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Employment, Earnings Supplements, and Mental Health: A Controlled Experiment

The Self-Sufficiency Project

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Abstract

Based on panel data derived from a controlled, randomized experiment — the Self-Sufficiency Project (SSP) — we investigate the relationship between employment and mental health in the context of providing fiscal incentives for employment to single heads of households who have been on welfare for at least one year. We also evaluate the relative cost effectiveness of the experiment in reducing long-term emotional problems compared with traditional depression treatment for participants with poor self-reported mental health.

We find that some measures of improved mental health are associated with increases in the probability of employment. Using an instrumental variable based on the controlled nature of the experiment, we also find that full-time employment decreases the probability of long-term emotional problems. Furthermore, we identify individuals for whom the program tested by SSP is particularly cost-effective based on their mental health status. We also show that the SSP program is a cost-effective policy tool that can increase the employment of individuals with long-term emotional problems.

Introduction

In 1992 Human and Resources Development Canada (HRDC) initiated the Self-Sufficiency Project (SSP). SSP was a controlled, randomized experiment that targeted single heads of households receiving welfare for at least one year, a subpopulation for whom re-entry into the active labour force has been particularly difficult. SSP was designed to reward individuals in the program group of the project with an earnings supplement if they were able to secure full-time employment during the first year after their enrolment. Given the positive and significant relationship between poor mental health and unemployment already established in the literature (see Jin, Shah, & Svoboda, 1995; Murphy & Athanasou, 1999), data regarding participants' mental health status were collected.

The controlled nature of the experiment and the breadth of demographic and health information collected provide an ideal dataset with which to investigate the relationship between mental health status and employment, while avoiding the well-documented endogeneity between employment and mental health already identified in the literature (see Hamilton, Merrigan, & Dufresne, 1997; Theodossiou, 1998; Bardasi & Francesconi, 2000).

This analysis focuses on four specific issues. First, does poor mental health reduce the probability of securing employment in response to an SSP-type initiative? Second, does working improve mental health? Third, is SSP cost-effective for persons with long-term emotional problems? Finally, what are the cost-effectiveness implications for a mental health treatment when compared with the program tested by SSP?

Study Design and Method — The Self-Sufficiency Project

The Self-Sufficiency Project (SSP) is the primary data source for this analysis. It is a longitudinal randomized experiment designed to study the response of long-term recipients of income assistance (IA). Enrolment in the project started in November 1992 and continued through March 1995. Overall, nearly 6,000 single parents residing in New Brunswick and British Columbia (BC) who had received income assistance for at least one year were enrolled in the study.

Participants were randomly assigned to the control or the program group of the study. Individuals in the control group were covered by the same welfare policy as the rest of the population in their province, while individuals in the program group of the study were offered a substantial earnings supplement through SSP. To receive the earnings supplement, the participants were required to secure full-time employment (i.e. 30 hours per week or more) within the first year following their enrolment in SSP and to withdraw from IA or welfare rolls. SSP participants were eligible for the earnings supplements for a total of three years following their first supplement payment if they secured employment during the first year. Failure to secure employment within one year resulted in loss of eligibility. The supplement was calculated as half the difference between a participant's gross earnings and an earnings benchmark set at $37,000 in BC and $30,000 in New Brunswick. For example, a participant residing in BC who found full-time employment for approximately 40 hours per week at $8 per hour would earn $16,000 ($8*2,000 hours) from employment and receive a supplement of $10,500 (($37,000-$16,000)/2). This effectively raises the hourly wage rate by 66 per cent to $13.25 per hour.

SSP provides data on a range of participants' behaviours and characteristics at baseline prior to being randomized and after 18 months and 36 months in the project. Participant demographics captured at baseline include age, gender, marital status, number of children, and a host of other socio-economic variables. Other data include information on individual workplace characteristics such as employment status, monthly hours worked, and monthly earnings for the 12 months preceding random assignment and every month following random assignment.

MENTAL HEALTH INDICATORS

Several questions related to mental health were asked at baseline, and a subset of these questions was asked again at the first follow-up.[1] The indicators of mental health status available at baseline are constructed from the following questions in the survey:

1. In the past year did you take part in any program providing counselling for personal problems, including family problems, emotional difficulties, or drug or alcohol abuse?

[1]Follow-up occurred between 15 and 21 months after baseline.

2a. During the last week how many days did you feel sad?

2b. During the last week how many days did you feel depressed?

2c. During the last week how many days did you feel that you could not shake off the blues, even with the help of family and friends?

2d. During the last week how many days did you feel lonely?

3a. Are you limited in the kind or amount of activity you can do because of a long-term emotional, psychological, nervous, or mental health condition or problem at home?

3b. Are you limited in the kind or amount of activity you can do because of a long-term emotional, psychological, nervous, or mental health condition or problem at work?

3c. Are you limited in the kind or amount of activity you can do because of a long-term emotional, psychological, nervous, or mental health condition or problem at school?

3d. Are you limited in the kind or amount of activity you can do because of a long-term emotional, psychological, nervous, or mental health condition or problem in other activities such as travel, sports, or leisure?[2]

The possible answers to questions 2a–2d were 0 days, less than 1 day, 1–2 days, 3–4 days, and 5–7 days. A positive answer to any of questions 3a–3d was considered a marker for a long-term emotional problem (LTEP) at baseline. Questions 1 and 3a–3d were the only questions related to mental health asked at the 18-month follow-up.

[2]http://www.intelihealth.com/IH/ihtIH/WSIHW000/8271/9025/197543.html?d=dmtMHSurvey&screen=2

Mental Health, Work, and SSP

DOES POOR MENTAL HEALTH REDUCE THE IMPACT OF AN SSP-TYPE INITIATIVE?

