

Randomised studies of income supplementation: a lost opportunity to assess health outcomes

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Abstract

Background—Despite the wealth of evidence linking low income to ill health, there is little information from randomised studies on how much and how quickly these risks can be reversed by improvements in income.

Objective—To conduct a systematic review of randomised studies of income supplementation, with particular reference to health outcomes.

Design—Extensive searches of electronic databases and contact with previous authors. As well as searching for trials that were specifically designed to assess the effects of increased income, studies of winners and losers of lotteries were also sought: if winning is purely chance, such studies are, in effect, randomised trials of increased income.

Results—Ten relevant studies were identified, all conducted in North America, mostly in the late 1960s and 1970s. Five trials were designed to assess the effects of income supplementation on workforce participation and randomised a total of 10 000 families to 3–5 years of various combinations of minimum income guarantees and reduced tax rates. Two trials were designed to assess re-offending rates in recently released prisoners and randomised a total of 2400 people to 3–6 months of benefits. One trial was designed to assess housing allowances and randomised 3500 families to three years of income supplements. One trial assessed the health effects of 12 months of income supplementation in 54 people with severe mental illness. Finally, one study compared three groups of people who won different amounts of money in a state lottery. In all these studies the interventions resulted in increases in income of at least one fifth. However, no reliable analyses of health outcome data are available.

Conclusions—Extensive opportunities to reliably assess the effects of increases in income on health outcomes have been missed. Such evidence might have increased the consideration of potential health effects during deliberations about policies that have major implications for income, such as taxation rates, benefit policies, and minimum wage levels. Randomised evidence could still be obtained with innovative new studies, such as trials of full benefit uptake or prospective studies of lottery winners in which different sized winnings are paid in monthly instalments over many years.

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The relation between low socioeconomic circumstances and the risks of poor health is well established.¹⁻³ Income is an important component of socioeconomic status (SES) and is independently associated with a wide range of health status measures.³ Furthermore, income is frequently manipulated by changes in public policy, such as taxation rates, benefit policies and minimum wage levels. There is little indication that potential changes in health status are routinely considered in decisions about implementation of such policies. The purpose of this review was therefore to discover what experimental evidence exists on how much and how quickly the risks of poor health can be reversed by improvements in income. Two main sources of such evidence were anticipated. Firstly, trials that were designed to assess the effects of increased income on outcomes such as workforce participation. Secondly, studies of lottery participants: if lottery winners are compared with non-winning ticket buyers, with the number and types of tickets bought taken into account, these studies are, in effect, randomised trials of increased income.

Methods

We sought to identify all randomised controlled studies in which there was allocation to different levels of income. Trials were not eligible if payment was explicitly linked to some behaviour modification (for example, incentive payments⁴), if payment could only be spent in a certain way (for example, vouchers⁵), if the control group had some other intervention (for example, Foodstamps Cashout Trials⁶), if there was allocation to services that usually cost money (for example, the RAND health insurance experiment⁷), or if there was allocation to interventions that potentially increased future income (such as employment assistance, for example, the JOBS study,⁸ or early childhood education, for example, the Highscope study⁹).

A number of computerised databases were searched: Current Contents (1995–1997), Embase (Excerpta Medica) (1980–1997), Medline (1966–1997), PAIS (Public Affairs Information Service) International (1972–1997), PsycLit (1974–1997), Social Science Index (1984–1997), Sociofile (1974–1997), EconLit (1969–1996), IBSS (International Bibliography of the Social Sciences, 1979–1997), Dissertation Abstracts (1988–1997), and The Cochrane Library (1997, issue 3). Search terms included income, income tax, experiment, randomised or randomised, social experimentation, health status, lottery, windfall, and subsidy. The author's names and study titles from relevant reports were also

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Table 1 Controlled experimental studies of increased income

