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Effects of Employment on Marriage: Evidence from a Randomized Study of the Job Corps Program

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ABSTRACT

This report explores the effects of employment-related outcomes (namely, average hours worked per week and average earnings per week) on the likelihood of marriage. The key challenge in estimating the effects of various employment-related outcomes on men's or women's likelihood of marriage is to account for the possibility that family status may affect employment outcomes (reverse causation) and that men and women with particular unobserved traits that make them more likely to be successful in the labor market may be more likely to marry (selection). Burstein (2007) in a recent article noted that in order to meet this challenge "one would need to randomly assign single men to a treatment group that had the effect of increasing their employment and earnings, and then look for the impact on their marital union formation." This report applies precisely that strategy to generate consistent estimates of the effects of men's and women's employment and earnings on their likelihood of marriage.

Data from an experimental evaluation of the Job Corps program, which found statistically significant positive effects on the employment outcomes of both male and female participants, have been the basis for generating the estimates in this report. The random assignment of eligible applicants to program and control groups created the opportunity for a source of variation in employment and earnings that is independent of family structure or the background characteristics of program participants. By applying the instrumental variable (IV) method, we used this exogenous variation in employment and earnings created by the Job Corps intervention to identify causal effects of these employment-related outcomes on the likelihood of marriage for disadvantaged individuals in their twenties.

The most prominent finding of this study is that an increase in employment and earnings via the Job Corps program increases the likelihood of marriage for young women with economically disadvantaged backgrounds. Since the estimates account for the possibilities of reverse causation and unobserved selection (by using IV estimation), the results suggest that for disadvantaged young women, an increase in employment and earnings leads to an increase in marriage rates. The positive effects on women's likelihood of

marriage may be regarded as reflecting the benefits of women's economic independence as well as the "good-catch" effect in the marriage market.

Estimates for men that do not account for potential selection bias (that is, the ordinary least squares, or OLS, estimates) show that employment and earnings are positively associated with men's likelihood of marriage as well. However, the IV estimates that appropriately account for potential selection problems and address the possibility of reverse causation indicate that much of that positive association between men's employment and marriage relates to unobserved individual characteristics that make men more likely to be successful both in the labor market and in the marriage market. Therefore, the results suggest that the OLS estimates are biased, and that for young men with economically disadvantaged backgrounds their employment and earnings have no statistically significant effect on their likelihood of marriage.

The study findings underscore the importance of addressing potential selection bias in estimating the effects of employment and earnings on likelihood of marriage. It provides clear evidence of a positive effect of employment and earnings on the likelihood of marriage for women, but no significant effect on the likelihood of marriage for men. Since the findings are based on a relatively young sample of men and women, in future research it would be important to examine the effect of employment on marriage on older subjects who have had a longer period of time, overall, to make marital transitions. Future research may also be directed towards an assessment of the *marriage-effect* of social services that are focused on improving employment related outcomes vis-à-vis those services that are focused on strengthening family related outcomes of economically disadvantaged people.

CHAPTER I

INTRODUCTION

Substantial empirical literature exists on the association between changes in employment-related outcomes (such as employment status, hours worked, earnings) for men and women and their choices regarding marriage.[1] These studies provide evidence of a small but positive association between employment outcomes and marriage rates for men. For women, the evidence is mixed – the empirical estimates variously show significant negative, significant positive, and insignificant relationships between women's employment outcomes and their marriage rates.

Several alternative hypotheses have been proposed to explain the relationship between employment outcomes and men's and women's marital status:

1. ***Changes in employment outcomes lead to changes in marriage rates.*** Obtaining a steady job or an increase in earnings might change the likelihood that a man/woman will marry.

2. ***Marriage leads to changes in employment outcomes.*** Marriage might change the likelihood that a man/woman works or affect how much a person earns.[2]

3. ***Anticipated marriage leads to employment.*** A man/woman planning to get married will try to get a steady job and increase earnings.

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[1] See, for example, Ahituv and Lerman (2007); Sassler and Goldschneider (2004); Black et al. (2003); Oppenheimer (2003); Xie et al. (2003); Blau et al. (2000); Wood (1995); Schultz (1994); Olsen and Farkas (1990).

[2] For recent discussions on the effects of family status on men's earnings, see Ribar (2004) and Mamun (2004).

4. ***Factors affecting labor market success also affect the likelihood of marriage.*** A range of other factors (for example, personal abilities, temperament, reliability, responsibility, and other traits; family background; and so on) that affect a man's/woman's likelihood of getting a job or increasing earnings also affect his/her likelihood of being married.

While all of these hypotheses are plausible explanations for the observed relationship, only the first hypothesis suggests a causal effect of employment outcomes on marriage. The other hypotheses suggest either that the causation works in the other direction (that is, marriage increases employment – hypotheses 2 and 3), or that employment is related to the likelihood of marriage through selection (in other words, people who are more employable are more likely to get married, a "selection effect" – hypothesis 4).

Only a handful of the existing studies, however, attempt to sort out the causal relationships between employment outcomes and the family status of men and women. As a result, there is not much reliable empirical evidence on the causal effects of employment and earnings on likelihood of marriage.

In this report, we explore whether improved employment outcomes lead to increases in marriage.[3] To identify the causal effects, we use data from an experimental evaluation of the Job Corps program (Schochet et al. 2001). The National Job Corps Study, which evaluated the Job Corps program by randomly assigning applicants to either a program or a control group, showed that those assigned to the program group achieved statistically significant employment and earnings gains compared to those in the control group. Since the study sample was randomly assigned to a program or a control group, the program's impacts on employment outcomes were independent of the participants' family status. In our study, reported here, we utilized these *exogenous* changes in employment outcomes to identify their causal effects on men's and women's likelihood of marriage.[4] More specifically, we applied the instrumental variables (IV) estimation technique, using the randomized treatment status in the Job Corps study as an instrumental variable, to explore the causal effects of employment and earnings on the likelihood of marriage. The IV technique enabled us to isolate the variation in employment and earnings caused by the Job Corps program, and then use that to produce unbiased estimates of the effect of the employment outcomes on marriage.

Establishing a causal link between employment-related outcomes and marriage will provide important input to policy discussions about strengthening marriages and relationships. The current study is the first one to examine the effect of changes in employment outcomes on marriage *for women* while accounting for the possibility of selection bias and reverse causation. It joins the ranks of a handful of other studies that look at the

[3] We also present some findings related to the effect of employment on cohabitation. Since we do not find significant results related to cohabitation, the discussion in the report focuses on marriage.

[4] The changes in men's and women's employment outcomes are independent of their marital status as well as of their unobserved characteristics, thus making the changes *exogenous*.

effect of employment on marriage *for men* while accounting for selection and reverse causation. Since our analysis is based on employment outcomes and marital status measured when men and women in the sample were between 20 to 28 years old, the empirical estimates would provide evidence on the effect of employment on marriage at a relatively young age. We acknowledge that estimated effects may have been different if our sample members could have been followed further into adulthood.

The remainder of the report is organized as follows: In Chapter II we provide a conceptual discussion of the economic determinants of family union decisions and a brief review of the relevant empirical literature. In Chapter III we present background information on the Job Corps study and describe the data used in the analysis. In Chapter IV we present the estimation procedure. Empirical results are presented in Chapter V, and a summary and conclusions follow in Chapter VI.

CHAPTER II

EMPLOYMENT-RELATED OUTCOMES AND FAMILY FORMATION: THEORETICAL PERSPECTIVES AND EMPIRICAL RESEARCH

Theoretical research provides a number of different perspectives on the relationship between employment outcomes and likelihood of marriage. The empirical studies conducted until now offer a mix of conclusions and do not provide consistent support for any single theoretical perspective. This section begins with a conceptual discussion of the theoretical literature on why employment outcomes might influence marriage. The discussion is followed by a brief overview of the associated empirical research, divided into two subsections: those related to employment outcomes and family status for men, and those related to employment outcomes and family status for women.

A. THEORETICAL PERSPECTIVES

Economic analysis of marriage, built on the foundation of Becker's (1973, 1974, 1991) seminal intra-household specialization model, suggests that the effects of employment on the likelihood of marriage are very different for men and women. Under the specialization model, the benefits of marriage come from the gains from specialization–traditionally men specializing in "market production" (in other words, earning money in the labor market) and women in "home production" (in other words, childbearing and other domestic activities). Thus, increased labor market opportunity for men would generally make marriage more attractive (bigger gains from specialization) while increased labor market opportunity for women would make it less attractive (smaller gains from specialization). Hence, according to the specialization model, an increase in employment would be expected to have a positive effect on the likelihood of marriage for men, while for women it would be expected to have an adverse effect.

Despite its simplicity and appeal, the specialization model cannot capture joint family decisions derived from the sometimes divergent interests of husbands and wives. Recent theoretical research in economics incorporates the possibility of joint decision-making in the

family resulting from a strategic interaction of both spouses' preferences and needs. These newer theoretical models of family consider the distribution of benefits within a marriage to be determined through a bargaining process between the spouses, and consider gender-role specialization as just one of many ways a couple can optimize their labor supply and consumption choices.[5] The bargaining models suggest that the effect of employment on the likelihood of marriage is influenced by the way employment affects the share of benefits for each spouse. Improved outside opportunities is likely to improve the spouse's bargaining position within a marriage and thereby improve her/his share of resources within the marriage. Thus, when a woman (or a man) is employed, her (his) share of resources within a marriage is likely to improve, thereby providing her (him) with greater incentive to be in a marriage. Hence, an exogenous increase in employment for women (or men) is expected to increase their likelihood of marriage.

Sociological theory also suggests that the relationship between employment and marriage is positive for both men and women. Wilson (1987, 1996) provides one of the most widely cited discussions of a causal link between economic resources and postponement of marriage among young Americans, particularly among the low-income African American population. Working his way through the complexity of jointly determined outcomes, Wilson argues that decreased employment opportunities for men reduces the pool of "marriageable" men and thereby negatively affects the marriage rate. One way in which the Wilson hypothesis can be put in the context of the economic theory of marriage is to consider marriage as the matching outcome of a search process in which women regard men as "marriageable" only when they have demonstrated a minimum ability to perform in the labor market (Wood, 1995). Generalizing this search theoretic approach for both genders, one might infer that an employed man or woman, due to his(her) ability to be an earner for the family, would be considered a potential "good-catch" for marriage by the opposite-sex counterpart, so employment would increase their likelihood of marriage (Oppenheimer, 1988, 1997).[6]

Based on recent qualitative empirical evidence, Edin and Kefalas (2005) and Edin and Reed (2005) offer additional conceptual insights into why men's and women's employment-related outcomes might affect marriage. They note that norms of economic standards among the low-income population now demand financial stability on the part of the men and economic independence on the part of the women as two key prerequisites for marriage.