Research papers by Card and Robins (1996), Lin, Robins, Card, Harknett, and Lui-Gurr (1998), Michalopoulos, Robins, and Card (1999), and Michalopoulos, Card, Gennetian, and Robins (2000) have clearly demonstrated the accuracy of the Self-Sufficiency Project (SSP) randomization procedure, the positive effects of SSP on the employment rate of the program group of the study, and the cost effectiveness of the intervention. Full-time employment rates in both New Brunswick and British Columbia were significantly higher for individuals receiving earnings supplements than those individuals receiving only the normal welfare assistance. At the 18-month follow-up, approximately 41 per cent of the program group had obtained some form of employment, compared with 30 per cent of the control group. Additionally, 29 per cent of those in the program group obtained *full-time* employment, while only 15 per cent of individuals in the control group were able to do the same (Lin et al., 1998). However, these authors did not focus on the relationship between employment and mental health status within the SSP context.[3]

To assess whether the positive effects documented by the preceding reports are robust across SSP participants of varying mental health status requires that employment rates be examined across such participants.

EMPLOYMENT RATES, MENTAL HEALTH STATUS, AND SSP

To identify possible differences across individuals with differing mental health status, tables 1–3 report overall (Table 1), part-time (Table 2), and full-time (Table 3) employment rates at baseline and 18-month follow-up for program and control groups by baseline mental health indicators.[4] The first panel of the tables compares individuals with long-term emotional problems (LTEPs) with those without. The second compares individuals who received counselling with those who did not; the third compares participants with different levels of self-reported depression.

The similar baseline employment rates for program and control groups within each mental health category confirm the accuracy of the randomization even within narrowly defined mental health categories. However, differences in employment rates between program and control groups are clearly identifiable at the 18-month follow up. At 18 months, in the overall sample, SSP nearly doubled full-time employment (28.5 per cent in the

[3]Lin et al. (1998) provides separate SSP impacts on full-time employment, receipt of income assistance, and receipt of either income assistance or a supplement payment for participants who said at baseline that they could not shake the blues last week for less than one day, one to two days, or three to seven days.

[4]Definitions and descriptive statistics for all variables in the tables are provided in the Appendix.

program group versus 15.2 per cent in the control group —not shown). This suggests that the program's ability to increase participation rates transcends mental health status. Because of the smaller number of individuals with long-term emotional problems, the employment rate for LTEP individuals in the program group is not statistically different from that of the control group; but the difference in the relative increases is similar to the one observed for the non-LTEP individuals. No pattern emerges across individuals receiving counselling. This may be because counselling is a treatment rather than a status.

The effect observed in Table 1 can be further disaggregated based on distinctions in the extent of employment. Table 2 presents results based on part-time employment. Since finding a part-time job (less than 30 hours) does not secure the SSP financial incentive, part-time employment rates at follow-up are typically significantly lower for individuals in the program group. Program group subjects had every reason to hold out for full-time employment, whereas individuals in the control group had no disincentive to accept available part-time employment.

Table 3 indicates that the much higher probability of securing full-time employment in the program group far outweighs the lower part-time employment rate at follow-up described in Table 2. Despite the smaller sample of individuals with emotional problems, the employment rates at follow-up among the program group are always statistically significantly greater than those of the control group. While the difference in full-time employment rate between the program and control group is similar across participants with different levels of emotional problems (the percentage point increase is twice as large for the program group), the increase is smallest in both the control and program groups for individuals with an LTEP and individuals who reported feelings of depression lasting three to four days in the week prior to the baseline survey. Employment rates at follow-up for individuals with an LTEP are half of what they are for individuals with no reported LTEP. However, the difference is less clear across individuals with different levels of reported depression. As indicated in Table 1, there is no clear effect of counselling independent of LTEP on full-time employment.

Overall, the results suggest that the SSP-type program is equally effective at increasing full-time employment rates for participants with mental impairments as it is for individuals without. In both cases, full-time employment rates were significantly greater for individuals provided with additional financial incentives. Nevertheless, the level of employment remained significantly lower for individuals with an LTEP compared with individuals without an LTEP, whether or not they were in the program group, suggesting a negative relationship between mental health and work.

To control for potential confounders and isolate the effect of mental illness and experimental status on the probability of employment rates requires more than descriptive statistics. Differences in the effectiveness of SSP for mentally ill participants can be assessed after controlling for observable characteristics via a logit regression with full-time employment status at follow-up as the dependent variable.

Table 1: Proportions Working at Baseline and at 18-Month Follow-Up for the Program and Control Groups by Categories of Mental Health Status

Variable	Group	Observations at Baseline	Employment Baseline (%)	Observations at Follow-Up	Employment Follow-Up (%)	Follow-Up Baseline Difference	Follow-Up Baseline Difference as a %	Experiment Control at Baseline p-value	Experiment Control at Follow-Up p-value
LTEP	Control	207	12	194	19	0.07	58.33	0.440	0.145
	Program	243	10	225	24	0.14	140.00		
No LTEP	Control	2,615	20	2,444	31	0.11	55.00	0.662	0.001
	Program	2,608	19	2,412	41	0.22	115.79		
Counselling	Control	697	19	642	30	0.11	57.89	0.060	0.001
	Program	746	16	688	41	0.25	156.25		
No counselling	Control	2,130	19	2,001	31	0.12	63.16	0.790	0.001
	Program	2,108	19	1,952	40	0.21	110.53		
Counselling and LTEP	Control	110	14	99	19	0.05	35.71	0.359	0.078
	Program	132	10	122	30	0.20	200.00		
Counselling but no LTEP	Control	585	20	541	31	0.11	55.00	0.141	0.001
	Program	611	17	563	43	0.26	152.94		
No depression	Control	733	20	687	31	0.11	55.00	0.405	0.003
	Program	752	18	721	39	0.21	116.67		
Less than 1 day of depression	Control	692	21	652	31	0.10	47.62	0.585	0.001
	Program	713	22	643	44	0.22	100.00		
1–2 days of depression	Control	695	21	646	34	0.13	61.90	0.131	0.007
	Program	676	18	628	41	0.23	127.78		
3–4 days of depression	Control	350	15	329	24	0.09	60.00	0.618	0.003
	Program	357	17	328	37	0.20	117.65		
5–7 days of depression	Control	347	14	319	25	0.11	78.57	0.450	0.028
	Program	352	12	318	33	0.21	175.00		