Study or group of studies	Start year	Major target group(s)	Allocation method	Sample size	Intervention
North American income maintenance experiments					
New Jersey/Pennsylvania Income Maintenance Experiment (GWIE)	1968	Low-income, 2 parent families	Conlisk-Watts model	725 study 632 controls (families)	Negative income tax plans
Rural Income Maintenance Experiment (RIME)	1970	Low-income, 2 parent families (85%) Low-income, 1 parent families (15%)	Conlisk-Watts model	372 study 437 controls (families)	Negative income tax plans
Gary Income Maintenance Experiment (GIME)	1971	Low-income, 2 parent black families (41%) Low-income, 1 parent black families (59%)	Conlisk-Watts model	1028 study 771 controls	Negative income tax plans Daycare subsidies
Seattle/Denver Income Maintenance Experiment (SIME/DIME)	1971	Low-income, 2 parent families (61%) Low-income, 1 parent families (39%)	Conlisk-Watts model	2747 study 2053 controls (families)	Negative income tax plans Employment counselling Educational subsidies
Manitoba Basic Annual Income Experiment (Mincome)	1975	Low-income 1- and 2-parent families	Conlisk-Watts model (modified)	>1300 families Winnipeg: 575 study 612 controls	Negative income tax plans
Financial assistance to ex-prisoners					
Living Insurance for ex-offenders (LIFE)	1973	Repeat theft offenders released from Maryland prisons	Stratified randomisation	216 study 216 controls	Weekly cash transfers Job placement services
Transition Aid Research Project (TARP)	1976	Released prisoners from Georgia and Texas	Stratified randomisation	1551 study 400 controls (Record linkage for additional 2031 controls)	Weekly cash transfers Job placement services
Housing allowances					
Experimental Housing Allowance Program: Demand Experiment (EHAP)	1973	Low-income renter households	Method of randomisation not stated	2466 study (in 17 groups) 1100 controls (in 2 groups)	Housing allowances
Mental health					
Partnerships for people with serious mental illness who live below the poverty line	1992	People with severe and persistent mental illness living in poverty	Envelope method	26 study 22 controls 54 randomised	Monthly cash allowances and forgivable loans for a year Support and advice
Lottery					
Massachusetts State Lottery	1984	Lottery ticket buyers	Not available	259, 129 and 108 "losers", small and big winners, respectively	Small, one-off prizes <i>v</i> 20 larger annual payments

subsequently used as search terms. No language restrictions were used. The reference lists of all papers identified by the search were scrutinised for additional studies. Additionally, the internet sites and publication lists of institutions involved in the design, conduct and analysis of the studies were searched. Lastly, contact was attempted with investigators, institutions and funding agencies involved in all potentially eligible studies. Data on any health outcomes were sought and original data obtained where possible.

Results

The combined search strategies identified 10 eligible studies (see table 1). All but two of the studies were social experiments carried out in North America that aimed to assess the effects of alternative welfare policies.

INCOME MAINTENANCE EXPERIMENTS

Four large trials in the US and one in Canada were carried out to assess the impact of a guaranteed minimum income on the "labour supply" (that is, workforce participation) of poor families. This issue was central to proposals to replace the complex set of welfare entitlements with a single cash benefit that would diminish as earnings increased.¹⁰ The basic intervention was a combination of a minimum income guarantee and a variable tax rate on earned income. Over 10 thousand low income families in a variety of settings were allocated by the Conlisk-Watts assignment model to many different combinations of

income maintenance or to control groups.¹¹⁻¹³ Payments continued for 3-5 years and averaged between about two fifths and four fifths of pre-experimental income.

Very few health outcome data were collected in these trials and even fewer reported. Micro-fiches of the original data were obtained from the National Archives and Records Administration (NARA) but most were unreadable (including the health data for SIME/DIME), no health related data had been archived from the New Jersey or Gary experiments and no data had been archived from the Rural experiment. Additionally, for a number of reasons related to the Conlisk-Watts assignment model, these studies did not provide properly randomised comparisons. Families were allocated to different groups according to complex models that depended on estimated annual income, family size and occasionally other factors such as race, and that aimed to maximise the number of families enrolled—that is, a higher proportion of poorer families went into the least generous plans.¹⁴ Despite the fact that allocation was related to pre-experimental income and other confounders, with major implications for the estimation of experimental effects,¹¹⁻¹³ the stratification variables were often not included in the analyses.^{11 14 15} Furthermore, response and follow up rates were inversely related to the generosity of the interventions.¹⁶⁻¹⁸