[5] See Lundberg and Pollak (1996) for a review of the bargaining models of intra-household decision making.

[6] Other sociological studies have pointed out that increased employment for women and ensuing financial autonomy may lead to reduction in their marriage rates (for example, see Chapter 6 in Thistle, 2006). However, it is not clear whether the hypothesis argues that greater economic independence for women leads to greater delays in marriage, or to increases in the proportion never marrying. If it is the former, then despite observing a temporary dampening effect of employment on marriage, in the long run we may still observe a positive effect of employment on marriage which would be consistent with other aspects of the economic independence and "good catch" effect discussed above.

Thus, conceptually, improving employment opportunities may promote marriage rates for both men and women.

B. EMPIRICAL LITERATURE

Most of the empirical research is able to establish only an associative relationship between employment outcomes and marriage rather than a causal one. As noted previously, a persistent limitation of many of the empirical studies is that they are unable to sort out the problem of selection and establish a causal relationship between employment outcomes and family status. In the presence of selection, the estimated relationship between employment outcomes and family status is biased and does not reflect a causal link. Another key challenge in estimating the effect of employment outcomes on marriage is to rule out the possibility that causation could go in the other direction, that is, that employment outcomes could be influenced by marriage. Only a handful of more careful studies have tried to address the problems of selection or reverse causation. Table II.1 provides a summary of the empirical studies discussed here, and indicates which studies are able to identify a causal effect of employment outcomes on marriage and cohabitation.[7] Some studies identify a causal effect of employment on marriage for men, but none do so for women.

1. Studies on the Relationship Between Men's Employment Outcomes and Marriage

Empirical analyses suggest that men who are employed or have higher earnings are more likely to be married. Many studies do not account for the possibility of selection or reverse causation, and are only able to establish an association between employment and earnings and marriage.[8] However, the following studies have addressed the issue of selection bias and reverse causation, and found either a positive or non-significant relationship between men's employment outcomes and marriage.

- A recent study by Ahituv and Lerman (2007) used a random effects probit model to account for selection and found that an increase in men's wage rates increased their likelihood of marriage.

- Black et al. (2003) studied economic shocks (both booms and busts) to the coal and steel industries to measure the effect of long-term changes in demand for low-skilled workers on welfare expenditures and family structures. Using county-level panel data from 1969 to 1993, they found that the expansion of high-wage jobs for low-skilled men increased marriage rates and reduced the incidence of female-headed households.

[7] The empirical studies discussed here are not at all comprehensive and provide only a brief review of the recent research on this issue.

[8] See, for example, Sassler and Goldschneider (2004); Burgess et al. (2003); Oppenheimer (2003); Xie et al. (2003); Sassler and Schoen (1999); Schultz (1994).

Table II.1 Selected Empirical Studies on the Relationship Between Employment Outcomes and Family Formation

Study	Data Source	Primary Focus	Whether the Study Addressed Selection	Key Relevant Findings
Ahituv and Lerman (2007)	National Longitudinal Survey (NLS) of Youth 1979	Linkages between marriage, work commitment, and earnings for men	Yes; used random effects probit model with unobserved fixed effects from hours worked and wage equations	A rise in wage rates and hours worked increases men's likelihood of marriage
Sassler and Goldscheider (2004)	National Survey of the Labor Force Experience of Young Men; National Survey of Families and Households	Importance of men's employment for marriage during 1970s and 1990s	No	Increase in men's employment is linked with increase in proportion of men who marry
Aassve (2003)	NLS of Youth 1979	Effect of economic resources on the likelihood of experiencing a premarital birth and marriage	No; used predicted wages from population-level data	High level of predicted wage for women is negatively associated with marriage prior to a non-marital birth, and is positively associated with marriage after a non-marital birth
Black et al. (2003)	County-level panel data for 1969-93 from Regional Economic Information System; 1970, 1980, and1990 U.S. Census	Effects of long-term changes in demand for low-skilled workers on welfare expenditure and family structure	Yes; used economic shocks (both boom and bust) to the local coal and steel industry	Increase in high-wage jobs for low-skilled men increases marriage rates
Burgess et al. (2003)	NLS of Youth 1979	Entry into marriage and divorce as a function of current and long-term earnings	No; used individual fixed wage effects	Higher earnings are positively associated with likelihood of marriage for men, and negatively associated with likelihood of marriage for women
Oppenheimer (2003)	NLS of Youth 1979	How young men's career development process affects the likelihood of cohabitation and marriage	No	There is a positive relationship between high earnings and marriage/cohabitation; a negative relationship between employment instability and marriage; and a positive relationship between employment instability and cohabitation

Study	Data Source	Primary Focus	Whether the Study Addressed Selection	Key Relevant Findings
Xie et al. (2003)	Intergenerational panel study of mothers and children; sample drawn from 1961 birth records in the Detroit area	Relationship between economic potential and rates of entry into marriage and cohabitation	No; used predicted earnings based on data from 1990 U.S Census and 1980-1992 High School and Beyond sophomore cohort.	Earnings potential is positively associated with the likelihood of marriage for men, but not for women. Earnings potential does not have any significant relationship with men's and women's entry into cohabitation
Sweeny (2002)	NLS of Young Men; NLS of Young Women; NLS of Youth 1979	Relationship between economic prospects and marriage formation	No	Earnings and employment are positively associated with the likelihood of marriage for men; for women, only earnings are positively associated with the likelihood of marriage
Blau et al. (2000)	1970, 1980, and 1990 U.S. Census	Impact of local labor and marriage market conditions on women's marriage	No; used MSA-level fixed effects and time trends	Better female labor market and worse male labor market are negatively associated with marriage rates for white women
Clarkberg (1999)	NLS of the High School Class of 1972	Role of earnings, income, and employment stability in marriage and cohabitation	No	Earnings and relative high income are positively associated with marriage and cohabitation for men and women
Sassler and Schoen (1999)	National Survey of Families and Households	Effect of attitudes and economic attributes on men's and women's marriages	No	Employment is positively associated with marriage for younger men and for older women
Smock and Manning (1997)	National Survey of Families and Households	Effect of economic circumstances of both partners in cohabiting unions on marriage	No	Male partner's earnings and employment are positively related to transition into marriage; no significant relation exists for female partners' economic circumstances

Study	Data Source	Primary Focus	Whether the Study Addressed Selection	Key Relevant Findings
Clarkberg et al. (1995)	NLS of the High School Class of 1972	Effects of attitudes, values, and work patterns on the likelihood of cohabitation	No	Labor force participation is negatively associated with men's likelihood of cohabitation; but no significant relations with women's likelihood of cohabitation
Thornton et. al. (1995)	Intergenerational panel study of mothers and children; sample drawn from 1961 birth records in the Detroit area	Influence of education on cohabitation and marriage	No	School accumulation is positively associated with marriage and negatively associated with cohabitation for men and for women
Wood (1995)	SMSA level data from 1970 and 1980 U.S. Census	Whether decline in African American marriage rates is driven by a declining pool of "marriageable" African American men	Yes; instrumental variables analysis used changes in SMSA level industrial structure as an instrument	Shrinking pool of high earning young African American men explains little of the decline in African American marriage
Schultz (1994)	Micro data from 1980 U.S. Census	Relationship that women's marriage rate has with welfare benefits and wage rates	No	Men's market wages are positively associated and women's market wage rates are negatively associated with marriage rates
Olsen and Farkas (1990)	Youth Incentive Entitlement Pilot Project	Effect of local employment opportunity on consensual union of African American youths from low-income households	Yes; used a waiting-time regression model with individual fixed effects	Employment opportunity encourages consensual union among African American youth

- Wood (1995) used standard metropolitan statistical area level (SMSA level) aggregated data from the 1970 and 1980 U.S. Census. Results from the analysis that account for selection suggest that a shrinking pool of high-earning young African American men had no significant role in explaining the decline in African American marriage.

- Olsen and Farkas (1990) examined the effect of a government program that guaranteed employment opportunities to disadvantaged, primarily African American, adolescents on family union and birth rates. They found that improved employment opportunity encourages the formation of marital or

cohabiting unions among youth from low-income families.[9] Since they used changes in employment opportunities caused by a public program as a way to identify the effect of employment on family union, their approach was conceptually similar to that of the current study. However, the changes in employment outcomes were identified using a comparison group design. They did not use the IV technique as we do in the current study, but instead used a waiting-time regression analysis with individual fixed effects to address the problem of selection.[10]

To identify the effect of men's employment on marriage, these studies used either a novel statistical technique (Ahituv and Lerman, 2007; Wood, 1995; Olsen and Farkas, 1990), or a natural experiment approach (Black et al., 2003) to address the issues of selection and reverse causation. In contrast, in the current study we use variation in employment generated by a randomized experimental evaluation. Thus, the current study provides evidence from a unique approach to estimating the effects of employment on marriage – for both men and women.

2. Studies on the Relationship Between Women's Employment Outcomes and Marriage

Studies focusing on women's employment-related outcomes and marriage have found mixed empirical evidence. Some of the studies have found that improved employment-related outcomes are negatively associated with marriage (for example, Aassve, 2003; Burgess et al. 2003; Blau et al., 2000), while others find that the estimated relationship between indicators of women's economic status and incidence of marriage is either positive (for example, Sweeny, 2002; Clarkberg, 1999), or not significant (for example, Xie et al. 2003; Smock and Manning, 1997). None of these studies has attempted to rigorously address either the problem of selection into marriage based on unobserved characteristics, or that of reverse causation. As a result, the estimates are potentially biased, and we are unable to draw strong causal inference about the effects of employment outcomes on women's likelihood of marriage based on these estimates.

3. Summary of Evidence

Altogether, the existing empirical literature suggests that economic resources have small but positive effects on marriage for men, but provide more limited and mixed evidence on

[9] Olsen and Farkas (1990) do not distinguish between marriage and cohabitation, and instead analyze them together as consensual unions. Even after combining the two types of family union, fewer than five percent of the adolescents in the sample experienced a consensual union.

