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## HEALTH-RELATED EFFECTS OF WELFARE-TO-WORK POLICES: EVIDENCE FROM SPAIN

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## INDEX

ABSTRACT

INTRODUCTION

1. HEALTH EFFECTS OF WELFARE-TO-WORK POLICIES: A REVIEW
  - 1.1. Background
  - 1.2. Empirical evidence
2. DATA
  - 2.1. The IMI program
  - 2.2. Data
3. ESTIMATION STRATEGY
4. RESULTS
5. CONCLUSIONS

ANNEXES

REFERENCES



## ABSTRACT

In this paper we evaluate the effects of welfare-to-work programs on physical and mental health status and a variety of lifestyles. We test whether or not participation in work-related activities yields better results in terms of health outcomes than more general measures aimed at promoting life-skills. The paper is based on data from the minimum income program of the Madrid Government (IMI). We take advantage of matching the program's administrative records –covering the whole history of the program– with a specific survey of former recipients who took part in different activities. Our results show that both health status –including physical and mental health problems– and behaviors outcomes were better for those individuals who had taken part in work-related activities.

*Keywords:* welfare-to-work, health outcomes, health behaviors, propensity score matching.

*JEL classification:* I12, I18, I38



## INTRODUCTION<sup>1</sup>

Non-health related policies may have consequences for health that are equally or more important than the outcomes they were originally designed to produce. These effects may be especially important in the case of income support policies. Health outcomes and health behaviors have become important themes in the broader public discourse about welfare reform. In most OECD countries, antipoverty programs have been redesigned with the aim of achieving better results in terms of work, personal responsibility, and economic self-sufficiency. As a result, raising the employability of recipients has become a key issue. This strategy faces major challenges, as poor physical or mental health diminish the labor market prospects of a significant proportion of welfare recipients. Health problems may not only affect the likelihood of employment but also may constraint recipients to successfully participate in work-related activities embedded in these programs. A growing literature documents the prevalence of physical, mental and behavioral health problems among welfare recipients [Bjorklund (1988), Kovess *et al.* (1999), Danziger *et al.* (2000), Coiro (2001), Cawley and Danziger (2005), Meara and Frank (2006)].

Researchers have consistently documented that physical health problems and psychological distress disorders may interfere with work goals in these programs. There is also evidence that shows that these mental- and physical-health related characteristics co-occur with human capital problems (Danziger, Kalil and Anderson, 2000). The difference is that whereas low education and job skills are obvious drawbacks in a competitive labor market, less tangible individual factors raise more subtle problems for employment and training interventions (Jayakody *et al.*, 2000). Physical and behavioral health problems may restrict recipients' ability to effectively participate in these programs and may also affect non-economic aspects of recipients' social performance.

The evidence on the other side of the issue is much more limited. An argument can be made that strategies moving people from dependence on welfare to self-sufficiency may also generate relevant health-related effects. In addition to direct effects on health insurance, welfare-to-work programs may impact households' economic resources, time constraints, and levels of stress. By fostering transitions from welfare to work these policies may affect both lifestyles and health status although it is not clear in which direction. This impact is an open question that has fueled some recent research but results are still inconclusive. There are primarily two domains of literature in this area. The first concerns the impact of welfare programs on health insurance. This issue is especially crucial in countries where health insurance coverage is not universal. A large literature has looked at the impact of welfare reform on health insurance in the U. S [Borjas (2003), Bitler *et al.* (2005), DeLeire (2006), Kaestner and Kaushal (2003)]. In general terms, the measured impacts are relatively small. The second area explores the relationship between welfare-to-work programs and a variety of health outcomes with a dominant role of assessment related to psychological distress. Evidence on this issue is beginning to emerge, and the results of different studies suggest that welfare-to-work programs can have significant effects on health outcomes (See Bitler and Hoynes, 2008, and Blank, 2009, for a review).

Our paper focuses on the second strand of this literature. There are still some key issues that remain open questions that the paper attempts to address. First, very few studies provide information on the effects of welfare-to-work programs both on health status and health behaviors. In this paper we evaluate the effects of a specific program on physical and mental health status and a variety of lifestyles. Second, few papers have specifically focused on work-related program participation. The mere fact of participation in work-related activities –even if recipients do not successfully find a job– may have positive benefits. In this paper we compare the health effects of participation in activities promoting labor-skills with those of general life-skills programs. Third, despite previous work has provided evidence on European countries (Huber *et al.*, 2009), to date the bulk of the research literature on the health effects of welfare-to-work participation has almost exclusively focused on North America. This paper is based on data from the minimum income program of the Madrid Government (IMI). The Spanish model is an interesting case of welfare reform and universal health systems in the comparative context. A pioneering model of welfare-to-work was put into action some years before employment-

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targeted reforms were implemented in most OECD countries and transitions from employment to unemployment are rather larger than in other countries.

The main goal is testing whether or not participation in work-related activities yields better results in terms of health outcomes than more general measures aimed at promoting life-skills. While it seems clear that the likelihood of moving recipients to employment is higher in the former programs, the evidence is less clear about health effects. We take advantage of matching the program's administrative records –covering the whole history of the program– with a specific survey of former recipients who took part in different activities (2,300 households). This survey covers a variety of dimensions of the households' economic well-being –including health status and behaviors– some years after their participation in the program. We perform propensity score matching. Our results show that both health status –including physical and mental health problems– and behaviors outcomes were better for those individuals who had taken part in work-related activities.

The structure of the paper is as follows. The following section reviews some of the pathways through which welfare-to-work programs may affect health status and behaviors. The second section introduces the program and the data used in the empirical part. The third section presents the estimation strategy. Empirical results are discussed in the fourth section. The paper ends with a brief list of conclusions.

## 1. HEALTH EFFECTS OF WELFARE-TO-WORK POLICIES: A REVIEW

### 1.1. Background

There are likely many pathways through which welfare-to-work programs can affect health and theory is ambiguous on the potential effects of participation on health status and behaviors. Some of the most common approaches on the determinants of health provide very general guidelines for the setting of hypotheses and their testing. The health production function may help to identify some of the general avenues through which these programs may affect health. The prototypical model developed by Grossman (1972) –which analyses how individuals allocate their resources to produce health– is the most relevant theoretical framework to explain health status. In this model, health represents a durable capital stock. Each individual owns an initial amount of such stock that depreciates with age and can be increased with investment. The demand for health consists of two elements: consumption commodity (which enters directly in the utility function) and investment commodity (which determines the total amount of time available for market and non-market activities).

Kenkel (1995) used the health production function framework to analyse the importance of lifestyles on health. The stock of health is produced as a function of the production technology given by the various lifestyles, the stock of human capital and different socioeconomic variables that can have an influence on the productivity of gross investment, the stock of pre-existing health or the determining factors of the rate of depreciation. As stated before, the inclusion of these factors responds to the fact that health is considered an essential commodity including aspects of both consumption and capital. Bitler *et al.* (2008) use this differentiation to anticipate the effects of welfare reform on health. Since health is a durable capital stock that will change slowly with investment and health services are investment goods consumed each period, it can be expected that a somewhat immediate impact of reform on health insurance could take place, while it may take months or years for welfare reform to impact health status. A key issue therefore is the extent to which welfare-to-work participation can produce substantial changes in lifestyles.

Besides lifestyles, investment decisions can be largely affected by changes in income. To the extent that welfare-to-work programs aim at alleviating recipients' financial problems, these policies should improve health. An enormous literature has grown up about the positive gradient between socioeconomic status (SES) and health (See Cutler *et al.*, 2008, and Currie, 2009, for recent reviews). Among the different theories underlying the relationship between SES and health one outstanding hypothesis for examining this interaction is that of poverty or relative deprivation. The poverty hypothesis refers to the disadvantages experienced by people living in poverty and may especially mirror some of the diffi-



culties faced by welfare recipients. Over their life cycle, some low-income households face enormous threats to health and well-being as a result of the combined disadvantage due to poverty and negative health behaviors. A natural caveat is, however, the problem of reverse causation. Poorer health is likely to reduce earning opportunities and another large literature has established that poor health reduces income and wealth. In terms of welfare policies, it seems clear that since welfare is a last resort for recipients, those who turn to it for support are likely to be in poorer health than those who do not.