Income maintenance was reported to modestly decrease workforce participation.¹⁹⁻²⁴ There were no consistent effects on other

Table 1 continued

Duration	Mean annual payments (1996 US \$)	Payment as % of base income	Major outcomes of interest
3 years	4800	23%	Workforce participation Consumption patterns
3 years	5900–6800	25–44%	Workforce participation
3 years	9500	45%	Workforce participation Utilisation of day care
3 years 5 years	10 500 (2 parent) 8100 (1 parent)	42% (2 parent)	Workforce participation Marital stability
3 years	Not available	Not available	Workforce participation
13 weeks	11 000	No base income	Earnings Re-offending
13 weeks 26 weeks	9000–10 000	No base income	Re-offending Employment Earnings
3 years	3000	25%	Participation rates Use of housing allowances Housing quality
1 year	3600	34%	Re-admission rates Quality of life scores
Follow up to 1994	One off \$150–7500 v \$30 000 per year v \$150 000 per year	140–800%	Workforce participation

outcomes that would affect health indirectly, such as marital stability, nutrition or education, and these findings are described in detail elsewhere.^{15 20 25–32} The few data available on health outcomes and health care are summarised below.

New Jersey—Pennsylvania Negative Income Tax Experiment

Information on health and medical care utilisation from this study was included in The Final Report from this project, but only for the 55% of participants who were in stable families and who completed the whole experiment.^{33 34} No statistically significant treatment effect was reported for chronic illnesses, hospital days, work days lost, or physician visits, but a possible increase in doctor's visits for children early in the experiment was reported. An alternative analysis in The Final Report³⁵ found that the experimental payments were associated with significantly altered patterns of medical care utilisation, which also varied with health insurance status, but that there was no significant effect on health status indicators (days in bed, days not working, illness lasting more than three months, illness interfering with work or illness preventing work). Finally an overview of the results on consumption, health and social behaviour in the Final Report, and reproduced elsewhere,²⁷ reports no significant findings for health, and that extra income was used in generally the same way as pre-experimental income resulting in a small improvement in housing and material standard of living.

KEY POINTS

- There have been large, randomised trials of income supplementation, with substantial payments made for months or years.
- The trials were not designed with a health focus (for example, some primarily assessed workforce participation) and opportunities to assess health outcomes were missed.
- Randomised evidence could be obtained with innovative new studies, such as prospective studies of lottery winners.

The Rural Income Maintenance Experiment

No reports on health or medical care utilisation from this study were published in refereed journals. The Final Report contains an analysis by Kerachsky,³⁶ also available from the study contractors Mathematica Policy Research Inc,³⁷ using the same methodology as in the New Jersey experiment, which found no significant effects for either medical care utilisation or health status. Women and children in experimental groups reported increases in the presence of illness, but total expenditure on medical care was not clearly different from controls. Measures of psychological well being used in this study found a few scattered and inconsistent effects.²⁰

The Gary Income Maintenance Experiment

The findings for low birth weight in this trial³⁸ seem to be the only health information reported in the peer reviewed literature and have been widely cited. The analysis of the experimental effect on birth weight was based on 404 single live births, identified retrospectively, with 256 in experimental families and 148 in controls. The mean birth weight for the treatment group infants was 3147 g and for controls it was 3173 g. The sample of 404 was divided into 12 “cohorts” of mothers on the basis of age (<18, 18–34, >34), interval since last birth (<16 months, >16 months) and smoking status. The numbers in each subgroup are not given but must average 21 for the intervention group and 12 for controls, and are likely to be smaller in the <18 and >34 age groups. The analysis reported a statistically significant ($p < 0.05$ or $p < 0.01$) improvement in birth weight in the experimental subgroups with three risk factors and in some subgroups with two. It also reported a significant ($p < 0.01$) decrease in the birth weight of subjects in the lowest risk group, that is the 18–34 year old non-smokers with a longer than 16 month birth interval. The researchers reported no difference in the frequency or type of prenatal care received by experimental and control mothers.³⁹

Seattle/Denver Income Maintenance Experiment

The Final Report of the SIME/DIME experiment¹⁵ summarised findings on health and medical care utilisation from unpublished analyses,⁴⁰ effects on psychological distress,⁴¹ and effects on birth weight. A

more comprehensive range of health related measures was used than in previous experiments, including work days lost because of illness, number of hospitalisations, hospital days, work days missed in the past six months, functional limitation in household tasks, presence of a chronic condition limiting daily living or work, duration of condition, a mental health index, and a subjective health assessment.