[10] The waiting-time regression model, developed by Olsen and Wolpin (1983), estimates the determinants of family union status while permitting individual-level fixed effects, incomplete spells, and time-varying control variables. Olsen and Farkas (1990) argued that these measures were able to minimize bias due to selectivity or improperly matched program and comparison sites, and enabled them to distinguish between the effects of natural variation in the employment outcomes from the effects on employment induced by the program.

marriage for women. It is in this context that this report presents new empirical evidence on the effects of employment and earnings on the likelihood of marriage for men and for women. Utilizing the experimental evaluation data, we can provide stronger evidence on these relationships. In particular, the study contributes to our understanding of the effects of low-income women's employment on their likelihood of marriage–since no careful study to date has addressed the problem of selection in this regard.

CHAPTER III

DATA USED IN THIS STUDY

The data for this study come from the National Job Corps Study (Schochet et al. 2001). Since the study uses random assignment, it could identify changes in employment and earnings that were caused purely by the Job Corps program and were not a result of the participants' choices about marriage or any other individual traits. Thus, data from the Job Corps study enable us to address the possibilities of reverse causation and selection in estimating the effects of employment outcomes on marriage. In this chapter we discuss the National Job Corps Study, the sample used in the current study, and the measures used in the analysis.

A. THE NATIONAL JOB CORPS STUDY

Job Corps is an education and vocational training program whose goal is to teach young people the skills they need to become employable and independent and to place them in meaningful jobs or to further their education. Since its inception in 1964, Job Corps has been a central part of the U.S. government's efforts to improve the economic self-sufficiency of disadvantaged youths. It is distinguished from other programs by the intensive education, training, and support services it provides in a residential setting. The average participation duration is about 28 weeks, and its major components include basic education, vocational training, residential living (including some training in social skills), health care and education, counseling, and job placement assistance. Services in each of these components are tailored to each participant.[11]

To participate in Job Corps, youths must be legal U.S. residents between 16 and 24 years old and must be disadvantaged (defined as living in a household that receives welfare or has income below the poverty level). In order to enroll in Job Corps, young people must

[11] For a broader discussion of the experiences of Job Corps participants, see Schochet et al. (2001) and Johnson et al. (1999).

be in need of additional education, training, and job skills and must possess the capacity and aspirations to benefit from Job Corps. They must also be free of serious behavioral and medical problems.

The National Job Corps Study was designed to provide information about the effectiveness of the program. The cornerstone of the study was the random assignment of youths found eligible for Job Corps to either a program group or a control group. Program group members were permitted to enroll in Job Corps and control group members were not (although they could enroll in other training or education programs).

The Job Corps evaluation sample consisted of 9,409 program group members and 5,977 control group members randomly selected from among nearly 81,000 eligible applicants nationwide during the study period. Sample intake occurred between November 1994 and February 1996. The sample represents the eligible applicant population in the contiguous 48 states and the District of Columbia during that period.

B. SAMPLE FOR THIS STUDY

For the current study, we used data from the Job Corps baseline survey conducted immediately after random assignment and the follow-up survey conducted 48 months after random assignment. The evaluation participants who completed the baseline and the 48-month follow-up surveys include 4,485 control group members (2,787 men; 1,698 women) and 6,828 program group members (3,741 men; 3,087 women).[12]

The analysis sample for the current study includes only men and women who reported at baseline that they have never been married; we limited the sample this way because the processes, opportunities, and challenges related to first marriage are likely to be systematically different from those related to remarriage.[13] Our analysis sample consists of 6,205 men and 4,379 women who completed both the baseline and 48-month follow-up survey and reported that they had never married at the time of the baseline survey (see Table III.1). The analysis sample consists of about 95 percent of the men and 91 percent of the women in the Job Corps evaluation sample.

Summary descriptive statistics on the baseline characteristics of men and women in the analysis sample are presented in Table III.2. The table shows that about 50 percent of men and women in our sample were randomly assigned to the program group where they received Job Corps services. The average age of men and women in our sample was 19 when they were interviewed for the baseline survey. Thus, during the 48-month follow-up survey, their average age was 23—about one-quarter of them were between 24 and 28, one- third were between 22 and 23, and the remainder were 20 or 21. The majority of men and women

[12] The survey nonresponse issue is discussed later in the report (in section IV.B). The Job Corps study report also provides detailed discussion on survey nonresponse (see Chapter III in Schochet, 2001).

[13] As evident from Table 2, the selected sample includes those who were cohabiting at baseline. We have analyzed data excluding them, with no substantive change in the findings.

Table III.1 Job Corps Evaluation Sample, by Gender and Marital Status at Baseline

At Baseline	Men		Women	
	Sample Size	% (Weighted)	Sample Size	% (Weighted)
Never married	6,205	95	4,379	91
Never married, not cohabiting	5,989	92	4,137	86
Cohabiting	216	3	242	5
Married	101	2	141	3
Separated/divorced/widowed	89	1	172	4
Missing	133	2	93	2
Total	6,528	100	4,785	100

Note: The analysis sample for the current study is represented by the gray rows. The percentages are calculated using sample weights to account for sample and survey designs and interview nonresponse.

were from racial/ethnic minority groups: 46 percent of men and 53 percent of women were African American, 17 percent of men and 18 percent of women were Hispanic, and 7 percent of men and 7 percent of women were from other non-White racial/ethnic groups. Only 19 percent of men and 28 percent of women in our sample had completed a high school degree or a GED, which reflects the disadvantaged background of the Job Corps applicants who constitute our sample.

Another indication of the disadvantaged backgrounds of the youth in the sample is the fact that 48 percent of the men and 55 percent of the women reported growing up in a household that received some type of public assistance. Also, 56 percent of men and 52 percent of women had a mother who completed high school, while 44 percent of men and 41 of percent women had a father who completed high school. Twenty-nine percent of men and 22 of percent of women reported having used drugs (marijuana and/or other drugs) and 33 percent of men and 17 percent of women reported having been arrested or charged in a delinquency/criminal complaint. Most of the men and women in our sample said they were in excellent or good health, and most lived in metropolitan areas.

While having data from an experimental evaluation is critical for the analysis in this report, there are other advantages to using data from the Job Corps evaluation study. First, the sample consists of men and women who were between 20 and 28 when they were interviewed for the 48-month follow-up survey, and that age range includes the average age for first family formation in the U.S.[14] Second, the sample includes young men and women

[14] The median age at first marriage for men and women, respectively, was 26.9 years and 24.5 years in 1995, and 27.1 years and 25.3 years in 2005 (U.S. Census Bureau 2005).

Table III.2 Baseline Characteristics of the Analysis Sample, for Men and Women (percentages unless otherwise noted)

Variables	Men	Women
Randomly Assigned to Job Corps Program Group	50	51
Age at Baseline (years)	18.7	18.8
Age Groups at Baseline		
16-17 years	45	40
18-19 years	31	34
20-24 years	24	26
Race/Ethnicity		
White	30	21
African American	46	53
Hispanic	17	18
Other	7	7
Education: Completed High-School/GED	19	28
Had Children	9	26
Health Status (self-reported)		
Excellent	50	41
Good	38	44
Fair	11	14
Poor	1	1
Ever Used Drugs		
No drugs used	38	45
Marijuana only	22	17
Marijuana and other drugs	7	5
Missing	33	32
Ever Arrested or Charged w/ Delinquency/Criminal Complaint	33	17
Native Language		
English	86	86
Spanish	9	9
Other	5	4
Parents' Education		
Mother at least high school graduate	56	52
Mother's education missing	19	16
Father at least high school graduate	44	41
Father's education missing	37	41
Family on Welfare When Growing Up		
Never	45	40
Some of the time	30	32
Most or all of the time	18	23
Missing	7	5
Live in Metro Area or Not		
Primary metropolitan statistical area (PMSA)	32	34
Metropolitan statistical area (MSA)	43	48
Non-PMSA/Non-MSA	25	18
Sample Size	6,205	4,379

Note: All figures were calculated by using sample weights to account for sample and survey designs and interview nonresponse.

with disadvantaged backgrounds. Eighty percent of Job Corps participants in the study came to the program without a high school credential, and 60 percent received some form of public assistance during the year prior to being enrolled in the program (Schochet 1998).[15] Given the recent emphasis by researchers and policymakers on lower rates of marriage and greater marital instability in low-income populations in the U.S., this sample seems particularly relevant.

C. VARIABLES

The variables used in the current study are based on those available from the public-use files generated under the National Job Corps Study. This section discusses the measure of marital status, the employment-related measures, and the independent variables included in the regression models.[16]

1. Measures of Family Status

The key outcome variables for the current study are the respondents' marital status when they were interviewed for the 48-month follow-up survey in the National Job Corps Study. In that survey, respondents were asked about their current marital status[17] and also asked to name household members and their relationship to the respondent. This information was used to identify whether they were married four years after they applied for the Job Corps program. As shown in Table III.3, about 12 percent of men and 14 percent of the women in the analysis sample were married at the time of the 48-month follow-up survey.

It is important to note that ideally we would like to examine the effect of employment in one period on the likelihood of marriage at a later period. However, as we drew data from the Job Corps evaluation study, we were limited by the fact that data on employment and family status were collected at the same time and only over a relatively short span of four years after applicants' random assignment to either the treatment group or the control group. The effect of the Job Corps program on the employment-related outcomes started to appear in the third year after random assignment and continued through the fourth year. Since we did not have a longer follow-up period for the family status outcomes, we generated average measures for the employment-related outcomes during the third and fourth year after random assignment to examine their effects on family status at the end of the fourth year.

[15] Although the Job Corps program targets disadvantaged youth, since it is a voluntary program, the eligible Job Corps applicants are likely to be more motivated than the general disadvantaged population.

[16] Detailed documentation on these variables is available in Schochet et al. (2003).

[17] Respondents were able to choose their answer from the following categories: married, separated, divorced, widowed, living together unmarried, and never married & not living together unmarried.