Despite this caveat, there is little doubt that the receipt of income may alleviate the extent of structural health problems. There is evidence in many countries, for instance, that cardiovascular diseases are especially sensitive to income effects (Middelkoop *et al.*, 2000). Living in low-income leads to psychosocial stress by which bodily functions, including the immune system, are compromised. Participation, therefore, in welfare-to-work programs –by raising recipients' income– may cause better access to care, a greater ability to afford a healthy lifestyle, less risk from the environment and better nutrition.

Probably, the most direct link between changes in SES and health induced by work-related activities is the impact of transitions from welfare to paid job. Clark and Oswald (1994) found that jobless people had approximately twice the mean mental distress of those with jobs. Theodossiou (1998) also found that unemployed individuals suffer significantly higher odds of experiencing a marked rise in anxiety, depression and loss of confidence and a reduction in self-esteem and the level of general happiness even compared with individuals in low-paid employment. Focusing only on mental health, Bjorklund (1985) and Mayer and Roy (1991) reached a similar conclusion. A very relevant result for the analysis of welfare-to-work programs is that the duration of unemployment –not only the occurrence– negatively affects mental health (Bjorklund, 1985). A key question may be the role of occupations in the relationship. Llana-Nozal *et al.* (2004) looks at whether the effect of work choices on mental health differs across occupations finding that the higher the skill level of the occupation, the better the mental health.

Other pathways suggested also relate to the transition into paid employment. Reform-induced increases in employment may lead to changes in a parent's time endowment which in turn can affect choices about health care utilization, diet, and health (Haider *et al.*, 2003). Paid employment also increases an individual's ability to contribute to the household's financial well-being, enhancing sense of accomplishment and self-esteem (O'Campo and Rojas-Smith, 1998). Depression, high stress levels, low self-esteem and lack of motivation have been found to be associated with less participation in job activities (Montoya *et al.*, 2002). To the extent that work-related activities can remove some of these barriers it could be expected positive psychological effects from these activities. Gottschalk (2005) also finds that work leads welfare recipients to be more optimistic about their abilities.

There is no guarantee, however, that moving from welfare to work always yields these positive benefits. Recipients who move to jobs characterized by low wages, low substantive complexity or routinization –the type of jobs that welfare recipients usually have access to– may have poorer psychological health (Elliot, 1996). The stressors associated with this type of jobs may outweigh the aforementioned benefits. Transitions from welfare to the working poor may involve additional threats. Employment in jobs with inconvenient schedules or providing limited personal satisfaction may lead to greater psychological distress.

There is also evidence even suggesting that access to paid jobs is not enough to overcome structural problems related to welfare participation. Kulis (1988), for instance, found that the psychological impact of cutbacks in welfare benefits was neither transitory nor mitigated by later employment status. Recipients may continue to experience high levels of psychological distress even after securing employment. Recipients who were also on welfare in their childhood may have worse chronic conditions than do those from higher income households. Evidence suggests that these adverse health effects accumulate over children's lives (Case *et al.*, 2002). In these cases, participation in work-related activities may have only a very limited impact on health outcomes. Previous work has provided evidence that regular health-promoting behaviors may work better in low-income households than low-wage jobs (Cheng, 2007, and Yoo *et al.*, 2010). Moreover, given the link between economic hardship and psychological and physical health problems, welfare-to-work programs will only produce positive health effects under substantial reductions of material hardship. While some authors have found that ex-recipients experience higher levels of hardship than welfare recipients (Edin and Lein, 1997, Danziger *et al.*, 2002), others conclude that material circumstances of single mother families improved modestly after welfare reform in the U.S. (Winship and Jencks, 2004, Meyer and Sullivan, 2008).

## 1.2. Empirical evidence

Despite the policy implications of potential health outcomes of welfare-to-work programs, not too many papers have paid particular attention to this issue. The bulk of the literature has focused almost exclusively on the U. S. experience (See Grogger and Karoly, 2005, Bitler and Hoynes, 2008, and Blank, 2009, for a review). Given that the core of welfare recipients in the U.S. is women with children most studies look at women's health care utilization and children's health, especially prenatal care and birth outcomes. An advantage of focusing on children is also that they are less susceptible to reverse causation concerns because there is less of a concern that poor health in children is causing low income. As stated by Knab *et al.* (2008), before welfare reform was enacted there were serious fears that increased work requirements and stronger child support enforcement might increase maternal stress, leading to increases in mental health problems. There was also concern that stronger child support enforcement might expose mothers to more violence from fathers. Also, substance abusers and women with mental health problems could be disproportionately harmed by welfare-to-work policies.

There is a body of results that suggest that the introduction of welfare-to-work programs had small, mixed and often insignificant impacts on health. Most studies find only small reductions in health care utilization (Currie and Grogger, 2002, Kaestner and Lee, Bitler *et al.*, 2005). The evidence on the effects of welfare reform on the utilization of health services by children is somewhat mixed, with an equal number of unfavorable and favorable impacts of reform on health (Grogger and Karoly, 2005, Bitler *et al.*, 2008). Looking at changes in welfare caseloads Kaestner and Tarlov (2007) found little evidence on the effects on health, obesity and mental health. Their results also show few statistically significant results on health behaviors (smoking, binge drinking, fruit and vegetable consumption, and physical activity). Only the likelihood of less binge drinking seems somewhat positively affected by reductions in welfare caseloads resulting from more restrictive policies. Regarding drug abuse, Corman *et al.* (2010) have found that welfare reform led to declines in illicit drug use and increases in drug treatment among women at risk for relying on welfare.

There are, however, other studies that find more negative effects. Time limits imposed to push welfare recipients into the labor market as soon as possible may have contributed to a deterioration of infant health. Leonard and Mas (2008) find some evidence that the population of mothers affected by time limits were less likely to seek prenatal care, suggesting a possible role for reduced medical care in explaining the deterioration in infant health. Haider *et al.* (2003) found that breastfeeding would have been 5.5 percent higher in the absence of welfare reform. Kaplan *et al.* (2005) found that welfare recipients' health outcomes –including hypertension, obesity, and cholesterol– were worse after welfare reform. Knab *et al.* (2008) results show that stricter requirements in welfare policies lead to increases in stress-related behaviors, depression, and ultimately to poorer overall health.

A substantial part of this literature has focused on mental health problems. Boothroyd and Olufokunbi (2001) compare the status of current welfare recipients with the status of those who have transitioned off of welfare considering both general and mental health status. Their results show that current recipients who have not found a job report significantly poorer health and mental health status than individuals who left the program. Danziger *et al.* (2001) also found that having worked in the more recent period reduces the probability of being at risk of depression of former welfare recipients despite the poor quality of jobs. Jayakody *et al.* (2000) try to disentangle the simultaneous causal pathways by which mental and behavioral health problems both influence and reflect adverse family circumstances and poor economic outcomes –substance use and prior mental health problems may trigger prolonged welfare receipt whereas welfare dependence can stimulate depressive symptoms and substance use. Their results show that prolonged welfare dependence and poverty aggravate existing substance use and mental health problems. At the same time, individuals who enter welfare with existing substance use and mental health problems are likely to have prolonged spells.

The empirical research on the impact of European welfare-to-work programs on health status and behaviors is very limited. Despite a number of studies analyze how health problems diminish the labor market prospects of a significant proportion of welfare recipients (Ayala and Rodriguez, 2006, Capellari and Jenkins, 2009, Hansen, 2009) there has been little research on the reverse effect. Huber *et al.* (2009) offer the most comprehensive analysis for Germany. They examine whether finding work or participating in welfare-to-work programs can come with additional benefits in terms of improved

health. Their results show that whereas employment increases mental health the effects of participation in welfare-to-work programs are ambiguous and statistically insignificant.

There is therefore a need for research that provides a more complete picture of how participation in welfare-to-work programs affects a more varied set of health outcomes. An examination of the relative effectiveness of work-related activities as compared to more general life-skills measures can yield important insights into the underlying effects on health of the new generation of welfare programs.

## **2. DATA**

### **2.1. The IMI program**

The program analyzed is the Madrid Regional Government's Welfare Program (IMI), which was set up in 1990. This welfare scheme is designed for individuals who have exhausted their rights to unemployment benefits. Social Assistance in Spain is completely decentralized and general risk of poverty is covered by regional schemes. The Madrid program can be considered an 'average' program within the complex set of regional schemes existing in Spain and Southern Europe. As in other European systems, all households are entitled to IMI access if they have used up entitlement to other income maintenance programs.