Note: LTEP stands for "long-term emotional problem."

Table 2: Part-Time Employment at Baseline and 18-Month Follow-Up for the Program and Control Groups

Variable	Group	Observations at Baseline	Employment Baseline (%)	Observations at Follow-Up	Employment Follow-Up (%)	Follow-Up Baseline Difference	Follow-Up Baseline Difference as a %	Experiment Control at Baseline p-value	Experiment Control at Follow-Up p-value
LTEP	Control	207	10.1	194	11.9	0.02	17.82	0.310	0.246
	Program	242	7.4	225	8.4	0.01	13.51		
No LTEP	Control	2,603	12.4	2,444	15.8	0.03	27.42	0.642	0.001
	Program	2,594	12.8	2,412	12.4	0.00	-3.13		
Counselling	Control	693	13.1	642	15.4	0.02	17.56	0.223	0.167
	Program	743	10.8	688	13.1	0.02	21.30		
No counselling	Control	2,122	11.9	2,001	15.5	0.04	30.25	0.302	0.001
	Program	2,097	13.0	1,952	11.8	-0.01	-9.23		
Counselling and LTEP	Control	110	11.8	99	13.1	0.01	11.02	0.155	0.271
	Program	131	7.7	122	7.4	0.00	-3.90		
Counselling but no LTEP	Control	581	13.4	541	15.5	0.02	15.67	0.596	0.272
	Program	609	11.3	563	14.4	0.03	27.43		
No depression	Control	729	12.6	687	17.0	0.04	34.92	0.767	0.002
	Program	746	13.1	721	11.0	-0.02	-16.03		
Less than 1 day of depression	Control	689	13.4	652	15.5	0.02	15.67	0.278	0.987
	Program	710	13.4	643	13.4	0.00	0.00		
1–2 days of depression	Control	692	13.4	646	16.1	0.03	20.15	0.710	0.021
	Program	674	12.8	628	11.6	-0.01	-9.38		
3–4 days of depression	Control	349	10.9	329	13.1	0.02	20.18	0.610	0.262
	Program	355	12.1	328	16.2	0.04	33.88		
5–7 days of depression	Control	346	8.1	319	13.5	0.05	66.67	0.926	0.109
	Program	350	8.3	318	9.5	0.01	14.46		

Note: LTEP stands for "long-term emotional problem."

Table 3: Full-Time Employment at Baseline and 18-Month Follow-Up for the Program and Control Groups

Variable	Group	Observations at Baseline	Employment Baseline (%)	Observations at Follow-Up	Employment Follow-Up (%)	Follow-Up Baseline Difference	Follow-Up Baseline Difference as a %	Experiment Control at Baseline p-value	Experiment Control at Follow-Up p-value
LTEP	Control	207	1.9	194	6.7	0.05	252.63	0.520	0.003
	Program	242	2.9	225	16.0	0.13	451.72		
No LTEP	Control	2,603	7.5	2,444	15.5	0.08	106.67	0.077	0.001
	Program	2,594	6.3	2,412	29.0	0.23	360.32		
Counselling	Control	693	6.2	642	14.3	0.08	130.65	0.371	0.001
	Program	743	5.1	688	27.5	0.22	439.22		
No counselling	Control	2,122	7.4	2,001	15.1	0.08	104.05	0.123	0.001
	Program	2,097	6.2	1,952	28.1	0.22	353.23		
Counselling and LTEP	Control	110	1.8	99	6.1	0.04	238.89	0.798	0.001
	Program	131	2.3	122	23.1	0.21	904.35		
Counselling but no LTEP	Control	581	7.1	541	15.9	0.09	123.94	0.356	0.001
	Program	609	5.8	563	28.6	0.23	393.10		
No depression	Control	729	7.7	687	14.3	0.07	85.71	0.090	0.001
	Program	746	5.5	721	28.8	0.23	423.64		
Less than 1 day of depression	Control	689	7.8	652	16.0	0.08	105.13	0.429	0.001
	Program	710	9.0	643	30.7	0.22	241.11		
1–2 days of depression	Control	692	7.9	646	18.0	0.10	127.85	0.050	0.001
	Program	674	5.3	628	29.8	0.25	462.26		
3–4 days of depression	Control	349	4.6	329	11.2	0.07	143.48	0.898	0.006
	Program	355	4.8	328	21.0	0.16	337.50		
5–7 days of depression	Control	346	5.5	319	11.9	0.06	116.36	0.187	0.001
	Program	350	3.4	318	23.9	0.21	602.94		

Note: LTEP stands for "long-term emotional problem."

