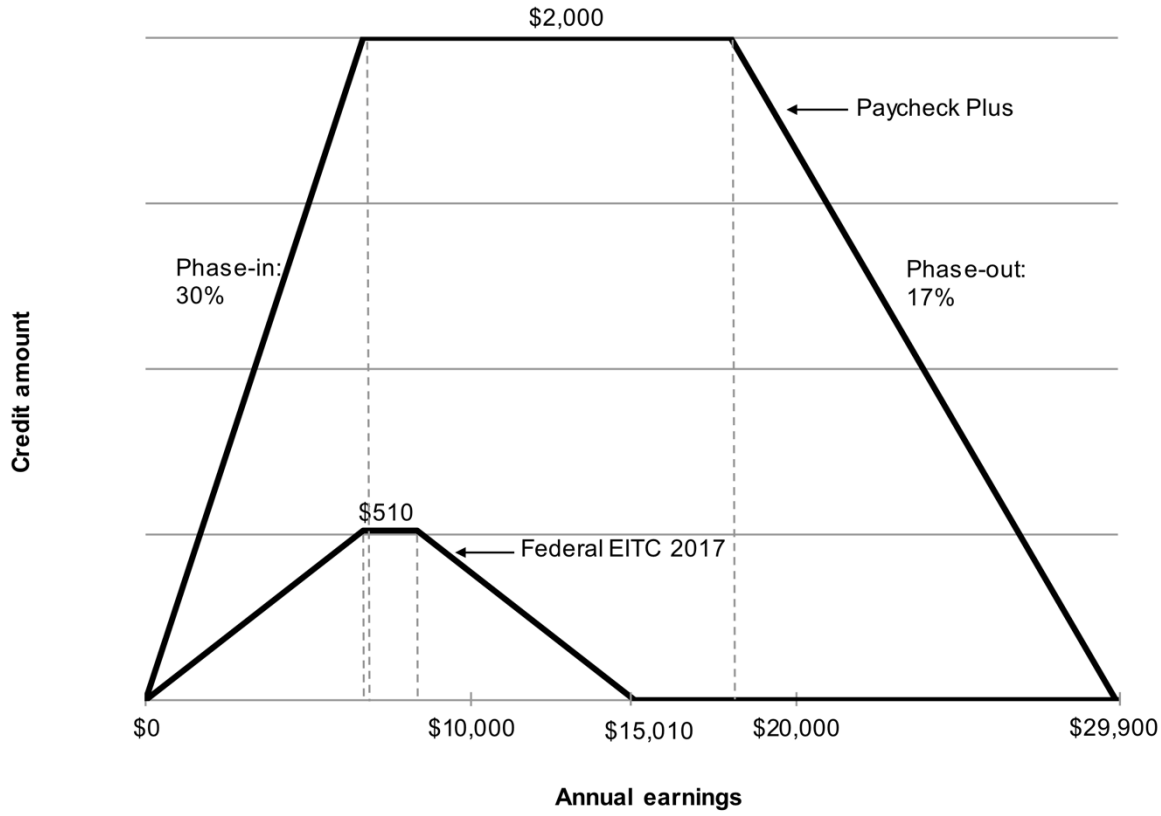
Table 2. Effect on Psychological Distress, Paycheck Plus Health Study (2013-2016)

	Unadjusted means (SD)		Adjusted difference
	Treatment	Control	(95% CI)
Intention to treat	5.06 (4.68)	5.37 (4.87)	-0.30 (-0.63 to 0.03)
Sample size	1,701	1,588	

Abbreviations: SD: Standard Deviation; CI: Confidence Interval.
Sources: Paycheck Plus baseline survey and 32-month survey data.

Figures

Figure 1. Overview of the Paycheck Plus Health Study (2013-2016)



Abbreviations: EITC: Earned Income Tax Credit.
Notes: The X-axis represents a given participants earnings from employment. The Y-axis depicts the tax credit that this individual will receive upon filing income taxes. The smaller curve depicts the benefits received by the control group (the current Earned Income Tax Credit). The top curve depicts the credit received by the treatment group (the Paycheck Plus mental health evaluation). For example, a participant who earns $18,000 per year would receive no tax refund were he or she in the control group, but would receive $2,000 were he or she in the treatment group.