Among the different institutional features of the program, the 'insertion activities' represent the most prominent trait in a comparative framework.<sup>2</sup> Once benefits are approved by the program's managers, recipients must sign an 'insertion contract' with the welfare agencies. Participation in these contracts is mandatory while recipients receive benefits. Initially, they are intended to improve the recipients' self-sufficiency through an individualized design of activities adjusted both to individual and households' characteristics. The idea of co-responsibility is at the heart of the program. Individual assessment is conducted when recipients enter the program and social services support is provided to help these households to address specific challenges. The contents of the contracts are negotiated by both sides resulting in a final plan of specific public intervention for each household.

Every recipient has to join a specific program. A broad classification of the activities can be made by breaking down the existing activities into two categories. The first set of activities includes overall actions developed to guarantee the basic preconditions of social participation (life-skills). They consist of a variety of services comprising such different topics as general life-skills, family mediation, children's schooling and activities aimed at making it easier for some families to continue their daily routines or helping recipients recognize their strengths. These actions also include specific medical assistance that may be relevant for understanding possible health effects.

A second set of activities specifically aim at improving recipients' employment opportunities (labor-skills). There are, first, various general services designed to improve the recipients' labor market opportunities including training and job assistance. Second, there are specific actions trying to push recipients into the labor market as soon as possible, including social enterprises and subsidized employment. The common purpose of these actions is the achievement of basic labor skills and the establishment of a friendly work environment as necessary first steps in the transition to competitive employment. Social enterprises are relatively similar to some of the experiences embedded in the U. S. paid work experience programs. Usually, they are conducted by government agencies and non-profit organizations. These entities work with a variety of targeted populations, including long-term unemployed.

### **2.2. Data**

In this study, we match the program's administrative records –covering the whole history of the program from the second half of 1990– with a specific survey conducted in 2001. This survey covers very different dimensions –including health outcomes– of the households' economic well-being some years after their participation in the program. Administrative records provide very detailed information on the recipients'

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<sup>2</sup> Insertion is the general term used in these countries to summarize the different types of activities aimed at improving life and labor skills of welfare participants. In general terms, it means higher levels of social participation.



characteristics at the moment of welfare participation. The IMI survey allows us to assess the possible effects of having taken part in the different activities on a variety of measures of economic well-being.

Administrative records comprise over 50,000 spells in the program corresponding to 39,200 households. 8,500 of them had left the program at some stage and then re-entered it at least once. Recipients' characteristics include some of the variables highlighted as ideal for analyzing welfare populations, such as the existence of structural problems (social isolation, alcohol abuse and drug addiction) or the development of behavior associated with marginal situations (prostitution or begging). The survey of IMI recipients was conducted by the Madrid Government in 2001 on a sample of recipients including very detailed information on both participation in subprograms during their time in IMI and different dimensions of the current economic situation. The sample size is about 2,300 households, obtained by stratified random sampling from the program's administrative records. The population of ex-welfare recipients was divided into four strata and a simple random sample was selected from each stratum.<sup>3</sup>

The survey contains detailed information on participation in the different 'insertion' activities included in the IMI program. There is also information on different dimensions of economic well-being, such as employment, subjective economic well-being, material hardship, social difficulties and health outcomes and behaviors. We will use the latter dimensions to evaluate the outcomes of the program.<sup>4</sup> Some data on socioeconomic characteristics such as age, gender, household type, marital status, educational attainment and labor status are also collected in the dataset.

A descriptive analysis of the IMI using administrative records data allows us to have a preliminary assessment of the characteristics and the incidence of personal problems among recipients including health problems. Table 1 differentiates between the households that completed a spell in the program at some time between 1990 and 2001 and the households that were receiving benefits when data gathering was underway. Almost fifty thousand spells are available, which are divided into the approximately 42,000 observations that correspond to already closed claimant files and 7,500 ongoing participants.

**Table 1**  
**SOCIO-ECONOMIC CHARACTERISTICS OF IMI RECIPIENTS (frequency distribution)**

	<i>Completed spells</i>	<i>Ongoing spells</i>
AGE		
<26	6.7	11.4
26-35	30.9	29.5
36-45	28.7	26.5
46-55	18.0	19.6
56-65	15.7	12.9
GENDER		
Males	40.3	34.2
Females	59.7	65.6
HOUSEHOLD SIZE		
1 person	25.8	33.4
2 people	20.6	21.1
3 people	20.2	18.6
4 people	15.5	12.1
5 people	8.9	7.6
6 people	4.7	3.9
7 people	2.2	1.9
8 or more people	2.0	1.3

(Keep.)

<sup>3</sup> The survey was conducted using as initial universe those households that had been in the program at a given moment in the previous decade. Therefore the sample may include both households who are still in the programs and leavers.

<sup>4</sup> We will use the survey data to identify treatments and outcomes. Socioeconomic information from administrative records of these households will be used to estimate the probability of taking part in a given treatment. Therefore, the sample we use in our identification strategy is 2,300 households.

(Continuation.)

	<i>Completed spells</i>	<i>Ongoing spells</i>
<b>HOUSEHOLD TYPE</b>		
Single person	25.8	33.4
Single-parent household	31.6	37.6
Other households with children	20.1	12.0
Other households without children	22.5	17.0
<b>EDUCATION</b>		
Does not read or write	10.3	13.6
No academic qualifications (only reads and writes)	20.6	21.6
Primary Education	36.7	35.5
Middle School Education	18.1	15.8
Secondary Education	6.6	6.6
Level 1 Vocational Training	2.9	2.3
Level 2 Vocational Training	1.7	1.4
University Degree	1.3	1.3
Post-Graduate Degree	1.5	1.8
<b>LABOR FORCE STATUS</b>		
Employed	18.0	13.5
Unemployed	59.1	69.0
Inactive	22.9	17.5
<b>EMPLOYABILITY</b>		
Totally unfit for normal work	9.6	8.0
Needs process of social / health recuperation	23.8	37.3
Unemployed needing training / education	21.1	25.4
Could access employment now	32.4	21.3
Does work on hidden economy or equivalent activity	8.3	7.0
Does normal work or equivalent activity	4.8	1.1
<b>SOCIAL PROBLEMS<sup>(*)</sup></b>		
Drug abuse	5.0	6.0
Alcohol abuse	4.8	4.7
Other mental health problems	8.8	10.9
Other physical health problems	14.9	18.1
Non-payment of dwelling, eviction	6.3	7.0
Debt accumulation, non-payment	9.7	9.4
Beggary	0.8	1.2
Prostitution	0.4	0.7
Social isolation	10.8	15.9
Ethnic minority	11.7	23.2
Number of observations	(41,996)	(7,568)

(\*) The categories appearing in social problems are non-excluding dummy variables. A household can therefore suffer from more than one problem. The figures show percentages of recipients affected by each problem.

The data on age shows a larger presence of middle-aged individuals among households' heads (Table 1). Concerning the differences between completed and ongoing spells the lower proportion of young people and the greater presence of individuals over 55 in the former stand out. This is due to the transfer of recipients to the national non-contributory pension scheme at the age of 65. Frequencies of recipients' gender suggest that the program has been increasingly used by women, who represent almost two-thirds of current spells and around 60 percent of completed spells. Regarding household size and type, small households stand out in general. People living alone make up a third of total households and have gained in relative weight over time. The presence of single-parent households is also striking, accounting for almost 40 percent of all cases. While the percentage of single-parent households is common to other European countries, the high figures for people living alone are a differentiating feature of the program being analysed.

A final set of variables provides information on different social problems, being the main characteristics we focus on. Five types of social problems stand out among IMI recipients. The first is related to health problems, be they general health problems or those derived from the consumption of drugs and alcohol, as well as from mental illnesses. Results show the prevalence of physical and mental health problems among welfare recipients especially in ongoing spells. Another group constitutes social pathologies arising from insolvency in situations of debt, including non-payment for dwellings. A third problem involves belonging to an ethnic minority. Belonging to an ethnic minority is not in itself a social problem. It is regarded as such in so far as belonging to an ethnic minority limits a person's possibilities of social integration. Most individuals classified into this group are gypsies. There is also a large percentage of recipients suffering from severe mental health problems that limit their chances of becoming economically self-sufficient. A final problem is the development of behaviour associated with social alienation, such as begging or prostitution, although this group is rather small.