A LOGIT ANALYSIS OF MENTAL HEALTH, FULL-TIME EMPLOYMENT RATES, AND SSP

The effect of mental health and SSP on the probability of being employed full-time at follow-up was evaluated using a traditional labour market model. Differences in labour demand conditions include regional and neighbourhood characteristics (e.g. urban versus rural) and cohort effects. Supply characteristics affecting the probability of finding employment include demographics (e.g. age, gender, marital status and parents' marital status, education, number and age of children, and immigrant status), the number of months on income assistance (IA) at the beginning of the study, parents' reliance on IA, mental health status, and whether the individual is in the control or program group. Access to full-time employment is the focus of the analysis because SSP provides incentives specifically aimed at increasing full-time employment. Based on these variables, it is possible to further investigate, *ceteris paribus,* the relationship between mental health indicators, SSP participation, and full-time employment in the labour market.

To assess whether results were sensitive to specific mental health assessment scales, the analysis is conducted on the individuals' responses to the LTEP question, the number of days an individual felt depressed, and counselling (Table 4).

Table 4: Logit Regressions of the Impact of Mental Health and SSP on Full-Time Work at the 18-Month Follow-Up

Dependent variable: Full-time employment						
	Odd-Ratio	**p-value**	**Odd-Ratio**	**p-value**	**Odd-Ratio**	**p-value**
Experimental Group Member	2.565	<0.0001	2.481	<0.0001	2.582	<0.0001
LTEP	0.557	0.0005	0.577	0.0012	0.569	0.0011
Less than 1 day of depression			0.963	0.7450	0.959	0.7202
1–2 days of depression			1.122	0.2753	1.125	0.2716
3–4 days of depression			0.733	0.0251	0.726	0.0227
5–7 days of depression			0.983	0.9003	0.987	0.9254
Received counselling					1.077	0.4001
N	5,232		5,210		5,206	

Note: LTEP stands for "long-term emotional problem." N is the sample size.

Other regressors included in the regression include age, cohort, province, education, marital status, both parents at home until 16 years of age, number of years employed before baseline, income assistance received in month before baseline, number of months on welfare during the three years before baseline, not born in Canada, immigrated in last five years, mother's education, father's education, working at baseline.

The results indicate that individuals in the program group were significantly more likely to secure employment than those in the control group. However, independent of the SSP group they are in, individuals with an LTEP were significantly less likely to secure employment. Overall, the positive effect of the program far outweighs the negative effect of the LTEP.

To assess the effect of the number of depressed days reported by the participant on the probability of finding full-time employment, the model is estimated with dummy variables capturing the number of depressed days in the week prior to the interview. Compared with

individuals with no reported depression, only those with three to four days of depression seem to have had a statistically significant reduction in their probability of securing employment. That reduction is significantly less pronounced than the reduction associated with an LTEP. Specifications including an interaction between mental health status and experimental status (not shown) indicate that the relative effect of depression on the probability of finding full-time employment was the same for individuals in the control and the program groups.

Overall, the logit results confirm the descriptive statistics from tables 1 through 3. Individuals in the program group were significantly more likely to find employment. Individuals with an LTEP were less likely to find full-time employment than those without an LTEP; however, the effect of depression is less clear, and the independent effect of counselling is non-existent.

DOES WORKING IMPROVE MENTAL HEALTH?

A large body of literature explores the effects of mental health on employment or on the probability of employment; but few have examined whether working improves mental health. Among studies that have examined that relationship, none benefited from an experiment such as SSP. As a result, the direction of the reported relationship is unclear. Is it that work increases mental health or that poor mental health prevents finding work?

Evans and Repper (2000) review existing literature on the link between employment, social inclusion, and mental health and determined that, in addition to the financial benefits gained, employment can improve the quality of life for many by providing social contacts and a connection with society. They find that working is a major determinant of social inclusion that "provides a sense of purpose and belonging; an opportunity to contribute to shared goals; a social forum; status and recognition for our efforts and achievements." Of course, individuals with social contacts and a greater connection with society may also be most likely to find employment. Hence, the direction of the relationship is unclear.

Taylor (2001) reports further qualitative and quantitative evidence on the benefits of work to mental health. However, despite the use of correlation, her analysis also suffers from the inability to identify the direction of the relationship between increased mental health and employment status. However, the results suggest that, although employment opportunities available to welfare recipients were frequently low-skilled, low-paying jobs with little advancement opportunities, most women in the study "expressed strong, positive attitudes about work." The findings reveal that 80 per cent of the study participants preferred to work even if welfare provided a financially comfortable living. The finding that depression was associated with perceived barriers to employment suggests that the relationship may be reversed. Specifically, individuals with depression may perceive higher barriers to employment and fail to gain employment. As a result, individuals who are employed are less depressed even though their employed status is unrelated to their lower level of depression.

Consistent with previous findings, a case study of mental health and employment by Hayton (2002) reports that employment is instrumental in increasing social status, social contacts, and self-esteem, thereby improving mental health. However, in this work as well as the other examples of research described, no formal evidence is available to establish the direction of the relationship between work and mental health. The SSP experiment provides an excellent setting to address this issue.

USING SSP TO ASSESS THE EFFECT OF WORK ON MENTAL HEALTH

The purpose of SSP was to examine the effect of an exogenous event, earnings supplements, on employment rates. However, the experimental design is also well suited to examine the effect of employment on mental health without the usual pitfalls due to reverse causality. Since the survey includes measures of employment and mental health at two points in time for all study participants and a randomization between those two points, it is possible to identify the direction of the relationship between employment and mental health. Participation in the experiment can be used as a reliable instrument to assess the effect of employment on the probability of reporting an LTEP because changes in full-time employment rates are driven in part by the exogenous randomization. It is also plausible to assume that the effect of random assignment to the experimental condition on mental health at the follow-up assessment is entirely mediated by employment.