Figure 2. Trial Profile, Paycheck Plus Health Study (2013-2016)

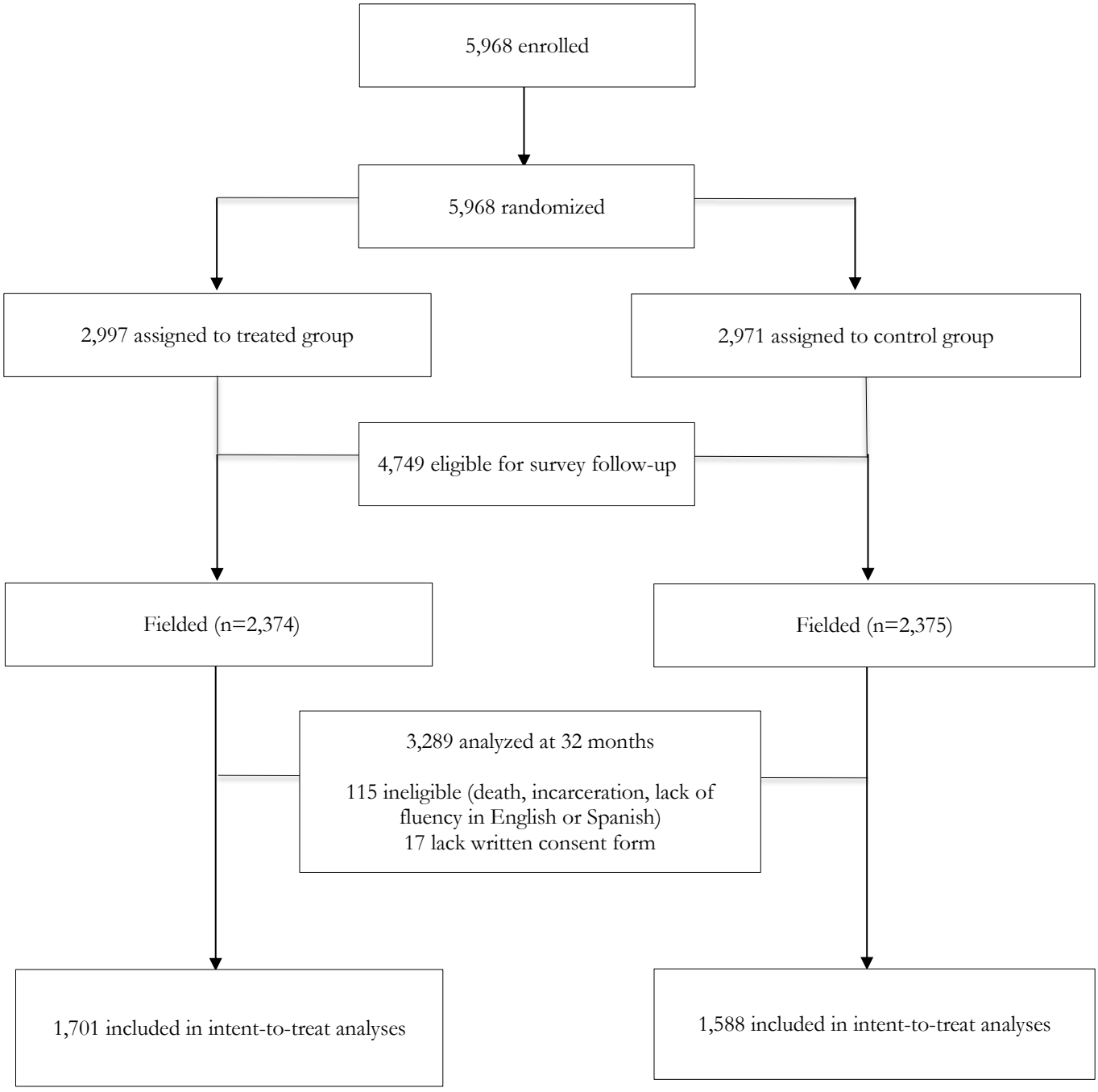
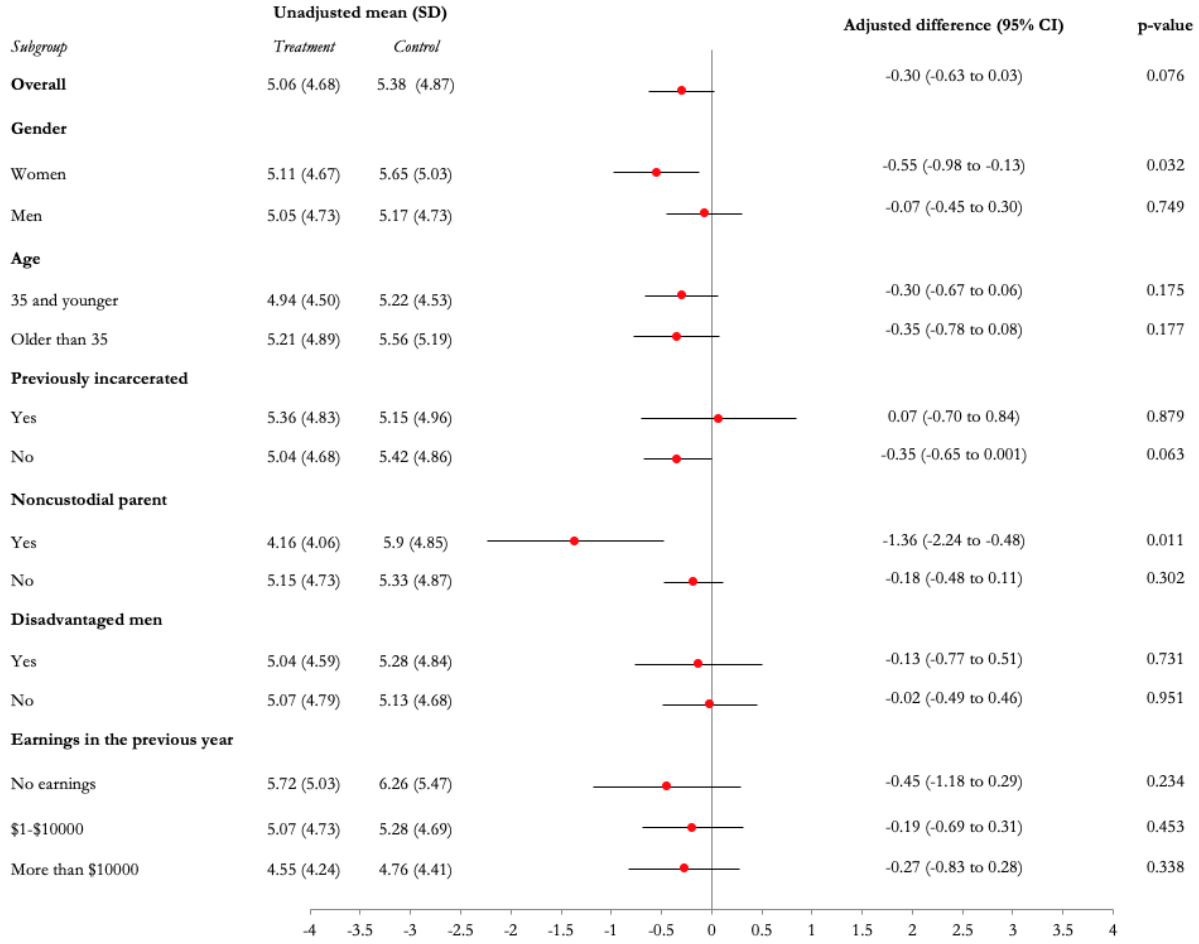