Survey data include more detailed information on health outcomes and behaviours. These variables will be used as outcomes in our evaluation strategy. First, there is specific information on general physical and health outcomes. Households were asked if anyone in the household had severe physical or mental health problems. Second, the IMI survey also gives information on the relative importance of some key health behaviours. Among the different options, we have chosen some of the most important behaviors that may affect health: drug addiction, alcoholism and gambling addiction. While health behaviors such as drinking or smoking may respond to short-term changes in employment and income circumstances and have been already studied (Kaestner and Tarlov, 2007) the research in the other two issues is sparse.

Despite a number of studies have investigated the relationship between welfare and drug use, most, however, have explored the extent to which illicit drug use affects welfare participation rather than how welfare affects drug use. Corman *et al.* (2010) use economic theory –welfare reform would decrease the demand for drugs if the opportunity cost of the recipients' time increases as a result of employment, if income decreases and drugs are normal, through increased sanctions, and/or if drugs become more distasteful when recipients join the labor market– to explore the effects of welfare reform in drug use. Their results show that welfare reform led to declines in illicit drug use.

The evidence on the effects of welfare reform on gambling is still less well explored despite gambling can be a precipitating factor in numerous health problems. The increased stress and anxiety faced by those experiencing gambling related difficulties, or failing to take care of one's needs when gambling such as eating properly, taking needed medication, or taking breaks from play to do other activities may all be contributors. Problem gamblers often experience liver, lung, and heart disease, poor nutrition, physical pain, depression and anxiety, and sleep disorders [Korn and Shaffer (1999), Burge *et al.* (2004), Desai *et al.* (2004)].

**Table 2**  
**PREVALENCE OF HEALTH PROBLEMS AND BEHAVIORS**

	Participants in work related activities			Participants in life-skills activities		
	N	Mean	Std	N	Mean	Std
Physical health problems	1023	0.2600	0.4389	793	0.3190	0.4664
Mental health problems	1031	0.1018	0.3026	794	0.1083	0.3110
Alcoholism	1032	0.0262	0.1597	797	0.0402	0.1964
Drug addiction	1031	0.0242	0.1539	796	0.0327	0.1779
Gambling addiction	1021	0.0039	0.0625	781	0.0102	0.1008
Health problems & behaviors	1034	0.3617	0.4807	799	0.4130	0.4927

Table 2 gives general support to the notion that the prevalence of health problems and “bad” behaviors is high among welfare recipients. The incidence of these problems can be succinctly summarized by a variable that takes the value of 1 if participants have at least either a health problem or a “bad” health behavior. For a high proportion of participants, impaired physical and mental health problems or dependence on alcohol, drugs or gambling may hamper their ability to be employed. More than one third of the participants have any kind of health problems.

Physical health problems stand out. The upper panel of Table 2 shows that one of each four participants in work-related activities has a physical health problem. The proportion is somewhat higher for participants in life-skills activities (32 %). Despite the fact that our measure is not strictly comparable, the rate of mental health problems is lower than that found for welfare populations in the U.S. (Danziger *et al.*, 2000). Drug and alcohol dependence occurs in about 2.5 % of the recipients whereas the prevalence of gambling addictions is rather low.

### 3. ESTIMATION STRATEGY

The key question in our evaluation approach is the extent to which participation in activities aimed at improving labor skills produces better health results than taking part in more general activities whose main goal is improving life skills. The IMI survey provides very detailed information on fourteen different treatments, including both actions aimed at upgrading life skills and work-related initiatives. We have aggregated these treatments into two different and mutually exclusive groups: non-participation in work-related activities (participation in life skills only) and participation in work-related activities. The latter include both general labor-oriented activities –access to specific employment offers, general job search assistance, and training– and labor-intensive sub-programs like subsidized employment and social enterprises.

The question of which are the major health effects of each one of the two possible treatments makes necessary to choose a particular method of evaluation. We perform propensity score matching using administrative data to identify the probability of taking part in each treatment and the IMI survey to identify treatments and outcomes. The fundamental basis of matching evaluation is to re-establish experimental conditions when no such data are available. It is possible to build up a sample counterpart by pairing each participant with non-participant recipients. A necessary assumption is conditional independence between non-treated outcomes and program participation (Rubin, 1977).

We consider the results of participation in work-related activities as the treatment effect. The primary treatment effect we analyze is the expected treatment effect for the treated population:

$$\tau = E(Y_1 - Y_0 | D = 1) = E(Y_1 | D = 1) - E(Y_0 | D = 1) \quad (1)$$

where  $Y_1$  denotes the health outcome for individuals engaged in work-related activities,  $Y_0$  denotes the outcome if these individuals were not exposed to the treatment, and  $D_i \in \{0,1\}$  is an indicator of this participation.

To the extent that participation in activities aimed at improving labor skills is not completely random a counterfactual is needed to estimate  $E(Y_0 | D = 1)$ , the health outcome participants would have experienced on average had participated only in life-skills activities. We can select from the non-participants a control group in which the distribution of observed variables is as similar as possible to the distribution in the participants group. This requires:

$$0 < \Pr(D = 1 | X = x) < 1 \quad \text{for } x \in \tilde{X} \quad (2)$$

and guarantees that all treated recipients have a counterpart in the non-treated group.<sup>5</sup> Rosenbaum and Rubin (1983) suggested the use of the probability of receiving treatment conditional on covariates (propensity score) to reduce the dimensionality of the matching problem. If the propensity score is known the average effect of treatment on the treated (ATT) can be estimated as:

$$\tau = E\{E\{Y_1 | D = 1, p(X)\} - E\{Y_0 | D = 0, p(X) | D = 1\}\} \quad (3)$$

where  $p(X)$  is the propensity score. To derive (3) from (1) requires an adequate balancing of pre-treatment variables. If this balancing hypothesis is satisfied, observations with the same propensity score must have the same distribution of observable characteristics independently of treatment status. This means a random exposure to treatment and control, and treated units should be on average observationally identical.

<sup>5</sup> These assumptions have been widely justified in different studies. See Rubin (1977), Rosenbaum and Rubin (1983), Angrist *et al.* (1996), Smith (2000), Becker and Ichino (2002), and Frolich (2004).

As Dehejia and Wahba suggest (1999) propensity score methods can be more effective than parametric models in controlling for observed differences in the evaluation of employment and training programs. Nevertheless, their drawbacks have also been outlined by different authors.<sup>6</sup> It may be the case that the matching process leads to a considerable loss of observations and that the more detailed the information is, the harder it is to find a similar control.

In order to obtain the corresponding scores we estimated a probit model with the covariates predicting participation in work-related activities using the program's administrative data:

$$\Pr \{D = 1 | X\} = \Phi \{h(X)\} \quad (4)$$

where  $h(X)$  is a starting specification that includes all the covariates as linear terms. Different covariates were considered in the initial specification including those related to the traditional framework of the health production function: the number of social problems, single-parenthood, educational level, household size, number of children, single persons, gender and some variables related to the administrative process. The latter variables may be controversial since the length of the first welfare spell was included as a covariate. Despite this variable may be directly related to the program's outcomes is also a very basic indicator of the duration of the treatment.

Data were sorted according to estimated propensity score, ranking from lowest to highest, in order to define a valid comparison group for treated individuals. The next step was to create subclasses with similar propensity scores. The subclasses (quintiles) were checked until balance was achieved. Different weighting procedures were selected to associate the set of non-treated observations with treated units. The results we present below have been obtained with nearest neighbor matching estimators without replacement. As stressed by Smith and Todd (2005), replacement reduces bias but in turn increases the variance of the estimator. The problem of matching without replacement is that estimates depend on the order in which observations get matched (Caliendo and Kopeinig, 2008). In our estimates ordering is randomly done. We carried out different sensitivity analyses with other estimators finding that results remain reasonably robust.<sup>7</sup>

As aforementioned, estimates of the effects of welfare-to-work programs on health outcomes and behaviors by using propensity score estimators are only reliable if the matching produces credible control groups. There is a common support requirement for the comparison of treated and controls. Figure 1 (annex) plots the different density distributions of the propensity score for the comparison under study. Overlap in compared propensity scores regions seems to ensure common support across treatment groups. Even though there are slight differences between the two densities the crucial issue of the overlap condition seems to hold.<sup>8</sup>

#### 4. RESULTS

The key question in our evaluation approach is whether or not participation in work-related activities produces better results in terms of health outcomes than taking part in measures aimed at upgrading basic life-skills. Table 3 presents estimates of the effects of participation in work-related activities on health as compared to having taken part only in life-skills activities. We begin the discussion with the estimated effects on general health problems. The main outcomes considered are physical health problems –defined as having any kind of severe problems– and mental health problems. Regarding the former, participation in work-related activities seems to have produced strong positive effects on health as compared to the effects of participation in life-skills sub-programs. We find that, to a high degree of statistical confidence, engaging welfare recipients in work-related activities yields a reduction of 20 percent in physical health problems. The evidence is therefore consistent with the hypothesis that participation in welfare-to-work programs improves health outcomes even if recipients do not

<sup>6</sup> See Blundell (2000), Smith and Todd (2004), and Imbens (2004).