A LINEAR REGRESSION APPROACH

Table 5a presents the percentage of individuals with an LTEP at baseline and follow-up.[5] We find no significant difference in the proportion with an LTEP at follow-up between the program and control groups. However, the increase in the proportion of individuals who develop an LTEP is larger for the control group than the program group. This suggests that the earnings supplement decreases the probability of developing an LTEP.

Table 5a: Self-Sufficiency Project Impact on the Proportion of Individuals With an LTEP at Home

Proportion of Individuals With an LTEP at Home	Baseline	18-Month Follow-Up
Program group	0.074	0.077
Control group	0.065	0.084
Difference	0.009	-0.007
N	5,681	5,269

Note: In this table, LTEP stands for "long-term emotional problem." N is the sample size.

The Static Model

A static model can be developed to estimate the effect of full-time work on the probability of being observed with an LTEP using a linear regression approach:

Let y_{ib} take the value 1 if the individual experiences an LTEP at baseline and 0 otherwise. Let y_{if} be the corresponding variable at follow-up. The probability of observing the outcome at baseline or follow-up can be expressed as

$$P(y_{ij}=1) = \theta ft_{ij} + \beta' X_{ij} + \phi' W_i \text{ for } j=b, f \qquad (1)$$

[5]The analysis is based on the LTEP question because it is the only question in the survey directly related to mental health that is asked both at baseline and at follow-up. The question is asked four different times in relation to home activity, school activity, leisure activity, and work activity. Since so few individuals were working or at school at baseline and since home activity is closer to work than leisure is, the LTEP question relating to home activity alone is selected in this section of the paper.

where X_{ij} and W_i are vectors of observed variables, and ft_{ij} is a dummy variable taking the value 1 if the individual is observed working full time at time j and 0 otherwise. This linear probability model can be estimated by ordinary least squares (OLS) assuming the following for y_{ij}:

$$y_{ij}= \theta ft_{ij} +\beta' X_{ij} + \phi' W_i + \alpha_i + \varepsilon_{ij} \qquad (2)$$

where α_i and ε_{ij} are unobserved terms. The estimation will provide consistent estimates of the model parameters if the explanatory variables are uncorrelated with the error terms. However, there are several reasons to believe that the error terms are correlated with ft_{ij}. For example, a stressful home environment might make it difficult to find a job *and* increase the likelihood of long-term emotional problems at home. To obtain consistent estimates of θ requires instrumental methods to estimate the effect of full-time work (IV). A variable Z that impacts ft_{ij} but is uncorrelated with X_{ij}, W_i, α_i, and ε_{ij} could serve as an instrument and yield a consistent estimate of θ where

$$\theta_{IV} = [E(y_{ij}| Z_{ij}=1) - E(y_{ij}| Z_{ij}=0)]/[E(ft_{ij}| Z_{ij}=1) - E(ft_{ij}| Z_{ij}=0)].$$

θ_{IV} is estimated as the difference between the proportion of individuals with y(ij)=1 and Z(ij)=1 and the proportion with y(ij)=1 and Z(ij)=0 divided by the difference between the proportion of individuals with a full-time job at j and Z(ij)=1 and the proportion with a full-time job at j and Z(ij)=0.

The randomization into a program group and a control group after baseline provides such an instrument since being in the program group substantially increases full-time employment relative to the control group. Randomization per se does not preclude possible correlation with X(ij). The estimator θ_{IV} is computed using data at the 18-month follow-up.[6]

For purposes of comparison, we first regressed the mental health outcome on full-time employment at follow-up using OLS. The IV estimator, θ_{IV}, is computed using employment in the program group as the instrument. The OLS estimates (Table 5b) suggest a strong, negative, and statistically significant effect of full-time work on the probability of having an LTEP. The coefficient is large (-0.07) given the dependent mean (0.08). Adjusting the regression for a number of baseline characteristics yields a similar estimate. The IV estimates with and without adjustments are similar to the OLS results but insignificant. This is not surprising since Table 5a indicates that the instrument (SSP participation) had no significant impact on mental health at follow-up.

The absence of significance of the IV coefficient could result from the LATE effect described by Imbens and Angrist (1994).[7] Specifically, the IV approach will only capture the effect of employment on mental health for those whose employment status is the result of SSP. Other individuals who may have found employment and would have done so in the absence of SSP will not affect the coefficient on the IV variables. Therefore, even if the overall effect of employment on mental health is significant, the IV approach may not reflect

[6]To confirm that SSP impacts mental health strictly through its impact on full-time work, we regressed the change in mental health status on the experimental dummy for individuals who did not obtain full-time work during the first year of the project since this was a precondition for receiving earnings supplements in following years. For this subsample, the impact of the experimental dummy was insignificant (p=0.238).

[7]Such an interpretation is possible if the probability of working full time cannot be reduced by being in the program group — a likely hypothesis given the parameters of SSP. See Imbens & Angrist (1994).

this. Furthermore, the static analysis does not capture the dynamic effect of SSP on employment and of employment on mental health. This is done in the following section.

Table 5b: Ordinary Least Squares (OLS) Regression and Instrumental Variable (IV) Regression Estimates of the Effect of Full-Time Employment on Being Observed With a Long-Term Emotional Problem at Follow-Up

Dependent variable: LTEP at home in 18-month follow-up

Independent Variables	OLS Without Controls	OLS* With Controls	IV Without Controls	IV* With Controls
Full-time employment**	-0.069	-0.056	-0.051	-0.065
	(-0.007)	(-0.007)	(-0.057)	(-0.056)
N	5,269	5,204	5,269	5,204

Note: In this table, LTEP stands for "long-term emotional problem at home." N is the sample size.