The authors reported a decrease in hospital days for men, improvement in mental health index for wives, and reduction in duration of chronic illness for female family heads. The authors conclude that the experimental treatments probably did not affect the health of participants significantly. For most groups there was no observable experimental effect on psychological distress levels. Most of the scattered subgroup effects indicated an increase in distress levels, and offered no support for the idea that the income guarantee increased psychological well being. The effect of the experiment on low birth weight was studied in the Denver sample, but the results were not widely disseminated.⁴² No experimental effect was reported for babies 2500 g or less. Repeat analyses using the definition for low birth weight from the Gary experiment (3000 g or less) reported a significant improvement in the low risk subgroup of Chicano women who did not smoke and did not have a short birth interval.¹⁵ An increase in medical care expenditures was reported of 28% in two parent families and 40% in single parent families.

The Manitoba Basic Annual Income Experiment (Mincome)

No health related data have been reported from the Mincome experiment. Plans to include health status measures including birth weight, head circumference (at birth), and nutritional status were dropped because the sample was considered too small to demonstrate significant differences (Hum D, personal communication).

FINANCIAL ASSISTANCE TO EX-PRISONERS

The Living Insurance For Ex-offenders (LIFE) project and Transitional Aid Research Project (TARP) recruited prisoners about to be released from prison in the USA, and aimed to assess the effect of regular income on rates of re-offending, employment, and earnings.⁴³ Overall, approximately 2400 people were randomised. Payments were made for 13 or 26 weeks at a rate 10–30% above the poverty threshold. The LIFE project, which only included subjects estimated to be at high risk of re-offending, reported a reduction in property offences, but the larger TARP study showed no clear effect on criminal activity. No health outcome information was collected in either study and, for TARP, this was confirmed after examining the original data.

THE EXPERIMENTAL HOUSING ALLOWANCE PROGRAM

The Experimental Housing Allowance Program (EHAP) was conducted to inform the debate over the use of housing allowances as a

substitute for public housing to low income families in the USA. The Demand experiment was one component of EHAP in which 3500 low income renter families were randomised to a variety of experimental housing assistance delivery plans or a control group. Several plans involved unconstrained cash payments and thus represented increased family income.⁴⁴ Payments averaged about one quarter of pre-experimental income for three years. Reported improvements in housing quality were small and did not vary greatly with the type of payment made.⁴⁵ No health outcome information was collected and all original data have since been inadvertently destroyed (Shroder M, personal communication).

MENTAL HEALTH STUDIES

The only study included in the review that was primarily designed to assess the links between poverty and health was a Canadian study of 54 people with serious mental illness who were living below the poverty line.⁴⁶ Twenty six participants were randomised to receive allowances and forgivable loans to raise them above the poverty line for one year. All participants selected one staff member from a consortium of supporting agencies to serve as a sponsor and another person to serve as an advisor. Compared with baseline, in both groups hospitalisation rates decreased substantially and quality of life improved in some domains (finances, mental and physical health). There was no clear difference in the response of the two groups, but the small sample size meant that moderate sized differences could not be excluded.