<sup>7</sup> Results are available upon request.

<sup>8</sup> Other indicators of matching quality were also estimated. The reduction in the standardised bias suggested by Rosenbaum and Rubin (1985) was estimated for the different variables used to define treated and matched control subsamples. Results suggest an acceptable fit.



move into more stable forms of employment. With all cautions, it must be stressed that these health effects are even more important than the employment effects found for these programs in many countries. In keeping with our initial assessments, these non-health related policies may have consequences for health that are equally or more important than the outcomes they were originally designed to produce.

**Table 3**  
**EFFECTS ON HEALTH OUTCOMES (PS matching estimates)**

Health Outcomes	Participation in work-related activities		Participation in life-skills activities	
<i>Physical health problems</i>	0,2584	(0,4380)	0,3205	(0,467)
Average effect	-19,4 <sup>(**)</sup>	(0,4508)		
	(n=1022)		(n=781)	
<i>Mental health problems</i>	0,1027	(0,3038)	0,1101	(0,3132)
Average effect	-6,7	(0,3079)		
	(n=1022)		(n=781)	
<i>Health problems &amp; behaviors</i>	0,3610	(0,4805)	0,4148	(0,4930)
Average effect	-13,0 <sup>(**)</sup>	(0,4860)		
	(n=1025)		(n=786)	

Standard deviation in brackets.

(\*\*\*) Significant at 99%, (\*\*) Significant at 95%, (\*) Significant at 90%.

The next outcome we discuss is the extent to which participation in these work-related activities produces noticeable changes in mental health problems. The most common finding in this strand of the literature –mainly focused on the U. S.– is that welfare reform reduced mental health problems among those recipients who left the programs and found a job. Our results show, however, that participation in work-related activities produces only modest positive effects. Despite the coefficient is negative –showing a reduction of the incidence of mental health problems– the effect is not well defined. Our estimates therefore provide somewhat contrasting evidence with respect to the results from previous studies. This difference may be partly explained by the way the outcome variable is defined. The aggregate nature of our variable –having or not mental health problems in the household– may hinder specific differences in particular mental health indicators like depression, high stress levels, low self-esteem, loss of concentration, irritability, fatigue or anxiety. Anyway, our results are in keeping with some of the studies analyzing the effects of participation in welfare-to-work programs in other European countries (Huber *et al.*, 2009).

These two results show that participation in work-related activities seem to improve health outcomes being the effects more visible in terms of physical than in mental health. In order to provide a general assessment of the incidence of these activities in health we have created an outcome variable comprising any kind of health problem including both physical and mental health difficulties and “bad” health behaviors. The average effect is positive and statistically significant. Participation in work oriented measures would result in more than a 13 percent reduction in overall health problems –including health outcomes and behaviors. A plausible case can be made, therefore, that health effects matter as outcomes of the program under study.

The results for health behaviors also seem to confirm positive effects of participation in work-related activities. This general outcome is somewhat different from those found in the U. S. Estimates of the association between changes in the welfare caseload caused by welfare policy and changes in health behaviors have found that U. S. welfare reform resulted in less binge drinking but does not appear to be related to other health behaviors, such as smoking, diet, and exercise (Kaestner and Tarlov, 2006). In our case, the prevalence of alcoholism falls a 30 percent when recipients are involved in any kind of work-related activities as compared to participation only in very general actions aimed at improving social participation (Table 4). The effect is strong and significant and raises some doubts regarding the

relatively undefined effects for mental health. The major economic rationale for changes in drinking and other health behaviors revolves around assertions of improvements in mental health. However, we did not find significant changes in mental health outcomes. This can be due to the fact that participation in work-related activities can potentially affect alcoholism habits in several ways not always connected to substantial mental health progress. It must be noted again that the definition of mental health problems is very broad. As a matter of fact, the percentages of mental health problems among participants are rather larger than the incidence of “bad” health behaviors.

**Table 4**  
**EFFECTS ON HEALTH BEHAVIORS (PS matching estimates)**

Health behaviors	Participation in work-related activities		Participation in life-skills activities	
<i>Alcoholism</i>	0,0166	(0,1604)	0,0269	(0,1980)
Average effect	-38,3 <sup>(*)</sup>	(0,3079)		
	(n=1023)		(n=784)	
<i>Drug addiction</i>	0,0245	(0,1546)	0,0339	(0,1759)
Average effect	-27,7	(0,1642)		
	(n=1022)		(n=783)	
<i>Gambling addiction</i>	0,0039	(0,0627)	0,0104	(0,1015)
Average effect	-62,5*	(0,0817)		
	(n=1022)		(n=782)	

Standard deviation in brackets.

(\*\*\*) Significant at 99%, (\*\*) Significant at 95%, (\*) Significant at 90%.

Among the different health behaviors considered, drug addiction is the only one that shows mixed evidence. The effect seems very large but it is not significant. This result is somewhat similar to those found in previous studies. Most previous empirical research on this issue has produced widely varying results and evidence is far less clear in this case than in other health behaviors. Only a handful of studies have examined the possible link of welfare-to-work participation and drug use. Recent results from Corman *et al.* (2010) show that welfare reform in the U.S. led to declines in illicit drug use and increases in drug treatment among women at risk for relying on welfare. However, the limited number of studies on this relationship makes necessary further research, thus remaining as an open question. In certain sense, the lack of concluding evidence may be related to the limited effects found in mental health problems. With all the limits implied by the variety of pathways for health behaviors to affect mental health, a significant change in drug abuse should be associated with likely changes in mental health. As stressed by Montoya *et al.* (2002), early drug use has been associated with increased depression in adulthood, illegal drug use also has been associated as self-medication for mental illness and drug use can exacerbate underlying mental health problems.

The last health behavior to discuss is gambling. As stated before, there is no prior evidence on the possible relationship between participation in welfare-to-work programs and gambling addiction. While it seems reasonable to expect a negative effect of gambling on employment due to a higher incidence of many psychological disorders and psychosocial concerns (Breyer *et al.*, 2009), there are no clear hypotheses supporting the opposite relationship. To the extent that reducing gambling addiction should make stress and anxiety lower as well as encourage better health habits, positive health effects could be expected from moving recipients to friendly labor environments. But no clear hypotheses emerge regarding the direct effect of participation in these work-related activities. Nevertheless, our results show a very strong and significant effect. Gambling addiction falls to a half of its value when compared to participation in very general life-skills activities. Therefore, participation in these activities aimed at improving labor skills seems to raise renewed capabilities for avoiding prior gambling behavior. However, the results should be taken cautiously since the prevalence of this behavior is rather small both in control and treated units.