*Other regressors included in the regression include age, cohort, province, education, marital status, both parents at home until 16 years of age, number of years employed before baseline, income assistance received in month before baseline, number of months on welfare during the three years before baseline, not born in Canada, immigrated in last five years, mother's education, father's education, and working at baseline.

**Full-time employment at the time of the 18-month interview, which usually occurred between 17 and 19 months after random assignment.

The Dynamic Model

The method developed in the previous section ignores the panel structure of the data when identifying the effects of full-time work on long-term emotional problems. Dynamic effects may be present and affect the results. Although the baseline proportions of individuals with an LTEP in the program and the control groups is statistically not different, the proportion of individuals with an LTEP increased by 0.019 for the program group and 0.03 for the control group (for individuals with no missing values at baseline and follow-up). As shown in Table 6a, the difference in differences is -0.016 ($p<0.10$). This suggests that participation in the program group reduces the growth in the proportion of individuals with an LTEP (Table 6a). This effect is large compared with the proportion of individuals reporting an LTEP at follow-up of 0.08. In both groups, about 90 per cent of individuals answered identically at baseline and follow-up to the LTEP question. The proportions of individuals in the program group who developed or were cured of LTEPs are virtually identical (0.050 versus 0.047), the proportion of participants in the control group who develop LTEPs is 0.058 versus 0.039 cured. This explains the differences between the changes in proportions with LTEPs across groups. Since individuals in the sample were long-term welfare recipients, there may be a secular increasing trend in the proportion of individuals with LTEPs, as illustrated by the increase in LTEPs in the control group. To account for this effect, we developed a simple dynamic model:

Adding a linear time trend to equation (1) yields

$$y(ij)= \gamma t + \theta ft(ij) +\beta' X(ij) + \phi' W(i) + \alpha(i) + \varepsilon(ij). \quad (3)$$

Taking the first difference of this equation yields

$$y(if)-y(ib)= \gamma + \theta(ft(if)-ft(ib)) +\beta'(X(if) -X(ib)) + \varepsilon(if)- \varepsilon(ib). \quad (4)$$

Table 6a: Ordinary Least Squares (OLS) Estimate of the First Difference of the Long-Term Emotional Problem Dummy Variable on the Experimental Dummy

Dependent variable: Change in LTEP at home		
Independent Variables	**OLS Without Controls**	**OLS* With Controls**
Program group	-0.016	-0.016
	(0.009)	(0.009)
N	5,264	5,221

Note: In this table, LTEP stands for "long-term emotional problem." N is the sample size.

*The other regressors that are added to the regression are age, cohort, province, education, marital status, both parents at home until 16 years of age, number of years employed before baseline, income assistance received in month before baseline, number of months on welfare during the three years before baseline, not born in Canada, immigrated in last five years, mother's education, and father's education.

The model can be modified to make γ a function of the change in full-time participation. Again, participation in the experiment can be used as an instrument to estimate the model, since experimental status is likely to affect the probability of gaining full-time employment. An OLS regression would yield a biased estimate of θ if changes in full-time work are correlated with $[\varepsilon(if)- \varepsilon(ib)]$ in equation (4). The OLS regression yields an estimate of -0.02 ($P<0.01$) (Table 6b, first column). The instrumental variable estimate of the same model yields an estimate of -0.12 ($p<0.1$). The effect is twice as large as the estimates in the static model and suggests that changes in full-time employment have a statistically significant and large positive effect on changes in long-term emotional problems.[8]

Table 6b: Ordinary Least Squares (OLS) Regression and Instrumental Variable (IV) Regression Estimates of the Effect of Full-Time Employment on Being Observed With a Long-Term Emotional Problem With Longitudinal Data

Dependent variable: Change in status of LTEP at home				
Independent Variables	**OLS Without Controls**	**OLS* With Controls**	**IV Without Controls**	**IV* With Controls**
Change in full-time employment status	-0.020	-0.018	-0.115	-0.119
	(0.008)	(0.008)	(0.064)	(0.066)
N	5,239	5,197	5,239	5,197

Note: In this table, LTEP stands for "long-term emotional problem." N is the sample size.

*The other regressors that are added to the regression are age, cohort, province, education, marital status, both parents at home until 16 years of age, number of years employed before baseline, income assistance received in month before baseline, number of months on welfare during the three years before baseline, not born in Canada, immigrated in last five years, mother's education, and father's education.

[8]This IV estimate is equal to the effect of the program on the change in LTEP status (-0.016) divided by the effect of the program on the change in full-time employment status (0.136).

Assessing the Relative Cost Effectiveness of Mental Health Treatment and Earnings Supplementation

Results from the previous sections suggest that an earnings supplement program such as the one tested in the Self-Sufficiency Project (SSP) is effective at getting welfare recipients back to work. They also show that individuals with long-term emotional problems have significantly lower employment rates than their healthy counterparts both in the program and the control groups. This suggests two possible approaches to getting persons with long-term emotional problems back into full-time employment. The first would be to enrol them into an earnings assistance program and the second would be to provide therapy for their mental illness. The choice of approach will depend in part on their relative cost effectiveness.

INCREMENTAL PUBLIC COST OF SSP BY MENTAL HEALTH STATUS

The cost-benefit analysis is based on 36 months of data following the Michalopoulos et al. (2000) methodology. Based on monthly public transfers net of projected income taxes for the six months prior to the 36-month follow-up, the program group received an incremental $56 per month in net public transfers compared with the control group. The public authorities could recoup these amounts if the program had long-term effects on labour supply beyond the three years of supplements. This incremental cost may vary across mental health status.