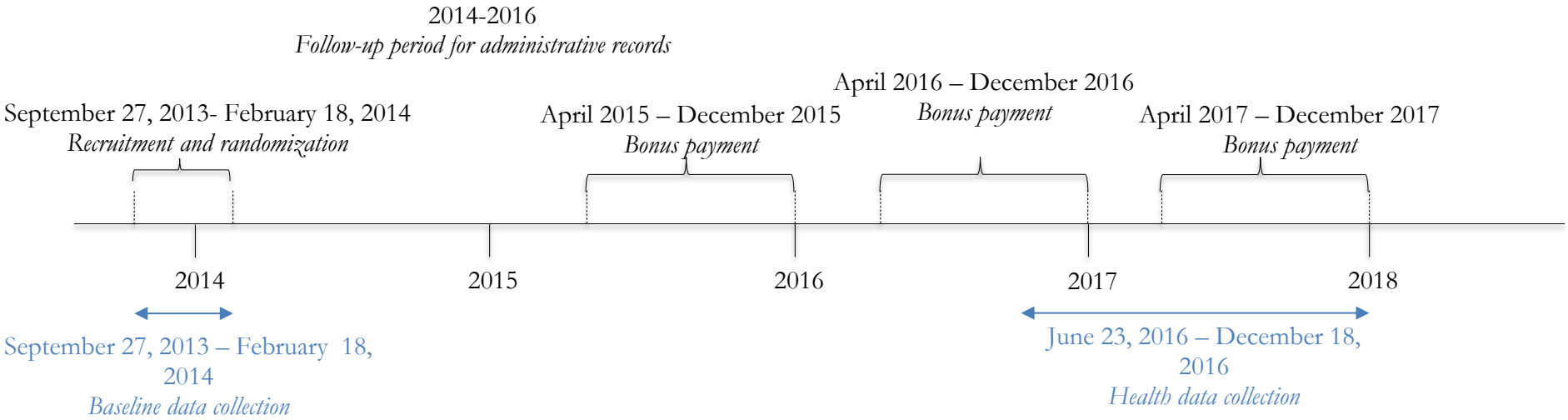
Figure 3. Forest Plot for Subgroup Analyses Comparing Paycheck Plus (Treatment Group) to Existing EITC (Control Group). Paycheck Plus Health Study (2013-2016).