**Table 5**  
**EFFECTS ON HEALTH OUTCOMES AND BEHAVIORS FOR TYPES OF HOUSEHOLD (PS matching estimates)**

Health Outcomes and Behaviors	Single parents		Couples with children		Couples, no children		Single person	
	Participation in work-related activities	Participation in life-skills activities	Participation in work-related activities	Participation in life-skills activities	Participation in work-related activities	Participation in life-skills activities	Participation in work-related activities	Participation in life-skills activities
<i>Physical health problems</i>	0,1790 (0,3839)	0,2446 (0,4308)	0,2172 (0,4133)	0,2365 (0,4264)	0,4028 (0,4916)	0,4251 (0,4956)	0,2844 (0,4522)	0,3646 (0,4826)
Average effect	-26,8 <sup>(*)</sup>		-8,2 (0,4186)		-5,2 (0,4935)		-22,0 (0,4664)	
	n=352	n=233	n=221	n=148	n=216	n=207	n=225	n=192
<i>Mental health problems</i>	0,0963 (0,2954)	0,0593 (0,2367)	0,1041 (0,3060)	0,1149 (0,3199)	0,1152 (0,3200)	0,1546 (0,3624)	0,0996 (0,3001)	0,1211 (0,3271)
Average effect	62,4 (0,2735)		-9,4 (0,3117)		-25,5 (0,3414)		-17,8 (0,3125)	
	n=353	n=236	n=221	n=148	n=217	n=207	n=231	n=190
<i>Health problems &amp; behaviors</i>	0,2946 (0,4565)	0,3008 (0,4596)	0,3348 (0,4730)	0,3356 (0,4738)	0,4541 (0,4990)	0,5481 (0,4989)	0,3991 (0,4908)	0,4715 (0,5005)
Average effect	-2,0 (0,4578)		-0,2 (0,4733)		-17,1 <sup>(**)</sup> (0,4990)		-15,4 (0,4952)	
	n=353	n=236	n=221	n=149	n=218	n=208	n=233	n=193
<i>Alcoholism</i>								
Average effect			0,0136 (0,1162)	0,0473 (0,2130)	0,0321 (0,1767)	0,0433 (0,2040)	0,0388 (0,1935)	0,0833 (0,2771)
			-71,2 <sup>(*)</sup> (0,1622)		-25,9 (0,1905)		-91,8 <sup>(**)</sup> (0,2351)	
			n=220	n=148	n=218	n=208	n=232	n=192
<i>Drug addiction</i>	0,0198 (0,1396)	0,0128 (0,1125)	0,0273 (0,1632)	0,0338	0,0459 (0,2097)	0,0338 (0,1812)	0,0087 (0,0928)	0,0518 (0,2222)
Average effect	54,7 (0,1295)		-19,2 (0,1707)		35,8 (0,1963)		-98,2 <sup>**</sup> (0,1648)	
	n=353	n=235	n=220	n=148	n=218	n=207	n=231	n=193

Standard deviation in brackets.

(\*\*\*) Significant at 99%, (\*\*) Significant at 95%, (\*) Significant at 90%.

A relevant question is whether or not the estimated effects are homogeneous across different types of households. Research findings for the U. S. (Bitler and Hoynes, 2008) and certain European countries (Huber *et al.*, 2009) suggest that the impacts of the new welfare-to-work programs vary across demographic groups. Unfortunately, the size of our sample does not permit a very detailed analysis of this issue. In some outcomes, like gambling addiction, the rather low incidence of the problem makes not possible to have reliable information. In other outcomes, however, there is evidence suggesting that the effects may differ among the different types of households.

If disaggregated data are used a more mixed picture emerges (Table 5). There is not a very clear pattern of the effects of participation in work-related activities on health outcomes and behaviors. In general terms, couples with children appear in terms of health outcomes less responsive to participation in these programs than other types of households. Participation in work-related activities seems especially positive in terms of the composite measure of health outcomes and behaviors for couples with no children. There is also a sizeable effect on physical health problems in the case of single parent families whereas participation in work-related activities seems to be more effective to reduce “bad” health behaviors in couples with children and single person households. The reduction of alcoholism and drug addiction in the latter households especially stands out. To the extent that marginal behaviors have usually been shown to have a higher prevalence among single persons it seems that welfare-to-work strategies may have especially positive effects in these households.

## 5. CONCLUSIONS

The past decade has witnessed an intense debate over the best strategies for moving people from welfare to work. The employment effects of welfare-to-work programs have been extensively studied in recent years. These policies, however, may also have very relevant consequences for health. While there is substantial empirical evidence showing that health problems may interfere with work goals in these programs the evidence on the other side of the issue is much more limited. Despite these strategies may generate relevant health-related effects results are still inconclusive.

In this paper we have focused on the minimum income program of the Madrid Government (IMI) to test whether or not participation in work-related activities embedded in these new strategies yield better results in terms of health outcomes and behaviors than more general measures aimed at promoting life-skills. Propensity score matching estimates suggest that participation in work-related activities seems to have produced strong positive effects on health as compared to the effects of participation in activities aimed at upgrading life-skills. Engaging recipients into different work-related activities may improve health outcomes even if recipients do not move into more stable forms of employment.

Results are more mixed when considering mental health outcomes. Our estimates do not show conclusive results in this dimension. The average effect is negative—showing, therefore, a reduction in this problem— but it is not well defined. This result partially differs from most U. S. empirical studies that find a lower incidence of mental health problems among welfare recipients who find a job. There is a substantial difference, however, in the nature of the treatment under study since we only focus on program participation—work-related vs. life-skill activities— regardless of the exits from the program into the labor market. Nevertheless, our results are relatively in keeping with the scarce empirical evidence for other European welfare-to-work programs.

Improvements in physical health outcomes are not the only positive consequences of participation in welfare-to-work programs. Our estimates also yield significant effects on the prevalence of bad health behaviors. Alcoholism, drug abuse and gambling addiction seem to have a lower incidence after having taken part in the varied schemes aimed at improving labor-skills. Especially relevant are the impacts on binge drinking and gambling with highly significant and strong effects.

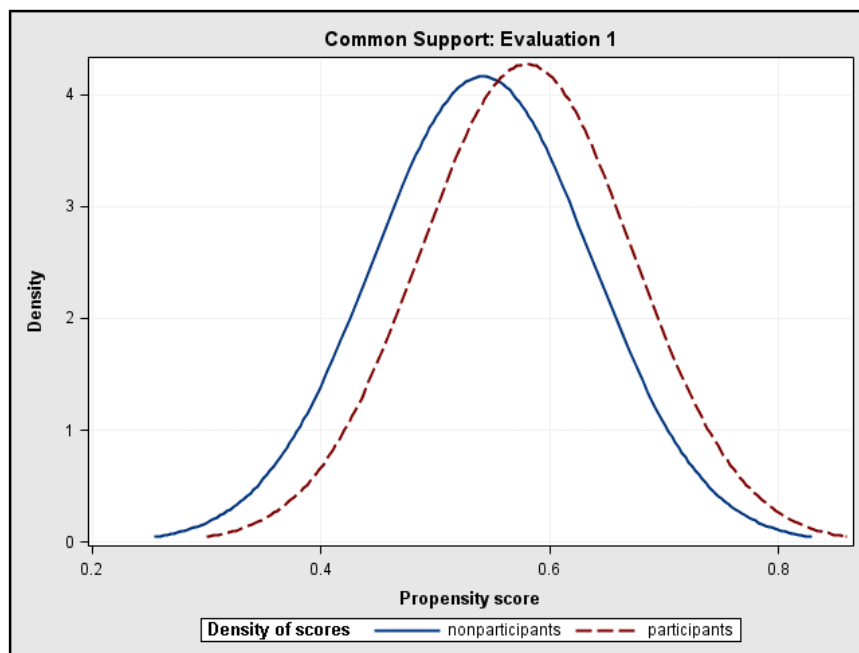
With some cautions, it must also be noted that the effects are somewhat heterogeneous across different types of households. When disaggregated data are used the pattern of the effects of participation in work-related activities is less clear. Health outcomes for couples with children appear less responsive to participation in these programs than those of other households. In the latter households, participation in work-related activities brings especially positive effects in terms of a sizeable reduction of alcoholism and drug addiction.

Our results, in short, offer critical support for the contention that welfare-to-work policies and the different actions focused on helping disadvantaged workers lacking basic job skills may have relevant unintended health effects. Health problems may create barriers to work but welfare-to-work programs can also yield positive health effects. This dimension should be considered in any overall assessment of welfare-to-work strategies. A better understanding of the effects of these new welfare policies on health may be helpful for an adequate design of the programs.



**ANNEX I**

**Figure 1  
COMMON SUPPORT**



**ANNEX II. PROGRAM EVALUATION WITH MULTIPLE TREATMENTS**

An extension of the binary treatment model may take place when participants can choose among different treatments or ‘packages’ of treatments. In that case, we must focus on the relative effectiveness of each treatment. Among the relevant options for policy-makers, three specific questions should be addressed. First, we can evaluate the effect of participation in some work-related scheme as compared to participate only in general measures promoting life skills. Second, we can assess the effects of participation in each one of the specific work-related schemes compared to participation in general life skills activities. Third, we can also examine the relative effectiveness of each specific labor-oriented treatment. Participation in general labor measures can be compared to taking part in more intensive activities. Both treatments can be also compared to mixed strategies combining both general labor services as well as more intensive activities.