Table 7 reports average net transfer payments by experimental status (EXP=0 for control group members, EXP=1 for program group members) and mental health indicator. The results show that the incremental cost of the SSP program was rather insensitive to the long-term emotional problem (LTEP) status of the participants. Whether individuals have LTEPs at follow-up or not, the level of support is roughly the same across experimental groups (if LTEP, Δ=$57; p=0.24; if No LTEP, Δ=$54, $p<0.01$). Therefore, the program seems to result in limited incremental costs irrespective of mental health status.

The results, based on the finer mental health categories that identify mild, moderate, and severe depression (not depressed, less than 1 day of depression per week, 1–2 days, 3–4 days, and 5–7 days), are more nuanced. The program seems to result in the greatest incremental costs for individuals with less than one day or one to two days of depression. It was less costly for individuals who were not depressed or often depressed (three to four or five to seven days per week).

Table 7: Self-Sufficiency Project (SSP) Impacts on Monthly Income and Net Transfer Payments in the Six Months Prior to the 36-Month Follow-Up Interview by Value of Mental Health Indicators at Baseline

	LTEP=1			LTEP=0			No Depression			Less Than 1 Day of Depression		
	EXP=0	EXP=1	Difference	EXP=0	EXP=1	Difference	EXP=0	EXP=1	Difference	EXP=0	EXP=1	Difference
Outcome												
SSP supplement payments		$92	$92		$162	$162	$0	$155	$155	$0	$153	$153
Income assistance payments	$677	$649	-$28	$564	$492	$72	$545	$452	-$93	$566	$526	-$40
Other transfer payments	$174	$205	$31	$240	$243	$3	$238	$244	$6	$241	$232	-$9
Projected income taxes	$20	$62	$42	$64	$97	$33	$51	$97	$46	$95	$96	$1
Net transfer payments	$824	$881	$57	$753	$807	$54	$742	$762	$20	$729	$818	$89

	1–2 Days of Depression			3–4 Days of Depression			5–7 Days of Depression		
	EXP=0	EXP=1	Difference	EXP=0	EXP=1	Difference	EXP=0	EXP=1	Difference
SSP supplement payments	$0	$175	$175	$0	$143	$143	$0	$143	$143
Income assistance payments	$548	$512	-$36	$643	$537	-$106	$623	$540	-$83
Other transfer payments	$234	$255	$21	$241	$236	-$5	$218	$219	$1
Projected income taxes	$59	$95	$36	$34	$92	$58	$45	$81	$36
Net transfer payments	$734	$854	$120	$849	$826	-$23	$799	$830	$31

	LTEP at Home Cured at 18 Months			LTEP at Home Onset at 18 Months			No Change in LTEP at Home		
	EXP=0	EXP=1	Difference	EXP=0	EXP=1	Difference	EXP=0	EXP=1	Difference
SSP supplement payments	$0	$112	$112	$0	$77	$77	$0	$60	$60
Income assistance payments	$605	$590	-$15	$673	$621	-$52	$781	$694	-$87
Other transfer payments	$178	$220	$42	$213	$188	-$25	$132	$173	$41
Projected income taxes	$19	$75	$56	$13	$37	$24	$11	$41	$30
Net transfer payments	$758	$842	$84	$885	$861	-$24	$895	$908	$13

Notes: LTEP stands for "long-term emotional problem."

The net transfer payments do not add up exactly to SSP supplement payments + Income assistance payments + Other transfer payments - Projected income taxes because of missing data in some categories.

There are a number of explanations for these patterns. First, the least depressed participants or the most often depressed participants seemed to receive the least SSP supplements. The healthy individuals received few SSP payments because they found jobs that paid well, resulting in small SSP supplements; the participants with the most days of depression received few payments because they were unlikely to find employment despite the program and therefore received limited payments. Second, there was a more significant decline in income assistance (IA) payments as a result of participation in the experiment for individuals who were healthy or very depressed. The former declined because their IA payments declined significantly as a result of their increased probability of finding employment (decrease from $545 to $452 = -$93 on average), the latter because they were the heaviest recipients of IA in the control group (decrease from $643 to $537 = -$106 for three to four days or from $623 to $540 = -$83 for five to seven days). This is consistent with the results based on the LTEP measure. Interestingly, for individuals who had three to four days of depression per week, the control group received on average higher transfers than the program group. This suggests that the earnings supplement reduced welfare payments sufficiently to compensate for costs associated with income supplement transfers and was cost minimizing. Regression results including baseline characteristics are not reported but left results largely unchanged.

Overall, the incremental costs associated with the SSP experiment were generally similar across mental status except for a slight increase among individuals with mild depression. Therefore, any long-term benefits resulting in persistently lower welfare payments after the end of the program would unambiguously argue in favour of SSP-type programs even for individuals suffering from mental health problems.

THE RELATIVE COSTS OF THE SSP PROGRAM VERSUS DEPRESSION TREATMENT

The data indicate the difference in employment between healthy individuals and individuals with emotional problems in the control group (the effect of emotional problems without the SSP program) and differences in employment between individuals with emotional problems in the control and the program groups (the effect of SSP on individuals with mental illness). A comparison of these two differences illustrates the relative merits of the SSP program versus mental illness treatment for the mentally ill. We rely on a cost per percentage point increase in employment as the relevant metric. Based on existing literature, we assume a cost of depression treatment of $160 per month over 18 months ($80 per month over 36 months) and a success rate of 50 per cent (Von Korff et al., 1998). We define success as a mental health profile similar to that of the reference group. The analysis does not consider the effect of the SSP program on mental health even though our results show that the SSP program may have reduced the incidence of LTEP by 19 per cent (1.6 per cent on an 8.4 per cent base).