Abbreviations: SD: Standard Deviation; CI: Confidence Interval.
Sources: Paycheck Plus baseline survey and 32-month survey data.

Appendix
Appendix Section 1. Program timeline

Appendix Figure 1. Program timeline for the intervention and data collection. Paycheck Plus Health Study, New York City site (2013-2016)



Source: adapted from Miller et al, 2018

Appendix section 2. 32-month survey response: reliability and generalizability. Paycheck Plus Health Study (2013-2016)

Our analysis is based on a survey administered to a random subset of eligible respondents between June 23, 2016 and December 18, 2016. Potential issues include the reliability of the survey (whether intervention group differences in psychological distress are unbiased indicators of the effect of Paycheck Plus because a large share of each group responded to the survey and there are no systematic differences in the characteristics of the two groups) and generalizability of the findings of the survey to all trial participants. These issues have been explored in details in a report from MDRC focusing on effects on earnings and employment. They show that the survey is reliable and can be generalized to the full study participants. We report here two results: a comparison of respondents and non-respondents to the survey and a comparison of the research groups in the survey sample.

Comparison of respondents and non-respondents to the survey

As showed in Appendix Table 1, 69.3% of surveyed respondents completed the survey. The response rate was significantly higher for participants in the treatment group, women, younger participants and those with higher earnings.

Appendix Table 1. Survey response rates by intervention group and subgroups. Paycheck Plus Health Study (2015-2018)

	Treatment	Control	*P*-value for difference	Total	Sample size
Overall response (%)	71.7	66.9	<0.05	69.3	4749
Women	80.3	74.0	<0.05	77.2	1920
Men	65.5	62.0		63.7	2,773
35 or younger	71.4	65.3	<0.05	68.4	2538
Older than 35	72.0	68.6		70.2	2211
Disadvantaged men subgroup	59.7	57.6		58.6	1017
Other men subgroup	68.3	65.5		66.9	1697
Earnings in the year before enrollment					
No earnings	57.8	61.2		59.5	1407
$1-$10,000	77.5	69.0	<0.05	73.1	1980
More than $10,000	77.7	69.2	<0.05	73.5	1345
Sample size	2,374	2,375		4,749	

Source: Miller et al. 2018, using Paycheck Plus baseline survey and 32-month survey data.