The question of which are the major outcomes of each one of the possible treatments as compared to a different treatment leads us to choose a particular method of evaluation. A well-known problem of causal inference is how to estimate treatment effects in observational studies in situations where some individuals are exposed to a treatment, but with no methods of experimental design to get a control group. Taking simply the difference between the outcomes of the respective treatments would lead to a selection bias. A literature based on direct comparisons of experimental and non-experimental findings has shown the strengths and limits of non-experimental causal studies<sup>9</sup>. In general terms, matching methods have been highlighted as producing valid estimates of program impacts. The fundamental basis of matching evaluation is to re-establish experimental conditions when no such data are available. It is possible to build up a sample counterpart by pairing each participant with non-participant recipients. A necessary assumption is conditional independence between non-treated outcomes and program participation (Rubin, 1977).

<sup>9</sup> The seminal contribution of LaLonde (1986) gave rise to an abundant literature comparing the effects on trainee earnings of an employment program run as a field experiment with the estimates that econometric methods without experimental data might have produced. Dehejia and Wahba (1999, 2002), and Smith and Todd (2004) use the same data from the National Supported Work Demonstration to test propensity score matching estimators.

The limitation for matching is that it relies on a sufficiently rich comparison group. As the number of observable covariates increases, there are growing problems for finding exact matches for each of the treated units. In a seminal study, Rosenbaum and Rubin (1983) suggested the use of the probability of receiving treatment conditional on covariates (propensity score) to reduce the dimensionality of the matching problem. As stressed by Becker and Ichino (2002), if this balancing hypothesis is satisfied, observations with the same propensity score must have the same distribution of observable characteristics independently of treatment status. This means a random exposure to treatment and control, and treated units should be on average observationally identical. In practice, matching on the propensity score is essentially a weighting scheme (Heckman *et al.*, 1998).

Most of the evaluation literature of welfare reforms using matching estimators rests, however, on a basic framework in which a program is administered at a point fixed in time, and individuals are either treated or not treated. For an adequate evaluation of the IMI program, it is necessary to extend the standard binary treatment model of only two states to the case of multiple states. We can follow the approaches proposed by Lechner (2001, 2002) and Sianesi (2001), introducing some variation in the estimates of the propensity score.

Given a framework of  $(M + 1)$  mutually exclusive sub-programs (treatments), every welfare leaver will have one observable outcome  $\{Y_0, Y_1, \dots, Y_M\}$ . Participation in one of the predefined mutually exclusive sub-programs is indicated by  $S \in \{0, 1, \dots, M\}$ . The standard definition of average treatment effects should be extended to address the question of several pair-wise comparisons of treatments. The possible comparisons can be developed considering a very straightforward procedure. We are interested in the effects of participation in one sub-program ( $a$ ) compared to participation in other sub-program ( $b$ ) for a former welfare recipient who took part in program  $a$ :

$$\tau_0^{a,b} = E(Y^a - Y^b | S = a) = E(Y^a | S = a) - E(Y^b | S = a) \quad (1)$$

where  $\tau^{a,b}$  represents the expected effect for a former welfare recipient randomly drawn from the group participating in sub-program  $a$ . As in the case of the standard binary treatment, we need a counterfactual to estimate  $E(Y^b | S = a)$ .

Assuming that the assumption of conditional independence holds also in the multiple-states framework—the effects of participation in a sub-program are independent of the assignment mechanism for any given value of a vector of characteristics—, evaluation requires to observe all the characteristics ( $X$ ) of the program's recipients affecting both the probability of participation in the respective sub-programs as well as the outcome variables<sup>10</sup>. All participants in sub-program  $a$  need to have a counterpart in group  $b$  for each  $X$ . We can select from the participants in  $b$  a control group in which the distribution of observed variables is as similar as possible to the distribution in the group of participants in sub-program  $a$ . This requires:

$$0 < \Pr(S = a | X = x) < 1 \quad \text{for } x \in \tilde{X} \quad (2)$$

and guarantees that all treated recipients have a counterpart in the other group.

As stated above for the standard binary treatment model of only two states, Rosenbaum and Rubin (1983) illustrated the use of the probability of receiving treatment conditional on covariates (propensity score) to reduce the dimensionality of the matching problem. Imbens (1999) showed that the properties of the propensity score for only two states hold also in models with multiple states. The propensity score is the conditional probability of participating in a sub-program given  $X$ :

$$\Pr^a(X) = \Pr(S = a | X) \quad (3)$$

For an adequate comparison of the outcomes of the different sub-programs we need a balancing score function ( $g(X)$ ) of the recipients' characteristics. As stressed by Sianesi (2001), since we are interested in the pair-wise comparisons of the different sub-programs, we need to find a balancing score ensuring the balancing of the  $X$ 's in the two subpopulations of interest for each comparison. We need a balancing function such that:

<sup>10</sup> As we are only interested in the pair-wise comparisons of the programs defined, the assumption of conditional independence can be relaxed by requiring to hold only for the groups of welfare recipients receiving either treatment  $a$  or treatment  $b$ . See Sianesi (2001).



$$E\left[\Pr(S = a | X, S \in \{a, b\}) | g(X)\right] = \Pr(S = a | X, S \in \{a, b\}) \equiv P^{a/ab} \quad (4)$$

Equation (1) can then be calculated, once the counterfactual is estimated as:

$$E(Y^b | S = a) = E_{P^{a/ab}} \left[ E(Y^b | S = b, P^{a/ab}(X)) | S = a \right] \quad (5)$$

If the aforementioned assumptions hold in the multiple states framework we only need, then, the propensity score to evaluate the different sub-programs. As discussed by Lechner (2002), two different approaches can be used to modeling the respective propensity scores for matching. One approach consists of specifying and estimating a multiple discrete-choice model, such as multinomial logit or probit model (structural approach). A second approach is estimating all conditional probabilities between possible pairs of choices directly (reduced-form approach). This second approach closely mirrors the usual propensity score approach for binary treatments. As we have defined seven pair-wise comparisons the reduced-form approach is not so prohibitive than when using more disaggregated analysis. Additionally, the problem of using the structural approach is that if one choice equation is misspecified all conditional probabilities could be misspecified.

A relevant question is the selection of X's for balancing the different sub-samples in each pair-wise comparison. Following Sianesi (2001), the resulting quality of the matched samples has guided our choice, for each pair-wise comparison, of the specification for  $g(X)$ .

To compare sub-program  $a$  and sub-program  $b$  for participants in sub-program  $b$ , each participant in the former group can be matched to one or more participants in group  $b$  based on the balancing score. Different weighting procedures may be selected for associating the sets of participants. In the next annex we offer a set of results using alternative matching estimators for the binary treatment comparison.

### ANNEX III. SENSITIVITY TO MATCHING ESTIMATORS AND COVARIATES

**Table A.1**  
**PROPENSITY SCORE MATCHING**  
**PARTICIPATION MODEL: OBSERVABLE COVARIATES THAT WE USE TO MATCH SIMILAR INDIVIDUALS**

Variable description	Variable name	Participation Model 1	Participation Model 2
HOUSEHOLD SIZE (1 person, 2 people, 3 people, 4 people, 5 people, 6 people, 7 people, 8 or more people).	Gtotal	Gtotal	Gtotal <sup>3</sup>
SINGLE PERSON (Household type).	Pesola	Pesola	Pesola <sup>2</sup>
GENDER (Males, Females).	Sexo	Sexo	
AGE (<26, 26-35,36-45,46-55,56-65).	Ed	Ed	Ed
EDUCATION (Does not read or write, No academic qualifications (only reads and writes), Primary Education, Middle School Education, Secondary Education, Level 1 Vocational Training, Level 2 Vocational Training, University Degree, Post-Graduate Degree).	Estu	Estu	Estu x Ed Estu x Sexo
EMPLOYABILITY (Totally unfit for normal work, Needs process of social / health recuperation, Unemployed needing training / education, Could access employment now, Does work on hidden economy or equivalent activity, Does normal work or equivalent activity).	Emplea	Emplea	Emplea <sup>3</sup> Emplea x Sexo Emplea x Ed
SOCIAL PROBLEMS NUMBER (Drug abuse, Alcohol abuse, Other mental health problems, Other physical health problems, Non-payment of dwelling, eviction, Debt accumulation, non-payment, Beggary, Prostitution, Social isolation, Ethnic minority).	Problemas	Problemas	Problemas Problemas x Ed Problemas x Estu

*Notes:* All the covariates are pre-treatment covariates. Conditional on the propensity score the distribution of pre-program covariates is independent of assignment to treatment (Rosenbaum and Rubin (1983). To test the sensitivity to the specification of the Propensity Score, a different specification must be considered for each combination of treatment and comparison group (Dehejia and Wahba (1999, 2002). We use the same source of data for participants and nonparticipants (Heckman, Ichimura and Todd (1997, 1998). The participation equation is to obtain a distribution of participation probabilities.