Table III.3 Marital Status at 48-Month Follow-Up for the Analysis Sample, by Gender

	Men		Women	
Marital Status at 48-Month	Sample Size	% (Weighted)	Sample Size	% (Weighted)
Never married, not cohabiting	4,222	68.0	2,974	67.9
Married	770	12.4[a]	612	14.0[a]
Cohabiting	1,028	16.6	636	14.5
Separated/divorced/widowed	168	2.7	149	3.4
Missing	17	0.3	8	0.2
Total	6,205	100.0	4,379	100.0

Note: The percentages are calculated using sample weights to account for sample and survey designs and interview nonresponse.

a. Based on data from the nationally representative Survey of Income and Program Participation (SIPP) marital history module, about 17 percent of men and 30 percent of women in the U.S. who were 15 and older in 2001 were married by age 24 (Kreider 2005).

2. Employment-Related Measures

The primary focus of the current study is to understand the influence of employment-related outcomes on an individual's family status. While a range of employment-related measures is available from the Job Corps evaluation study,[18] for our purposes we wanted to generate measures of employment that would be comprehensive and capture the employment outcomes of men and women over a longer period of time. We expected that such comprehensive measures would not only capture current employment status and earnings but also perform as proxies for long-run employment and earnings potentials. Current employment and earnings, as well as employment and earnings prospects in the future, are all believed to play important roles in determining the family status of men and women. Marriages that occur in the current period can be influenced by current employment outcomes and also by anticipated future employment outcomes. Thus, we considered our estimates of the effects of employment outcomes on marriage as the effects of broader employment potentials of men and women in the sample. To that end, we combined information from the evaluation study to generate the following two employment measures:

Average Hours Worked per Week. Combining two variables available from the Job Corps evaluation public-use data file, we generated a measure of average hours worked per

[18] Examples of employment-related outcomes available from the Job Corps evaluation study include the individual's employment by quarter since random assignment, proportion of weeks employed since random assignment, hours worked per week since random assignment, and weekly earnings by quarter and hourly wages.

week during years three and four after random assignment. The two original variables in the public-use data file incorporated follow-up survey data on number of days worked per week, hours worked per day, and tenure in the jobs at which respondents were employed during years three and four since random assignment. Our measure captures both the event and the extent of employment experience by a respondent, since it incorporates those who were never employed during the two-year period by applying a value of zero hours worked per week. As noted above, the variable gives us a measure of employment that captures the employment status of the respondents during a two-year period and is expected to capture their longer-term employment potentials far better than employment measures over a short period of time.

Average Earnings per Week. Again, we combined two variables on weekly earnings available from the Job Corps public-use data file to generate a measure of average earnings per week during years three and four after random assignment.[19] The original variables in the public-use data file incorporated follow-up survey data on hourly wage or weekly earnings, hours worked per week, and tenure in the jobs at which respondents were employed during years three and four since random assignment. The measure captures the earnings effect of employment for the respondents over a two-year period. Those who were not employed during the two-year period were assigned zero earnings per week so that they could be included in our analysis.

3. Other Variables Included in the Regression Models

In estimating the relationship between employment-related outcomes and marriage, a range of independent variables is included in the regression models. The independent variables, which are all based on information from the baseline survey, include these:

- Age (entered as three age groups: 16-17, 18-19, and 20-24 years old)
- Race/ethnicity
- Whether completed high-school/GED
- Whether had children
- Self-reported health status
- Whether ever used illicit drugs
- Whether ever arrested or charged with delinquency or criminal complaint
- Native language (English, Spanish, or other)

[19] The public-use data file from the National Job Corps Study reports earnings and wages in 1995 dollars. The study measured earnings in 1995 dollars to be consistent with measures of program costs used in the benefit-cost analysis (Schochet, Burghardt, and Glazerman 2001).

- Whether mother completed high school
- Whether father completed high school
- When growing up, whether the family received any public assistance
- Whether the individual lives in a metropolitan area (primary metropolitan statistical area, PMSA, or metropolitan statistical area, MSA).

Summary statistics on these independent variables, discussed earlier in this chapter, are presented in Table III.2.

CHAPTER IV

EMPIRICAL METHODOLOGY

The primary challenge in empirically estimating the effects of employment and earnings on family formation is to address the issue of selection with respect to employment-related outcomes and family status. In this chapter we discuss why we can use the Job Corps experiment to identify the effects of employment and earnings on marital status, and also discusses the instrumental variable (IV) estimation method. Additionally, we examine the validity of the various assumptions underlying the IV approach in the context of our analysis.

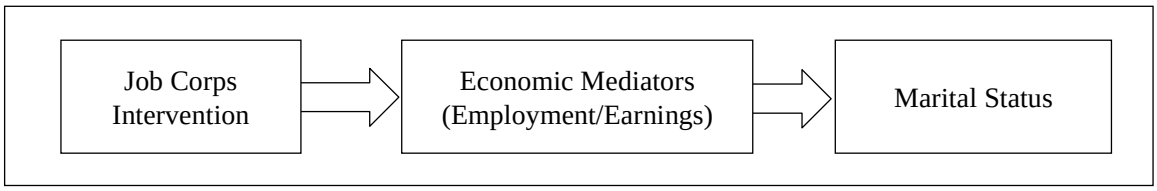
A. JOB CORPS PROGRAM AND MARITAL STATUS

A key assumption underlying the IV analysis is that the only way random assignment to Job Corps program affects marital status of men and women is by influencing their employment-related outcomes. As shown in Figure 1, any effect of the Job Corps program on the individual's marital status is expected to be mediated by economic outcomes such as employment and earnings, because the services provided under the Job Corps program, by design, focus primarily on improving the participants' economic outcomes and not on family-related outcomes.[20]

It is critical for the validity of the estimation technique used in this analysis that the only way random assignment to Job Corps affects men's and women's marital status is by first influencing their employment-related outcomes. Otherwise, we cannot exclude other causal

[20] The social skills training provided as a mandatory service to Job Corps participants can be considered to have some effect on personal relationship skills, and thereby provide another pathway through which Job Corps may affect marital status. However, social skills training in Job Corps centers on everyday workplace challenges (such as communication, team-building, problem-solving, conflict management), so it is not expected to have a strong influence on marital status independent of its influence on employment-related outcomes.

Figure 1. Conceptual Framework Relating Job Corps Program and Marital Status



pathways between the Job Corps participants' employment outcomes and their marital status, and as a result the IV estimates cannot be interpreted as causal effects of employment-related outcomes on marriage. Figure 1 illustrates the conceptual framework implied by a situation in which this restriction is met. This key assumption would not have been met, for instance, if the Job Corps training included a marriage and relationship skills education component. If such relationship skills training were part of the Job Corps intervention, there would exist at least one other pathway by which the intervention could affect the participants' marital status, and we would not be in a position to establish a causal link between employment and marriage.

B. INSTRUMENTAL VARIABLES ESTIMATION

The relationship between employment/earnings and marriage can be estimated using a simple model of the following form:

$$Y_i = \beta_0 + \beta_1 E_i + \beta_2 X_i + u_i \qquad (1)$$

where Y_i is a binary outcome indicating the marital status of individual *i*, E_i indicates an employment-related outcome (average hours worked per week and average weekly earnings) for individual *i*, X_i is a vector of background variables, β_j represents the model parameters to be estimated (*j*=0, 1, 2) and u_i is a residual. The coefficient β_1 represents the effect of employment/earnings on the individual's family status.

When estimating β_1 with ordinary least squares (OLS), to obtain an unbiased estimate of β_1 it is required that the employment outcome is uncorrelated with the residual u_i. If E_i is correlated with the unobserved component of the family status equation (that is, u_i in equation 1), then the OLS estimate of β_1 will be biased.[21] For example, correlation between

[21] For dichotomous dependent variables, instead of a linear OLS model, a nonlinear estimation model (logistic or probit estimation) can be applied, but a linear OLS estimation (that is, a linear probability model) provides a convenient approximation of outcome probability around the mean values of the covariates (see, for example, Wooldridge 2002, Ch. 15). The linear probability model also provides the advantage of having a direct and more intuitive interpretation. Although all regression analysis in this report involves dichotomous dependent variables (indicators of marital and cohabiting status), we apply linear estimation models for all analysis essentially to benefit from the advantages of linear estimation mentioned here.

E_i and u_i may arise if the unobserved, underlying characteristics that make an individual more likely to be employed or earn more also make him/her more likely to marry. To address the possibility of such selection we utilize the instrumental variables (IV) estimation strategy with the randomly assigned treatment status of Job Corps applicants to either program or control groups as an instrumental variable.[22]

The IV estimation approach can be represented by a simple two-equation model:

$$E_i = \alpha_0 + \alpha_1 T_i + \alpha_2 X_i + v_i \qquad (2)$$

$$Y_i = \beta_0 + \beta_1 E_i + \beta_2 X_i + u_i \qquad (3)$$

where T_i is randomly assigned treatment status and is the instrumental variable, v_i is a residual, and all other terms are as defined before. Two assumptions are needed to be satisfied for T_i to be a valid instrument in our analysis. First, T_i has to be independent of the individual traits that can affect both employment-related outcomes and marital status, and second, it needs to be correlated with the employment outcomes. More specifically, the assumptions are: (1) T_i is uncorrelated with the residual terms in equations 2 and 3, and (2) the covariance between E_i and T_i differs from zero.

The first assumption is satisfied considering the following two aspects of the instrument in our analysis. First, in the Job Corps study, eligible applicants were randomly assigned to program and control groups; thus, by design T_i is independent of any individual traits that may affect study participants' employment outcomes and family status. Second, as has been argued earlier in this section, with the Job Corps services focusing exclusively on improving the participants' economic outcomes, it is reasonable to consider that the randomized treatment status would have no effect on marital status except through the employment-related outcomes. Thus, in addition to having a truly randomized instrument, we are able to make a reasonable case for satisfying the *exclusion restriction* (Angrist et al. 1996) required for identification of β_1, and thereby satisfy the assumption that T_i is uncorrelated with the residual terms.

The second assumption for instrument validity has also been met, since Job Corps applicants randomly assigned to the program achieved significant improvements in employment-related outcomes when compared with those who were randomly assigned to the control group. We present the estimated program impacts for the sample selected for this study in Table IV.1.[23] The results show that for both of the labor market outcomes, the opportunity to participate in the Job Corps program had a statistically significant positive

[22] The idea of using randomized treatment status as an instrumental variable is not new; see, for example, Permutt and Hebel (1989), Angrist (1990), Evans and Ringel (1999), Gennetian et al. (2005).