Notes: Chi-square tests were run to determine whether there are differences in the response rates by research groups.

Miller and colleagues further investigated which baseline characteristics were associated with the probability of being a respondent to the survey. They found that overall differences in individual characteristics between respondents and non-respondents were statistically significant, but that these differences had a very small effect on the likelihood of responding to the survey.

Comparison of respondents within the survey sample

Appendix table 2 displays the baseline characteristics of the treated and control group in the survey sample. There only one small significant difference in baseline characteristics between the two groups (age at randomization at 10 percent significance level), which was confirmed by Miller and colleagues by testing for associations between individual characteristics of individuals in this sample and research group membership. These results suggest that we can obtain unbiased estimates of the impact of the program using the 32-month survey data.

Appendix Table 2. Baseline characteristics of 32-month survey respondents, by intervention group. Paycheck Plus Health Study (2015-2018)

	Treatment	Control	Total	Sample size
Men (%)	53.5	55.4	54.4	1,767
35 or younger	54.2	51.3	52.8^{+}	1,736
Older than 35	45.8	48.7	47.2	1,553
Hispanic	28.2	28.9	28.5	921
Non-Hispanic Black	59.3	60.2	59.7	1,930
Non-Hispanic White/other	12.6	10.9	11.8	381
High school diploma or equivalent	53.5	54.9	54.2	1,754
Some college or higher	27.2	24.9	26.1	844
Noncustodial parent	8.7	8.9	8.8	289
Ever incarcerated	13.7	15.5	14.5	463
Disadvantaged men subgroup	17.8	19.3	18.5	596
Currently working	50.1	49.7	49.9	1,627
Working full-time	25.1	26.9	26.0	837
Earnings in the past year				
$1-$6,666	29.8	29.2	29.5	964
$6,666-$11,999	17.5	17.1	17.3	564
$12,000-$17,999	15.3	13.3	14.3	467
$18,000 or higher	13.3	13.8	13.5	442
Filled tax return for tax year 2012	65.5	65.2	65.4	2,126
Has heard of EITC	48.5	48.2	48.4	1,570
Has received EITC in the past	19.9	21.4	20.6	654

Sample size	1,701	1,588	3,289

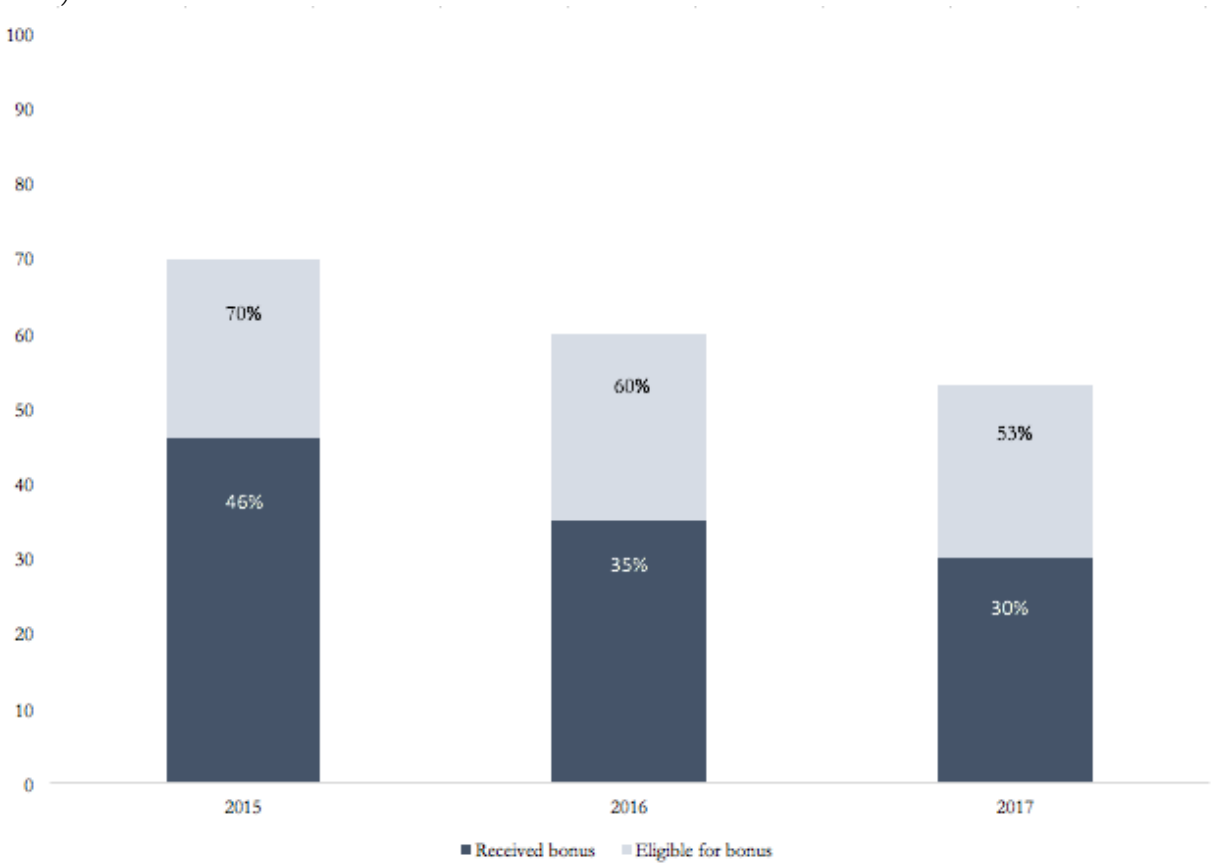
Source: Miller et al. 2018, using Paycheck Plus baseline survey and 32-month survey data.