**Table A.2**  
**PROPENSITY SCORE MATCHING. PROBIT MODEL OF PROGRAM PARTICIPATION**

Participation Model 1			Participation Model 2		
Variable	Coefficient	Standard errors	Variable	Coefficient	Standard errors
Constant <sup>(*)</sup>	.4796768	.3087687	Constant <sup>(***)</sup>	.9099311	.2351971
Gtotal	-.040304	.076101	Gtotal <sup>3 (*)</sup>	-.0049811	.0036426
Pesola	.1208904	.1279056	Pesola <sup>2 (*)</sup>	.1348313	.0981186
Sexo <sup>(*)</sup>	.1056909	.0719277			
Ed <sup>(***)</sup>	-.1959597	.0315764	Ed <sup>(***)</sup>	-.4256833	.0753621
Estu	.0169852	.0357807			
			Estu x Ed <sup>(***)</sup>	.0535289	.0200186
			Estu x Sexo <sup>(*)</sup>	-.0553831	.0352946
Emplea <sup>(**)</sup>	.0648292	.0368797	Emplea <sup>3 (***)</sup>	-.040674	.0067457
			Emplea x Sexo <sup>(***)</sup>	.1591172	.0489559
			Emplea x Ed <sup>(***)</sup>	.0734051	.0230019
Problemas <sup>(**)</sup>	.0700118	.0397731	Problemas	.3401441	.1680508
			Problemas x Ed	-.0392235	.0345634
			Problemas x Estu <sup>(*)</sup>	-.0554636	.0370624
Observations					

(\*\*\*) Significant at 99%, (\*\*) Significant at 95%, (\*) Significant at 90%.

Notes: The region of common support in Model 1 is [.35529761, .83070789].

The region of common support in Model 2 is [.15555575, .94310898].

Propensity score methods require that a separate propensity score specification be estimated and examine the sensitivity of the treatment effect to small changes in the propensity score specification: inclusion of higher-order terms.

All the covariates are balanced in both models.

**Table A.3**  
**ROBUSTNESS CHECKS**  
**Propensity score specification Model 1: gtotal,pesola, sexo, ed, estu, emplea, problemas**

Health Outcomes	Nearest Neighbor (Random Draw)	Direct nearest-neighbor Nnmatch (1)	Direct nearest-neighbor nnmatch (2)	Normal Kernel
<i>Physical health problems (PS6)</i>		1416	1416	
N. Treat	1038			1038
N. Control	749			811
ATT	-0.055	-0.025	-0.037	-0.063
Std Err.	0.025	0.030	0.028	0.023
t	-2.224	-0.85	-1.31	-2.731
		SATT	SATT	
<i>Mental health problems (PS11)</i>		1425	1425	
N. Treat	1038			1038
N. Control	750			811
ATT	-0.014	-0.002	-0.012	-0.011
Std Err.	0.018	0.020	0.019	0.013
t	-0.757	-0.12	-0.66	-0.866
		SATT	SATT	
<i>Health problems &amp; behaviors (PSALUDO)</i>		1432	1432	
N. Treat	1038			1038
N. Control	754			811
ATT	-0.059	-0.041	-0.057	-0.054
Std Err.	0.028	0.032	0.030	0.025
t	-2.101	-1.26	-1.91	-2.183
		SATT	SATT	

(Keep.)

(Continuation.)

Health Outcomes	Nearest Neighbor (Random Draw)	Direct nearest-neighbor Nnmatch (1)	Direct nearest-neighbor nnmatch (2)	Normal Kernel
<b>Health Behaviors</b>				
<i>Alcoholism (PS7)</i>				
N. Treat	1038	1429	1429	1038
N. Control	753			811
ATT	-0.010	-0.018	-0.020	-0.013
Std Err.	0.010	0.012	0.011	0.009
t	-1.008	-1.48	-1.69	-1.436
		SATT	SATT	
<i>Drug addiction (PS8)</i>				
N. Treat	1038	1427	1427	1038
N. Control	753			811
ATT	-0.010	-0.016	-0.014	-0.008
Std Err.	0.009	0.012	0.011	0.009
t	-1.080	-1.33	-1.22	-0.938
		SATT	SATT	
<i>Gambling addiction (LUDOPA)</i>				
N. Treat	1038	1411	1411	1038
N. Control	734			811
ATT	-0.012	-0.006	-0.006	-0.005
Std Err.	0.006	0.006	0.006	0.004
t	-2.081	-1.02	-1.00	-1.227
		SATT	SATT	

Note: each column reports the matching estimator with a different matching algorithm. The matching algorithms used are nearest neighbor (with one and five neighbors), caliper and radius (with a caliper of 0.001) and kernel (using a Normal density). Furthermore, standard errors are also estimated using bootstrap (in brackets). The propensity score specification is selected for each treatment-comparison group combination to balance pre-treatment covariates.

**Table A.4**  
**ROBUSTNESS CHECKS**  
**Propensity score specification Model 2: gtotal3, pesola2, ed, edprob, estuprob, emplea3, problemas, emplexex, empleed, estued, estusex**

Health Outcomes	Nearest Neighbor (Random Draw)	Direct nearest-neighbor nnmatch	Direct nearest-neighbor nnmatch (2)	Normal Kernel
<i>Physical health problems (PS6)</i>				
N. Treat	1038	1416	1416	1038
N. Control	636			811
ATT	-0.003	-0.033	-0.036	-0.014
Std Err.	0.031	0.030	0.026	0.026
t	-0.096	-1.09	-1.40	-0.526
		SATT	SATT	
<i>Mental health problems (PS11)</i>				
N. Treat	1038	1425		1038
N. Control	638			811
ATT	0.018	0.009	-0.002	0.000
Std Err.	0.025	0.020	0.017	0.015
t	0.710	0.47	-0.09	0.025
		SATT	SATT	

(Keep.)

(Continuation.)

Health Outcomes	Nearest Neighbor (Random Draw)	Direct nearest-neighbor nnmatch	Direct nearest-neighbor nnmatch (2)	Normal Kernel
<i>Health problems &amp; behaviors (PSALUD0)</i>				
N. Treat	1038	1432	1432	1038
N. Control	642			811
ATT	-0.020	-0.038	-0.052	-0.031
Std Err.	0.035	0.032	0.028	0.023
t	-0.560	-1.20	-1.88	-1.335
		SATT	SATT	
<i>Health Behaviors</i>				
<i>Alcoholism (PS7)</i>				
N. Treat	1038	1429		1038
N. Control	640			811
ATT	-0.013	-0.014		-0.014
Std Err.	0.013	0.012		0.009
t	-1.022	-1.20		-1.533
		SATT	SATT	
<i>Drug addiction (PS8)</i>				
N. Treat	1038	1427		1038
N. Control	641			811
ATT	0.005	-0.009	-0.016	-0.006
Std Err.	0.011	0.011	0.011	0.010
t	0.445	-0.79	-1.49	-0.639
		SATT	SATT	
<i>Gambling addiction (LUDOPA)</i>				
N. Treat	1038	1411		1038
N. Control	629			811
ATT	-0.005	-0.007		-0.002
Std Err.	0.006	0.006		0.005
t	-0.804	-1.21		-0.507
		SATT	SATT	

<sup>1</sup> Bootstrapped standard errors in brackets.

(\*\*\*) Significant at 99%, (\*\*) Significant at 95%, (\*) Significant at 90%.

Note: each column reports the matching estimator with a different matching algorithm.

The matching algorithms used are nearest neighbor (with one and five neighbors), caliper and radius (with a caliper of 0.001) and kernel (using a Normal density). Furthermore, standard errors are also estimated using bootstrap (in brackets). The propensity score specification is selected for each treatment-comparison group combination to balance pre-treatment covariates.

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