[23] The program impact on labor market outcomes for men and women in the full evaluation sample are reported in Schochet et al. (2001, Tables D.6 and D.7) and show estimated impacts that are similar to those presented here.

Table IV.1 Impacts of Job Corps on Employment and Family Outcomes of Eligible Applicants, for Men and for Women (for the analysis sample selected for the current study)

	Men		Women	
Outcomes at 48 Months	Control Group Mean	Estimated Impact	Control Group Mean	Estimated Impact
Employment Outcomes				
Avg. hours worked per week in yrs 3 & 4 (hour)	27	1*	21	1**
Avg. earnings per week in years 3 & 4 ($)	205	14***	145	10**
Family Status Outcomes [a]				
Married at 48-month	12	-0.1	12	3.0***
Never married, non-cohabiting at 48 months	68	-0.8	70	-3.3**

Note: Estimated impacts per eligible applicant are measured as the difference between the weighted means for program and control group members. For estimates of program impacts on the employment outcomes for the full evaluation sample, see Tables D.6 and D.7 in Schochet et al. (2001).

a. The control group means for the family status outcomes do not add up to 100 percent since we do not include the outcome "cohabiting at 48-month". Men and women in neither of the two family statuses reported here were either cohabiting at 48-month (16 percent of men and 14 percent of women) or data on their family status was missing.

*/**/*** Estimates are significantly different from zero at the 0.10/0.05/0.01 level.

effect for men as well as for women. This provides evidence of non-zero covariance between the instrument and the employment-related measures in our analysis. For any employment measure for which there is not a statistically significant impact of the Job Corps, the randomized treatment status could not be used as a valid instrument.[24]

Taken together, the randomized treatment status from the Job Corps Study constitutes a valid instrument for estimating the effect of employment on marriage.[25] We estimated the marital status equation using both OLS and IV estimation methods.[26] With both of these

[24] A weak covariance between the endogenous variable (E_i) and the instrument (T_i) will result in too large standard errors of the IV estimates. Strong positive and statistically significant impact of Job Corps treatment on the employment measures would rule out that possibility.

[25] We used the statistical software Stata to implement the IV estimation. More specifically, we used Stata instrumental variable regression command "ivreg2."

[26] We used a linear instrumental variables estimator, despite having dichotomous family status indicators as dependent variables, to facilitate direct, intuitive interpretation. Moreover, Angrist (1991) showed that linear instrumental variables estimators perform nearly as well as the correctly specified nonlinear (maximum likelihood) estimator. Applying non-linear estimation models using the "probit" and "ivprobit" commands in

estimation methods, the regression models included a set of baseline characteristics as independent variables (X_i in the equations above, and listed in section III.C) to control for the possibility that both employment and marital status could be correlated with these observable characteristics, and not including them in the regression equation might have led to biased estimates of the effect of employment on marital status. Since all of these control variables were measured at baseline, they are predetermined with respect to the individual's marital status and employment-related outcomes measured 48 months after random assignment.

Finally, all analyses in this report were conducted separately for men and women, and we used the sample weights to account for the sample and survey designs and for interview nonresponse. Note that the Job Corps evaluation study had a 93.1 overall response rate (93.8 percent for treatment and 92.3 percent for control) for the baseline survey, and 79.9 percent overall response rate (81.5 percent treatment and 77.8 percent control) for the 48-month survey.[27] There were some differences in the average baseline characteristics of respondents to the 48-month survey and the full sample of respondents and nonrespondents. However, there were very few differences in the average baseline characteristics of treatment group respondents and control group respondents, which limited the possibility of bias in the estimated impacts.

(*continued*)
Stata produced estimates that were very similar to those from linear estimation (see Table A-1 in the appendix for results from linear and non-linear estimation for men and women). In some instances, however, we were unable to obtain non-linear estimates, as the empirical likelihood function did not converge.

[27] The response rates in the Job Corps 48-month follow-up survey are comparable to response rates in other large scale surveys or surveys conducted under other evaluation studies. For example, the overall response rate was 81 percent in the 2002 round of the National Longitudinal Survey of Youth 1979 (CHRR, 2006); 76 percent in the third follow-up survey of the Quantum Opportunity Program evaluation study (Schirm et al, 2006), and 84 percent in the 1-year follow-up child assessment survey of the Head Start Impact Study (DHHS 2005). Thus, survey nonresponse need not be of particular concern for the Job Corps sample, and hence for the analysis in the current study.

CHAPTER V

RESULTS

This chapter presents the empirical estimates of the relationship between employment-related outcomes and the individual's marital status. We discuss the OLS estimates that do not account for potential selection bias as well as the IV estimates that do, under certain reasonable assumptions, address potential selection bias due to unobservable characteristics, and the possibility of reverse causation. As noted earlier, although we analyzed the effect of employment outcomes on cohabitation, the findings are not discussed at length here since there is no evidence of a statistically significant effect. For interested readers, the results are presented in Appendix Table A-2.

A. EFFECTS OF EMPLOYMENT-RELATED OUTCOMES ON MARRIAGE FOR MEN

To understand whether there is a causal effect of employment outcomes on marital status, we utilized a multivariate regression approach, applying OLS and IV estimation techniques. In the OLS estimation, we controlled for a range of observed characteristics, while in the IV estimation, in addition to controlling for observed differences, we account for unobserved selection.

Results from both OLS and IV estimation of the marital status equations for men are presented in Table V.1. Each cell in the table reports the coefficient on the employment-related outcome from a separate regression.[28] Complete results for the full specification of each regression for men are reported in Appendix Table A.3.

[28] In other words, the column labeled OLS provides the OLS estimates of β_1 in equation 1, with each employment-related measure entered separately in an estimating equation, and likewise the column labeled IV provides the IV estimates of β_1 in equation 3.

The OLS results concerning men's likelihood of marriage, shown in Table V.1, suggest that even after controlling for various baseline characteristics, there is a small but statistically significant positive association between men's employment outcomes and their likelihood of marriage. These estimates are generally comparable to the findings from similar studies (see, for example, Sassler and Goldschneider 2004), which were also unable to account for unobserved selection. However, the magnitude of the OLS estimates is quite small. For example, a 10 percent increase in the hours worked per week (from the current level of 27 hours per week) is associated with an increase of less than one percentage point in men's likelihood of marriage; a 10 percent increase in weekly earnings (from the current level of $201 per week) is associated with an increase of one-half percentage point in men's likelihood of marriage.

When we address the potential selection bias in the OLS estimates of the effect of employment-related outcomes using IV estimations, neither of the two coefficients on employment outcomes remains statistically significant. Thus, changes in employment and earnings have no statistically significant impact on men's likelihood of marriage. In addition, the estimates from the IV analysis for marriage in Table V.1 are smaller in magnitude than the corresponding OLS estimates, which suggests that the OLS estimates of the effects of employment outcomes on men's likelihood of marriage are biased upward.[29] These results are similar to the findings of Wood (1995), which showed that when the potential endogeneity of "marriageability" measures (based on income and employment levels) is accounted for, there is not a significant effect of men's employment and earnings on marriage rates.

However, these results contrast with findings from some of the other studies that have accounted for selection and found positive effects of men's employment on marriage rates (Ahituv and Lerman, 2007; Black et. al., 2003; and Olsen and Farkas, 1990). A key factor that may explain the difference between the estimated effects of employment outcomes on marriage for men in the current report and the findings in these other studies is that men in our analysis sample were generally much younger when we last observed their marital status. The average age for men in our sample was 22.7 years when they were interviewed during 1999-2000 for the 48-month survey. Ahituv and Lerman (2007) used panel data to analyze marital and employment transitions for men over a 23-year period, from when these men were 17 years old to when they were 40 years old. Black et al. (2003), on the other hand, used county-level data on employment and family structure over a period ranging from the late 1960s through the early 1990s and have included a population of much broader age range. Olsen and Farkas (1990), however, had a sample of men who were between 17 to 22 when they were interviewed in 1981. Despite the comparability of age, the sample in Olsen and Farkas (1990) consisted solely of African American men. Such differences in the composition of the samples analyzed in these studies are possible factors that can help

[29] One of the reasons the IV estimates can be *not* statistically significant is the fact that the two-step IV estimation procedure can produce too large a standard error around the estimates by way of weak correlation between the endogenous variable and the instrument. But that does not appear to be the case here, since the randomized Job Corps treatment has a strong positive impact on the employment related outcomes.

Table V.1 Effects of Employment Outcomes on the Likelihood of Marriage for Men and Women (coefficients from OLS and IV Estimation)

	Linear (Coefficients)	
Likelihood of Marriage at 48-Month	OLS	IV
Men		
Avg. hours worked per week in years 3 & 4 (N=6054)	0.0025***	-0.001
	(10.06)	(0.08)
Avg. earnings per week in years 3 & 4 (N=5923)	0.00024***	0.00004
	(8.43)	(0.06)
Women		
Avg. hours worked per week in years 3 & 4 (N=4281)	-0.0007*	0.024*
	(1.77)	(1.70)
Avg. earnings per week in years 3 & 4 (N=4202)	-0.00002	0.0028*
	(0.38)	(1.75)

Note: Absolute value of robust t-statistic (for OLS) and z-statistics (for IV) are in parentheses.

Each coefficient comes from a separate regression model. In each specification, control variables include age, education, race/ethnicity, health status, drugs use, arrest history, whether had a child, native language, parents' education, public assistance status when growing up, and whether live in a metropolitan area. The full sets of estimates are reported in Appendix Tables A.3 and A.4.

*/**/*** Estimates are significantly different from zero at the 0.10/0.05/0.01 level.

explain the difference in the estimated effects of employment on marriage for men. In addition, all of these other studies are based on cohorts of men who were in an age range similar to that of the current study sample about one or two decades ago. During the intervening years, marriage rates have decreased, age at first marriage has increased, and attitudes towards marriage have also changed. The difference between the findings for men in the current study and those for men in the previous studies may reflect these underlying differences across cohorts.

B. Effects of Employment-Related Outcomes on Marriage for Women

The results from the multivariate analysis for women indicate that increased employment and earnings have a significant effect on marriage. Table V.1 presents the results from both OLS and IV estimations of the marriage equations for women. As with the results for men, each cell in Table V.1 reports the coefficient on the employment outcome from a separate regression. Complete results for the full specification of each regression for women are reported in Appendix Table A.4.