Notes: Chi-square tests were run to determine whether there are differences in the response rates by research groups.

Appendix Section 3. Effect of Paycheck Plus on bonus receipt and socioeconomic outcomes

This section presents the eligibility and receipt of the credit in the treated group over the three first year of the study. It also shows the impact of the Paycheck Plus on a range of socioeconomic outcomes to provide the reader with a sense of the efficacy of the Paycheck Plus RCT on employment/income/poverty and contextualize the mental health findings.

Appendix Figure 2. Bonus eligibility and receipt in the treated group. Paycheck Plus (2013-2016)



Source: Miller et al. (2018) based on IRS tax forms, W-2s, and 1099-MISCs, Paycheck Plus data.
Notes: In 2015, 65% of those eligible received the bonus. In 2016, 58% of those eligible received the bonus. In 2017, 57% of those eligible received the bonus.

Appendix Table 3. Paycheck Plus effects on income, poverty and employment (year 1-3 of the trial). Paycheck Plus (2013-2016)

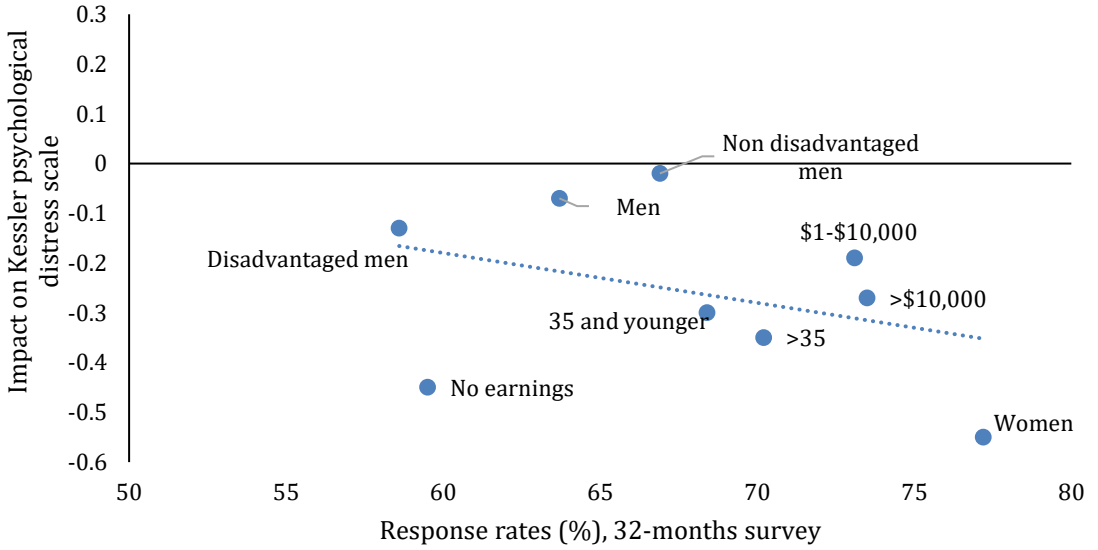
Outcome (years 1-3)	Treated group	Control group	Difference	*P*-value
After bonus earnings ($)	12,054	11,419	635	<0.05
Household income at survey, per household member ($)	16,210	16,259	-49	
Income below 50% of poverty line (%)	29.2	32.6	-3.4	<0.05
Income 50-100% of poverty line (%)	20.2	17.4	2.8	<0.05
Income below poverty line (%)	49.4	50.0	-0.6	
Employment rate (%)	77.3	75.4	1.9	<0.05
Employment rate among women	83.2	80.0	3.2	<0.05