Table 7 shows that control group members with baseline LTEPs received on average $824 per month in net transfer payments in the six months prior to the 36-month survey compared with $753 for individuals with no LTEP (Δ=$71). This difference resulted from a higher level of employment (full-time and part-time) for individuals without LTEP (eight percentage point increase in employment rates). With a 50 per cent treatment effectiveness,

expected savings from depression treatment would be $35.50. Given the $80 treatment cost, this implies a net cost of $44.50 per month for the expected four percentage point increase in employment rate. This translates to $11.10 per month per percentage point increase in the participation rate. This is virtually identical to the cost of $11.40 per month per percentage point increase in the employment rate for the SSP program.

Based on full-time participation, results are more favourable for the SSP program. For depression treatment, the cost of treatment was $12.20 per percentage point increase ($24.40 if regression-based), while for the SSP program the cost was $6.10 per percentage point increase (identical if regression based). In this case, the SSP program was clearly more cost-effective in increasing full-time employment than mental illness treatment.

Conclusion

This analysis examined the relationship between mental health and employment and assessed the relative cost effectiveness of mental health intervention and earnings supplement programs for individuals suffering from mental health problems.

The results suggest that an earnings supplement program such as the one tested by the Self-Sufficiency Project (SSP) is equally effective in increasing employment for persons with emotional problems and persons without emotional problems. In other words, the increase in employment rates among participants in the program is similar across individuals with different mental health conditions despite differing levels of employment at baseline. Conversely, in the absence of an earnings supplement program, individuals are less likely to be employed irrespective of their mental health state.

Because an earnings supplement program has an impact on work irrespective of mental health, it may indirectly affect mental health through the increase in employment. The controlled design offers an unusual opportunity to examine the effect of work on mental health free of the usual endogeneity. Using instrumental variables, the results suggest that full-time work has a statistically significant, large, negative effect on the probability of reporting a long-term emotional problem.

While the effectiveness of the SSP program for participants with or without long-term emotional programs is reassuring, the cost at which this effectiveness was achieved is a concern. While the overall incremental cost of the SSP program was very small for individuals who were not depressed or very depressed (less than $35 per month), the cost for individuals with mild or moderate depression (depressed less than one day per week or one to two days per week) was greater ($89 and $120 per month, respectively). However, comparison with mental illness treatment suggests that an SSP-type program is more cost-effective in increasing the employment rate than depression treatment. Of course, this last point ignores the quality of life benefits associated with depression treatment that may not be achieved through the increased employment resulting from an SSP-type program and the possibility that depression treatment might be more effective in promoting sustained employment than the time-limited effects of SSP.

Overall, this analysis of SSP suggests that earnings supplements are effective across mental health conditions, that employment decreases the probability of long-term emotional problems, and that earnings supplements can be a cost-effective way to return individuals to work when compared with depression treatment.

Appendix:
Mental Health Variables Available in the SSP Data

COUNSEL	A dummy variable that takes the value of 1 if the individual reports having received counselling for personal problems including family problems, emotional difficulties, or drug or alcohol abuse, 0 otherwise.
NO_DEP	A dummy variable that takes the value of 1 if the individual reports no depressed days for the baseline reference week, 0 otherwise.
LT1_DEP	A dummy variable that takes the value of 1 if the individual reports less than one depressed day for the baseline reference week, 0 otherwise.
DEP_12	A dummy variable that takes the value of 1 if the individual reports one to two depressed days for the baseline reference week, 0 otherwise.
DEP_34	A dummy variable that takes the value of 1 if the individual report reports three to four depressed days for the baseline reference week, 0 otherwise.
DEP_57	A dummy variable that takes the value of 1 if the individual reports five to seven depressed days in the baseline reference week, 0 otherwise.
EXP	A dummy variable that takes the value of 1 if the individual is in the program group, 0 otherwise.
FFT	A dummy variable that takes the value of 1 if the individual reports working full-time at the follow-up interview, 0 otherwise.
LTEP	A dummy variable that takes the value of 1 if the individual answers yes to any of the questions on long-term emotional problems at baseline, 0 otherwise.
DFFT	Value of a dummy variable indicating full-time work at follow-up minus a dummy variable indicating full-time work at baseline.
DLTEP	Dummy variable for long-term emotional problems at home at follow-up minus a dummy variable for long-term emotional problems at home at baseline.

Table A.1: Descriptive Statistics of Mental Health Variables Available in the SSP Data

	Full Sample		Control Group		Program Group	
	Mean	**Std**	**Mean**	**Std**	**Mean**	**Std**
Baseline						
Received counselling	0.24	0.44	0.24	0.43	0.26	0.44
No depression	0.25	0.44	0.26	0.44	0.26	0.44
Less than 1 day of depression	0.26	0.43	0.25	0.43	0.25	0.43
1–2 days of depression	0.25	0.43	0.25	0.43	0.24	0.43
3–4 days of depression	0.12	0.33	0.12	0.33	0.12	0.33
5–7 days of depression	0.12	0.33	0.12	0.33	0.12	0.33
In program group	0.50	0.50				
Employed full time	0.21	0.41	0.15	0.30	0.28	0.45
LTEP	0.08	0.27	0.70	0.26	0.08	0.28
Follow-up at 18 months (%)						
LTEP cured at 18 months	4.33		3.91		4.75	
No change in LTEP status	90.20		90.27		90.20	
Onset of LTEP at 18 months	5.43		5.81		5.05	
Lost full-time employment at 18 months	2.89		3.34		2.43	
No change in full-time employment status	79.42		85.33		73.51	
Gained full-time employment status	17.89		11.32		24.06	

Notes: Std stands for "Standard Deviation."
LTEP stands for "long-term emotional problem."

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