The OLS estimates in Table V.1 concerning women's likelihood of marriage indicate that for both of the employment-related measures, there is a small but negative association with women's likelihood of marriage, although the relationship is statistically significant only

for hours worked per week. Some of the existing studies that did not try to account for the potential selection problem also provide similar evidence of negative relationships between women's economic opportunities and their likelihood of marriage (for example, Aassve, 2003; Blau et al., 2000). The negative association between employment outcomes and marriage for women may indicate that women who are less likely to succeed in the labor market select into marriage. The negative association may also highlight the possibility that women are less likely to work after they are married, particularly once they have children. Thus, the negative OLS estimates potentially reflect selection bias as well as the possibility of marriage causing a reduction in women's employment.

However, the IV estimation, which is able to account for the possibility of selection as well as reverse causation, indicates a statistically significant positive effect of women's employment and earnings on marriage. The IV coefficients on both of the employment outcomes have signs opposite to the corresponding OLS estimates, which suggest a negative selection bias in the OLS estimates. The estimated IV coefficient on weekly hours worked suggests that a 10 percent increase in the weekly hours worked (from the current level of 22 hours per week) would increase the likelihood of women's marriage by more than 5 percentage points. Since only 14 percent of the women in the sample were married when they were interviewed for the 48-month follow-up survey, the estimated effect can be considered a substantial effect of employment on women's marriage. The estimated IV coefficient on weekly earnings suggests that a 10 percent increase in weekly earnings (from the current level of $152 per week) would increase the likelihood of women's marriage by more than 4 percentage points. Evidently, the effect of earnings on women's marriage is relatively smaller than the effect of hours worked, though it is still substantial.

Overall, these results suggest that increased employment and earnings will have a positive effect on women's likelihood of marriage. These results are not consistent with findings in many other existing studies, all of which established only an associative relationship and did not account for the potential selection bias in their estimates.

C. RESULTS FOR SUBGROUPS

We analyzed the effects of employment outcomes on marital status for various subgroups defined by race, educational achievement, age, and childbirth. The results from these subgroup analyses for men are reported in Table V.2 and those for women are reported in Table V.3.[30]

In light of the emphasis put forward in the empirical literature about the racial/ethnic difference in the relationship between employment outcomes and marital status, we conducted subgroup analysis for African American and non-African-American men and

[30] In some of the subgroup samples, the randomized treatment status did not have statistically significant non-zero covariance with one or both of the employment-related outcomes reported in Tables V.2 and V.3 (see estimates in Appendix Table A-5). In those cases we could not use the randomized treatment status as a valid instrument, and as a result, we could not report the IV coefficients in those cases.

women.[31] The results for men in both racial groups suggest no statistically significant effect of the employment-related measures on their likelihood of marriage. The results for women indicate an important exception to our findings for all women. As shown in Table V.3, for African American women the OLS estimates show statistically significant positive relationships between employment outcomes and marriage. When unobserved selection is accounted for through the IV estimation, the estimated relationships still remain positive, but are no longer statistically significant. Again in this subgroup, while the IV point estimates of the effects of employment outcomes on marriage are still larger than their OLS counterparts (suggesting negative biases in the OLS estimates), they are much smaller than the estimated effects for women in the overall sample. These estimates of weaker effects of employment and earnings on marriage for African American women might be explained by a combination of relatively low rates of marriage among African American women in the sample (only 8.9 percent were married by the 48-month follow-up survey, compared to 14.0 percent for the entire sample) and the small sample size of women in this subgroup.

We estimated the relationship between employment-related outcomes and marriage for men and women in other subgroups as well: those based on level of education, age, and whether the individual had a child at baseline. It has been suggested in the literature that the influence of economic factors in family life transitions might differ by level of education (for example, Moffitt, 2000). Although most of the men and women in our sample appear to have low levels of education at baseline, approximately one in five men and one in five women in our sample graduated from high school. We analyzed the data for the subgroup of people with less than high school education.[32] We also estimated the relationship between employment-related outcomes and marriage for men and women 20 to 24 years old at baseline (24 to 28 years old at the 48-month follow-up). This subgroup is interesting because older sample members overall had a longer period of time in which to experience their first marriage and they are more likely to have already made that transition.

In addition, we conducted the analysis for the subgroup of men and women who did not have a child at baseline. This is an interesting subgroup because the dynamics of life choices with and without a child can be substantially different, and we wanted to examine whether that difference affects the relationship between employment outcomes and marriage.[33] The findings from these subgroup analyses are broadly consistent with those from the overall sample: for women, the OLS estimates of the effect of employment and

[31] We combined men and women in white, Hispanic, other racial/ethnic groups in the non-African American category to take advantage of a larger sample size for the subgroup analysis. Even then, we did not have sufficient statistical power to identify statistically significant effects of Job Corps program on one of the employment outcomes for men, and both employment outcomes for women.

[32] We could not conduct the analysis for the subgroup of people who completed high school because we did not have enough statistical power to implement instrumental variables analysis for this subgroup.

[33] For women without a child at baseline, the randomized treatment status is not valid as an instrument for either of the labor market outcome measures presented in this report. Hence, we do not present IV results for women in this subgroup.

Table V.2 Effects of Employment Outcomes on the Likelihood of Marriage for Men in Different Subgroups (coefficients from OLS and IV Estimation)

	Marriage	
Men in Subgroup	OLS	IV
All Men (from TableV.1)		
Avg. hours worked per week in years 3 & 4 (N=6054)	0.0025 ***	-0.001
	(10.06)	(0.08)
Avg. earnings per week in years 3 & 4 (N=5923)	0.00024 ***	0.00004
	(8.43)	(0.06)
African American		
Avg. hours worked per week in years 3 & 4 (N=2791)	0.0017 ***	-0.0034
	(5.26)	(0.40)
Avg. earnings per week in years 3 & 4 (N=2734)	0.0002 ***	-0.0004
	(4.79)	(0.53)
Non African American		
Avg. hours worked per week in years 3 & 4 (N=3263)	0.0031 ***	—
	(8.50)	
Avg. earnings per week in years 3 & 4 (N=3189)	0.00028 ***	0.00041
	6.91	(0.37)
Less Than High School Education		
Avg. hours worked per week in years 3 & 4 (N=4852)	0.0024 ***	—
	(8.81)	
Avg. earnings per week in years 3 & 4 (N=4742)	0.0002 ***	-0.0003
	(7.34)	(0.32)
Age 20-24 at Baseline		
Avg. hours worked per week in years 3 & 4 (N=1439)	0.0021 ***	-0.0027
	(3.83)	(0.24)
Avg. earnings per week in years 3 & 4 (N=1410)	0.0002 ***	-0.0003
	(3.90)	(0.33)
Without Child at Baseline		
Avg. hours worked per week in years 3 & 4 (N=5490)	0.0018 ***	—
	(6.52)	
Avg. earnings per week in years 3 & 4 (N=5378)	0.0002 ***	0.0008
	(6.13)	(1.01)

Note: Absolute value of robust t-statistic (for OLS) and z-statistics (for IV) are in parentheses.

Each coefficient comes from a separate regression model. In each specification, control variables include age, education, race/ethnicity, health status, drug use, arrest history, whether had a child, native language, parents' education, public assistance status when growing up, and whether live in a metropolitan area.

"—" under the IV column indicates that the IV analysis could not be conducted. This occurred because the randomly assigned treatment status did not have a statistically significant effect on the relevant employment outcome, which invalidated the use of the randomized treatment status as an instrument. As a result, we could not report the IV coefficients in those cases.

*/**/*** Estimates are significantly different from zero at the 0.10/0.05/0.01 level.

Table V.3 Effects of Employment Outcomes on the Likelihood of Marriage for Women in Different Subgroups (coefficients from OLS and IV Estimation)

	Marriage	
Women in Subgroup	OLS	IV
All Women (from Table V.1)		
Avg. hours worked per week in years 3 & 4 (N=4281)	-0.0007 *	0.024 *
	(1.77)	(1.70)
Avg. earnings per week in years 3 & 4 (N=4202)	-0.00002	0.0028 *
	(0.38)	(1.75)
African American		
Avg. hours worked per week in years 3 & 4 (N=2379)	0.0007 *	0.005
	(1.69)	(0.64)
Avg. earnings per week in years 3 & 4 (N=2348)	0.0001 **	0.0007
	(2.01)	(0.63)
Non African American		
Avg. hours worked per week in years 3 & 4 (N=1902)	-0.0021 ***	—
	(3.44)	
Avg. earnings per week in years 3 & 4 (N=1854)	-0.00016 **	—
	(2.14)	
Less Than High School Education		
Avg. hours worked per week in years 3 & 4 (N=3046)	-0.00036	0.026 *
	(0.85)	(1.76)
Avg. earnings per week in years 3 & 4 (N=2990)	0.00003	0.0033 *
	(0.52)	(1.88)
Age 20-24 at Baseline		
Avg. hours worked per week in years 3 & 4 (N=1179)	0.0003	0.018 *
	(0.39)	(1.79)
Avg. earnings per week in years 3 & 4 (N=1160)	-0.00002	0.0019 *
	(0.20)	(1.81)
Without Child at Baseline		
Avg. hours worked per week in years 3 & 4 (N=2993)	0.001 **	—
	(2.28)	
Avg. earnings per week in years 3 & 4 (N=2935)	0.0001 **	—
	(2.54)	

Note: Absolute value of robust t-statistic (for OLS) and z-statistics (for IV) are in parentheses.

Each coefficient comes from a separate regression model. In each specification, control variables include age, education, race/ethnicity, health status, drug use, arrest history, whether had a child, native language, parents' education, public assistance status when growing up, and whether live in a metropolitan area.

"—" under the IV column indicates that the IV analysis could not be conducted. This occurred because the randomly assigned treatment status did not have a statistically significant effect on the relevant employment outcome, which invalidated the use of the randomized treatment status as an instrument. As a result, we could not report the IV coefficients in those cases.

*/**/*** Estimates are significantly different from zero at the 0.10/0.05/0.01 level.

earnings on women's likelihood of marriage are generally biased downward, and there is a substantial and statistically significant positive effect of women's employment and earnings on marriage; for men, the OLS estimates of the effect of employment outcomes on marriage are biased upward, and there is no statistically significant effect of employment and earnings on their likelihood of marriage.