Source: Adapted from Miller et al (2018).

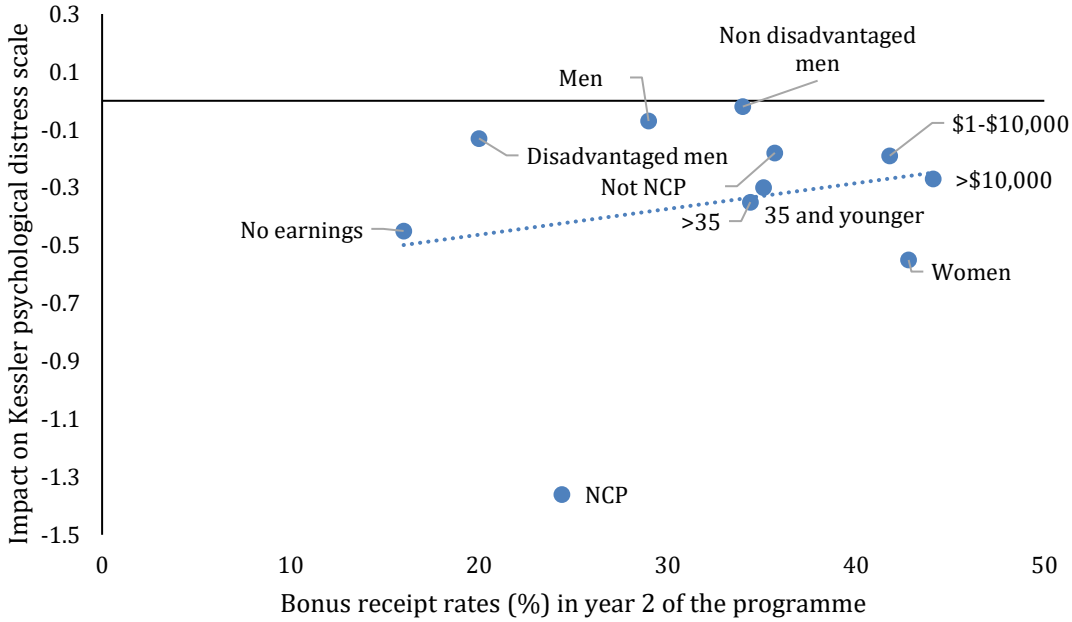
Notes: Estimates on after-bonus earnings rely on IRS data (n=5,968), estimates on all other outcomes rely on survey data (n=3,289). Estimates were adjusted for pre-random assignment characteristics using ordinary least squares.