Overall, the subgroup findings are similar to the results from the full analysis sample of men and women: employment and earnings have no statistically significant effect on marriage for men; for women the employment outcomes have positive and statistically significant effects on marriage. The only exception is among African American women, for whom the estimated effects of employment outcomes on marriage are much weaker than those for all women and are not statistically significant. One notable pattern appears from the subgroup results for men: for most of the subgroups considered here, the OLS estimates are positive (and statistically significant), but the IV estimates are mostly negative although not statistically significant. The point estimates from the IV analyses for these subgroups are generally larger than their OLS counterparts, but are not statistically significant--which suggests possible lack of statistical power to estimate the IV coefficients for these subgroups.

D. DISCUSSION

Our analysis in this report identifies a set of interesting findings: for the young population represented in our sample, employment and earnings seem to have no statistically significant effect on men's likelihood of marriage, but they do have a statistically significant positive effect on women's likelihood of marriage. There are two aspects to these findings that we would like to discuss in further detail: first, the positive effect of employment outcomes on marriage for women; and second, the dichotomy of the findings along the gender line.

Edin and Kefalas (2005) offered some qualitative evidence on why improved employment and earnings may prompt women to marry. Their conclusions, based on interviews with a small sample of single mothers in large urban areas, suggest that disadvantaged women feel very strongly about becoming economically self-sufficient before taking marriage vows. Thus, for some disadvantaged single mothers, improving economic independence may play a key role in determining their marital status. This and earlier research suggests that increased economic self-sufficiency for a woman through employment can positively affect her likelihood of marriage in a number of ways. First, employment provides her with the financial ability to act independently in making solo consumption decisions and will increase her influence in joint consumption decisions when she is married. Second, a woman's employment is likely to reduce the inequality between husband and wife in their contribution to household economic resources, which in turn is likely to increase the "symmetrical dependency" between them and result in improvements in a woman's status in the family (Oppenheimer, 1997). Third, when a woman is employed, the distribution of resources within the marriage is likely to improve for her, since employment improves her consumption opportunities outside of the marriage. While these aspects of the effect of employment on marriage are not consistent with the intra-household specialization model (Becker, 1991), they can be reconciled in the context of a bargaining model of the

household, where improved outside economic opportunities for a woman would imply increased benefits for her within the marriage as well (Lundberg and Pollak, 1996), thereby increasing the likelihood of marriage for employed women.

In addition, the estimated positive effects of women's employment outcomes on marriage can be explained under an "extended spouse search" model (Oppenheimer, 1988). In this model, a woman's economic success in the labor market increases her attractiveness as a potential partner (as a "good-catch"), and men would prolong their spouse-search process to find women with greater economic success—both contributing to increased marriage rates for women who are employed and earn more.

Thus, the estimated positive effects of employment and earnings on marriage for women can be considered reflections of benefits of economic independence for women and of the "good-catch" effect in the marriage market. In low-income disadvantaged families, these considerations are likely to be important for some women, since they are likely to influence economic welfare within the marriage as well as outside of it.

For men, the IV estimates are not statistically significant, and many of the IV point estimates are actually negative. Several factors can explain these estimates for men. On average, men tend to transition into marriage at an older age than women, and most men in the analysis sample may be too young for the effects on marriage to be observed. Such a conclusion is consistent with evidence from a recent long-term randomized evaluation of Career Academies (Kemple and Willner, 2008). Findings from the Career Academies evaluation suggest that for men who are on average three to four years older than our analysis sample, but who have disadvantaged backgrounds similar to the Job Corps applicants', improved employment outcomes increase their likelihood of marriage. Thus, observing men in the analysis sample at an older age might have led to different findings.

In addition, social norms regarding men's employment maturity and income stability expected for them to get married are ostensibly stronger than those for women (Edin and Kefalas, 2005; Oppenheimer, Kalmijn, and Lim, 1997). For a population of young, economically disadvantaged men, this may translate into their postponing marriage to establish a more successful labor market performance history over time. Furthermore, the "good-catch" effect may not be very strong for these young, recently employed men. A combination of these factors may result in the negative IV estimates that we identify in some of our analyses. Moreover, as noted earlier, we may have lacked sufficient sample size to give us the statistical power to estimate the IV coefficients with higher precision (that is, smaller standard error).

CHAPTER VI

CONCLUSION

The key challenge in estimating the effects of employment-related outcomes on the likelihood of men or women marrying is the need to account for the possibilities that marital status may affect employment outcomes (reverse causation) and that men and women with particular unobserved traits that make them more likely to be successful in the labor market may select into marriage (selection). A recent article by Burstein (2007) notes that in order to meet this challenge "one would need to randomly assign single men to a treatment group that had the effect of increasing their employment and earnings, and then look for the impact on their marital union formation." The current study applies precisely this strategy to generate consistent estimates of the effects of men's and women's employment and earnings outcomes on their likelihood of marriage. Data from an experimental evaluation of the Job Corps program, which is focused on improving employment outcomes for its participants, has allowed us to generate these estimates. The random assignment of eligible applicants to program and control groups created the opportunity for an exogenous source of variation in employment and earnings of a program participant. By applying the instrumental variable (IV) method, we utilized this exogenous variation in employment and earnings as a way to identify their effects on marriage.

The most prominent finding of this study is that an increase in employment and earnings via the Job Corps program increases the likelihood of marriage for young women from an economically disadvantaged background. Estimates made heretofore used ordinary least squares (OLS) estimates and were unable to account for selection, that is, for the possibility that women with unobserved characteristics that make them less likely to succeed at employment can select into marriage. These estimates suggested that there is either negative or non-significant association between women's employment outcomes and marriage. The negative association highlighted the possibility that women are less likely to work after they are married, particularly once they have children. However, when the possibilities of reverse causation and unobserved selection are accounted for through IV methods, the estimates suggest that for disadvantaged young women, raising employment and earnings leads to an increase in marriage rates. The positive effects of an increase in

employment and earnings on women's likelihood of marriage may reflect the benefits of women's economic independence as well as the "good-catch" effect in the marriage market.

Similar estimates that do not account for potential selection bias indicated that employment and earnings are positively associated with men's likelihood of marriage (the report replicates these findings). However, the IV estimates that appropriately account for potential selection problems and address the possibility of reverse causation indicate that much of the positive association between men's employment and marriage relates to unobserved individual characteristics that make men more likely to be successful in the labor market as well as in the marriage market. In other words, the results suggest that the OLS estimates are biased, and that there is no statistically significant effect of employment and earnings on the likelihood of marriage for young men with economically disadvantaged backgrounds.

It is important to note some limitations of the study. First, we considered marriage as a family status that is independent of cohabitation. While we focused on marriage for our analysis, the two types of family status may not be independent of each other. Although a multinomial discrete response model seems to have been appropriate to capture their dependence, the instrumental variable estimation method is not amenable to multinomial discrete variables. Second, in each regression model the labor market variables were entered one at a time, although they may be correlated. Once again, with only a single instrumental variable at hand, it would not have been possible to derive unbiased estimates of the coefficients if more than one endogenous variable were included in the specification. Third, the study sample is representative of 16- to 24-year-old Job Corps applicants during 1994-95, and therefore the findings from the study are not generalizeable to the entire population in the United States. However, the findings *are* relevant for young individuals with disadvantaged socio-economic backgrounds, who are similar to Job Corps applicants.

These limitations notwithstanding, the study underscores the importance of addressing the potential selection bias in estimating the effects of employment and earnings on men's and women's family union decisions. The study provides clear evidence of a positive effect of improved employment opportunities for women on their likelihood of marriage but no significant effect of improved employment opportunities for men on their likelihood marriage. Since the findings are based on a relatively young sample of men and women, in future research it would be interesting to examine the effect of employment on marriage for men and women who are somewhat older and have had a longer period of time, overall, to make marital transitions. Future research may also be directed towards an assessment of the *marriage effect* of social services that are focused on improving employment-related outcomes vis-à-vis services that are focused on strengthening family related outcomes of economically disadvantaged people.

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APPENDIX A

TABLES

Table A1. Effects of Employment Outcomes on the Likelihood of Marriage for Men and Women (Coefficients from Linear Estimation and Marginal Effects from Nonlinear Estimation)

	Linear (Coefficients)		Nonlinear (Marginal Effects)	
Likelihood of Marriage at 48-month	OLS	IV	Probit	IV Probit
Men				
Avg. hours worked per week in years 3 & 4 (N=6054)	0.0025***	-0.001	0.0024***	-0.0016
	(10.06)	(0.08)	(10.45)	(0.15)
Avg. earnings per week in years 3 & 4 (N=5923)	0.00024***	0.00004	0.0002***	-
	(8.43)	(0.06)	(8.97)	
Women				
Avg. hours worked per week in years 3 & 4 (N=4281)	-0.0007*	0.024*	-0.0005	0.0189***
	(1.77)	(1.70)	(1.54)	(3.68)
Avg. earnings per week in years 3 & 4 (N=4202)	-0.00002	0.0028*	-0.000004	0.0023***
	(0.38)	(1.75)	(0.08)	(3.89)

Note: Absolute value of robust t-statistics (for OLS) or z-statistics (for IV and nonlinear models) are in parentheses.

Each coefficient comes from a separate regression model. In each specification, control variables include age, education, race/ethnicity, health status, drugs use, arrest history, whether had a child, native language, parents' education, public assistance status when growing up, and whether live in a metropolitan area.

"–" under the IV Probit column indicates that the IV analysis could not be conducted, because the likelihood function did not converge.

*/**/*** Estimates are significantly different from zero at the 0.10/0.05/0.01 level.

Table A.2. Effects of Employment Outcomes on the Likelihood of Cohabitation for Men and Women (Coefficients from Linear Estimation and Marginal Effects from Nonlinear Estimation)

	Linear (Coefficients)		Nonlinear (Marginal Effects)	
Likelihood of Cohabitation at 48-month	OLS	IV	Probit	IV Probit
Men				
Avg. hours worked per week in years 3 & 4 (N=6054)	0.0018***	0.014	0.0018***	0.014
	(6.74)	(0.92)	(6.87)	(1.26)
Avg. earnings per week in years 3 & 4 (N=5923)	0.0002***	0.0008	0.0002***	0.0008
	(5.90)	(1.02)	(6.24)	(1.11)
Women				
Avg. hours worked per week in years 3 & 4 (N=4281)	0.0008**	0.0026	0.0008**	0.0037
	(2.17)	(0.28)	(2.18)	(0.39)
Avg. earnings per week in years 3 & 4 (N=4202)	0.0001**	0.00009	0.0001**	0.0002
	(2.39)	(0.08)	(2.52)	(0.20)

Note: Absolute value of robust t-statistic (for OLS) and z-statistics (for IV and nonlinear models) are in parentheses.