Appendix Figure 3. Impact of Paycheck Plus on Response Rates, Bonus Receipt, Earnings and Employment and Psychological Distress

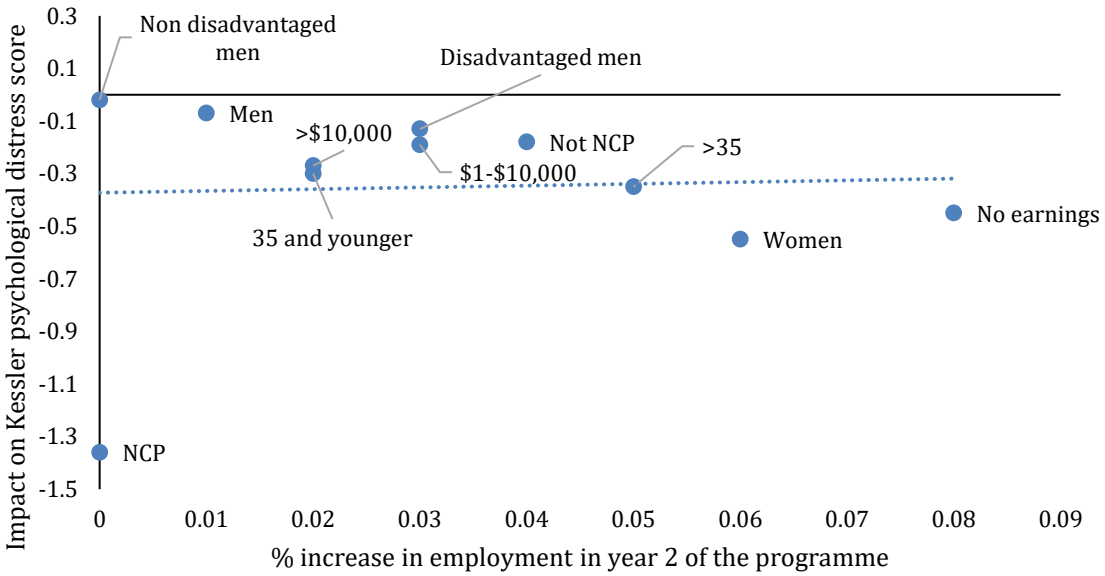
A. Response Rates and Psychological Distress



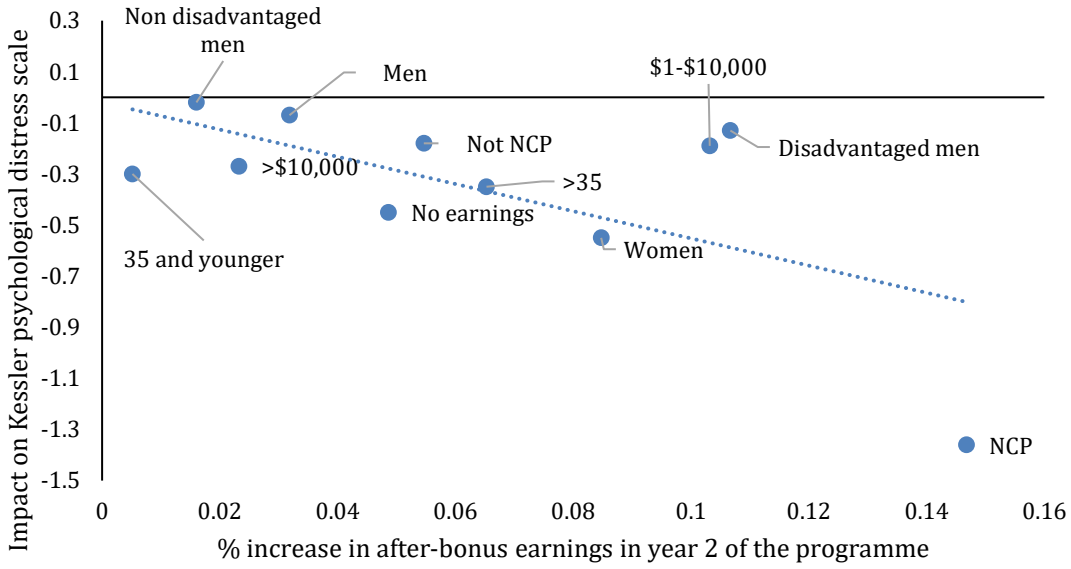
B. Bonus Receipt and Psychological Distress



D. Employment Rates and Psychological Distress



E. Earnings and Psychological Distress



Appendix Section 4. Multiple Imputation

Appendix Figure 4. Comparison of the main models and models with multiple imputation overall and by subgroups. Paycheck Plus Health Study (2013-2016).