Each coefficient comes from a separate regression model. In each specification, control variables include age, education, race/ethnicity, health status, drug use, arrest history, whether had a child, native language, parents' education, public assistance status when growing up, and whether live in a metropolitan area.

*/**/*** Estimates are significantly different from zero at the 0.10/0.05/0.01 level.

Table A.3 Complete OLS and IV Results From Regression of Marriage on Employment Outcomes for Men

Variables	Average Hours Worked Per Week in Years 3 and 4		Average Earnings Per Week in Years 3 and 4	
	OLS	IV	OLS	IV
Employment Outcome	0.0025	-0.001	0.00024	0.00004
[indicated in the column heading]	(10.06)***	(0.08)	(8.43)***	(0.06)
Age: 18-19 years at baseline	0.024	0.036	0.025	0.032
	(2.39)**	(0.83)	(2.44)**	(1.32)
Age: 20-24 years at baseline	0.054	0.07	0.057	0.067
	(3.98)***	(1.23)	(4.12)***	(1.92)*
Completed high school or GED at baseline	0.002	0.008	0.004	0.008
	(0.16)	(0.33)	(0.31)	(0.44)
Black	-0.076	-0.107	-0.076	-0.094
	(6.64)***	(1.00)	(6.59)***	(1.60)
Hispanic	-0.032	-0.045	-0.035	-0.042
	(1.79)*	(0.95)	(1.89)*	(1.42)
Other	-0.018	-0.037	-0.02	-0.03
	(0.76)	(0.54)	(0.85)	(0.77)
Health (self-report): excellent	0.003	0.009	0.001	0.005
	(0.05)	(0.16)	(0.01)	(0.08)
Health (self-report): fair	0.012	0.01	0.01	0.009
	(0.22)	(0.17)	(0.19)	(0.15)
Health (self-report): good	-0.009	-0.005	-0.01	-0.008
	(0.16)	(0.10)	(0.18)	(0.14)
Drug use: marijuana only	-0.002	-0.006	-0.004	-0.006
	(0.14)	(0.32)	(0.32)	(0.43)
Drug use: marijuana and/or other drugs	0.02	0.015	0.015	0.016
	(0.94)	(0.57)	(0.71)	(0.71)
Drug use: missing	-0.003	-0.002	-0.004	-0.004
	(0.32)	(0.23)	(0.35)	(0.37)
Ever arrested at baseline	-0.007	-0.013	-0.007	-0.009
	(0.76)	(0.60)	(0.72)	(0.78)
Has child at baseline	0.049	0.047	0.048	0.049
	(2.71)***	(2.44)**	(2.59)***	(2.61)***
Native language: Spanish	0.025	0.025	0.027	0.027
	(1.13)	(1.10)	(1.20)	(1.22)
Native language: other	-0.004	-0.005	-0.011	-0.009
	(0.14)	(0.20)	(0.46)	(0.36)
Mother at least high school graduate	-0.005	-0.003	-0.007	-0.006
	(0.40)	(0.22)	(0.62)	(0.44)
Mother's education missing	-0.002	-0.006	-0.001	-0.004
	(0.11)	(0.29)	(0.08)	(0.22)

Table A.3 (continued)

Variables	Average Hours Worked Per Week in Years 3 and 4		Average Earnings Per Week in Years 3 and 4	
	OLS	IV	OLS	IV
Father at least high school graduate	-0.003	-0.004	-0.001	-0.002
	(0.22)	(0.30)	(0.10)	(0.16)
Father's education missing	-0.013	-0.019	-0.012	-0.016
	(0.96)	(0.72)	(0.93)	(0.88)
Sometimes on welfare while growing up	-0.008	-0.01	-0.005	-0.007
	(0.81)	(0.81)	(0.50)	(0.57)
Always on welfare while growing up	0.011	0.003	0.012	0.008
	(0.93)	(0.09)	(1.01)	(0.42)
Primary metropolitan statistical area	-0.053	-0.052	-0.056	-0.052
	(4.43)***	(4.27)***	(4.56)***	(3.08)***
Metropolitan statistical area	-0.018	-0.016	-0.02	-0.018
	(1.55)	(1.10)	(1.67)*	(1.32)
Constant	0.108	0.215	0.129	0.176
	(1.92)*	(0.57)	(2.29)**	(1.05)
Sample size	6054	6054	5923	5923

Note: Absolute value of robust t-statistic (for OLS) and z-statistics (for IV) are in parentheses.

*/**/*** Estimates are significantly different from zero at the 0.10/0.05/0.01 level.

Table A.4. Complete OLS and IV Results from Regression of Marriage on Employment Outcomes for Women

Variables	Average Hours Worked Per Week in Years 3 and 4		Average Earnings Per Week in Years 3 and 4	
	OLS	IV	OLS	IV
Employment outcome	-0.0007	0.024	-0.00002	0.0028
[indicated in the column heading]	(1.77)*	(1.70)*	(0.38)	(1.75)*
Age: 18-19 years at baseline	0.013	-0.026	0.017	-0.019
	(0.95)	(0.84)	(1.22)	(0.63)
Age: 20-24 years at baseline	0.001	-0.076	0.004	-0.074
	(0.05)	(1.51)	(0.23)	(1.46)
Completed high school or GED at baseline	0.025	-0.099	0.021	-0.118
	(1.59)	(1.30)	(1.28)	(1.39)
Black	-0.143	-0.098	-0.14	-0.088
	(8.02)***	(2.60)***	(7.81)***	(2.19)**
Hispanic	-0.081	-0.046	-0.078	-0.072
	(3.34)***	(1.09)	(3.16)***	(1.87)*
Other	-0.04	0.038	-0.036	0.037
	(1.31)	(0.60)	(1.18)	(0.59)
Health (self-report): excellent	0.03	-0.032	0.022	-0.03
	(0.63)	(0.37)	(0.44)	(0.39)
Health (self-report): fair	0.054	0.001	0.048	0.027
	(1.09)	(0.01)	(0.93)	(0.36)
Health (self-report): good	0.027	-0.048	0.022	-0.019
	(0.58)	(0.53)	(0.45)	(0.26)
Drug use: marijuana only	-0.033	-0.051	-0.032	-0.038
	(2.25)**	(2.00)**	(2.21)**	(1.64)
Drug use: marijuana and/or other drugs	-0.015	-0.047	-0.004	-0.048
	(0.48)	(0.90)	(0.14)	(0.86)
Drug use: missing	0.019	0.022	0.02	0.036
	(1.39)	(1.08)	(1.49)	(1.67)*
Ever arrested at baseline	-0.021	0.002	-0.021	0.004
	(1.45)	(0.08)	(1.41)	(0.15)
Has child at baseline	0.031	0.059	0.031	0.042
	(2.38)**	(2.30)**	(2.36)**	(2.00)**
Native language: Spanish	0.122	0.136	0.124	0.164
	(4.11)***	(3.17)***	(4.09)***	(3.29)***
Native language: other	0.039	0.009	0.03	-0.037
	(1.11)	(0.17)	(0.86)	(0.52)
Mother at least high school graduate	0.018	-0.013	0.016	-0.013
	(1.38)	(0.47)	(1.20)	(0.50)
Mother's education missing	0.029	0.049	0.027	0.042
	(1.63)	(1.69)*	(1.52)	(1.52)

Table A.4 (continued)

Variables	Average Hours Worked Per Week in Years 3 and 4		Average Earnings Per Week in Years 3 and 4	
	OLS	IV	OLS	IV
Father at least high school graduate	-0.029	-0.039	-0.031	-0.064
	(1.69)*	(1.50)	(1.75)*	(2.01)**
Father's education missing	-0.026	-0.008	-0.026	-0.024
	(1.52)	(0.30)	(1.48)	(1.01)
Sometimes on welfare while growing up	-0.039	-0.025	-0.042	-0.024
	(2.96)***	(1.14)	(3.16)***	(1.02)
Always on welfare while growing up	-0.023	0.036	-0.021	0.041
	(1.56)	(0.88)	(1.41)	(0.97)
Primary metropolitan statistical area	-0.02	-0.04	-0.019	-0.106
	(1.05)	(1.37)	(0.99)	(1.85)*
Metropolitan statistical area	-0.018	-0.052	-0.02	-0.088
	(1.00)	(1.65)*	(1.12)	(1.95)*
Constant	0.23	-0.191	0.223	-0.068
	(4.22)***	(0.75)	(3.98)***	(0.38)
Sample size	4281	4281	4202	4202

Note: Absolute value of robust t-statistic (for OLS) and z-statistics (for IV) are in parentheses.

*/**/*** Estimates are significantly different from zero at the 0.10/0.05/0.01 level.

Table A-5. Impacts of Job Corps on Employment of Eligible Applicants, for Men and Women in Different Subgroups (for the analysis sample selected for the current study)

	Men		Women	
Outcomes at 48-Month	Control Group Mean	Estimated Impact	Control Group Mean	Estimated Impact
African American				
Avg. hours worked per week in years 3 & 4	23	1*	20	2**
Avg. earnings per week in years 3 & 4	165	14**	138	11*
Non African American				
Avg. hours worked per week in years 3 & 4	31	0	22	1
Avg. earnings per week in years 3 & 4	237	12*	155	6
Less Than High School Education				
Avg. hours worked per week in years 3 & 4	26	1	19	2**
Avg. earnings per week in years 3 & 4	196	12**	125	13***
Age 20-24 at Baseline				
Avg. hours worked per week in years 3 & 4	30	2*	24	3**
Avg. earnings per week in years 3 & 4	233	25***	169	23**
Without Child at Baseline				
Avg. hours worked per week in years 3 & 4	28	1	22	1
Avg. earnings per week in years 3 & 4	205	14***	147	7

Note: Estimated impacts per eligible applicants are measured as the difference between the weighted means for program and control group members.

*/**/*** Estimates are significantly different from zero at the 0.10/0.05/0.01 level.