LOTTERY STUDIES

Imbens *et al* (personal communication) surveyed winners of the Massachusetts State Lottery in the mid-1980s with the aim of assessing the effects of winning on labour supply and subsequent earnings. The “control” group was 259 season ticket holders who won comparatively small one off payments of \$150–\$7500 (adjusted to 1996 US dollars). Two study groups were identified: 129 people who won less than \$53 000 per year (average = \$30 000 per year) for 20 years and 108 people who won more than \$53 000 per year (average = \$150 000 per year) for 20 years. Although the chances of any given ticket winning were equal, there were three factors that may have affected baseline comparability between the study and control groups. Firstly, the control group was season ticket holders while the study groups included season ticket and regular ticket holders. Secondly, survey response rates were 49% for the control group and 42% for the study groups. Thirdly, there may have been confounding by number of tickets bought and hence probability of winning. Overall, there was clear evidence that at baseline the control group participants had higher earnings, were older, better educated and bought fewer tickets. However, there were only very small differences between the two study groups. After taking these factors into account, the authors reported that only those winning more

than \$53 000 per year reduced their labour supply substantially. No health outcome data were collected.

Discussion

Evidence from observational studies is convincing that poverty is a powerful cause of ill health. The studies reviewed here could have provided reliable evidence on the speed and extent to which the risks of poor health are reversed by income supplementation. However, they are uninformative in this regard, principally because health outcome data were not collected rather than a lack of relevant studies: 10 randomised studies of income supplementation were identified and, although follow up was short there were relatively large numbers in total and proportional increases in income of at least one fifth. In particular, reliable conclusions from the large North American income maintenance trials concerning health outcomes are not possible because of lack of data and major shortcomings in design and analysis.

A systematic review should identify, collate, appraise and, if appropriate, combine results from similar studies.⁴⁷ Problems with one or more aspects of data collection, storage, and analysis of the individual studies prevented the last step occurring for this review and a formal numeric meta analysis was not performed. The narrow focus of this review on randomised trials of income supplementation and health outcomes was taken for several reasons. Firstly, randomisation improves the reliability of results. Secondly, income is an easily identifiable and theoretically modifiable component of SES. Thirdly, health outcomes were chosen rather than extent of health care utilisation because the latter is likely to be determined by both need and ability to pay. Lastly, for reasons of manageability, the review did not attempt to summarise the many thousands of other relevant studies, including observational studies of individuals, studies of societal factors such as the gap between rich and poor, and trials that involve other components of SES.

Experimental evaluation of social policies is controversial.⁴⁸⁻⁵¹ In particular in this case, the balance between the costs and consequences of policies to increase income might be quite different at the individual and societal levels. However, the controversies surrounding experiments should be viewed in light of the fact that substantial changes in income are already made by governments via taxation, benefits, etc. Moreover, these changes are made in an unsystematic way so their effects on, for example, health, cannot be evaluated reliably.

This review has shown that randomised trials of income supplementation have been done but the opportunities to assess the effects on health outcomes were missed. For a number of reasons, including their enormous cost,⁵² the income maintenance experiments are unlikely to be repeated, but innovative alternatives are possible. For example, as large amounts of social welfare benefits go unclaimed,⁵³ potential recipients could be randomised to additional advice and assistance in obtaining a full

entitlement. Another realistic alternative is to use the randomisation process inherent in lotteries, as demonstrated in the Massachusetts State Lottery study reported here. For example, a prospective study of winners, in which different sized monthly instalments of lottery winnings were made in return for completion of a questionnaire, would, in effect, be a randomised trial of more compared with less income supplementation. It would therefore be able to reliably assess the effects of increased income on health. Although such studies would involve some sacrifice of applicability for reliability and be less pertinent to policy on the structural determinants of income inequality, they could still provide some evidence relevant to policies affecting income at an individual level. If the findings were positive they would provide a powerful incentive to increase the consideration of potential changes in health status during policy deliberations on taxation, benefits and minimum wage levels.

Information on original studies was given by Mark Bendick Jr (EHAP and RAND), Glen Cain (RIME), Gary Gerber (Mental health study), Derek Hum (Mincome), Guido Imbens (Massachusetts State Lottery study), Maurice Macdonald (Foodstamps), Joseph Newhouse (RAND), Jim Ohls (Foodstamps), Peter Rossi (LIFE, TARP, GWIE, SIME/DIME), Mark Shroder (EHAP) and Raymond Struyk. Help with searches was provided by Center for Electronic Records archivists at National Archives and Records Administration (USA), Carolyn Estey (Stanford Research Institute), Bert Penn (Institute for Research on Poverty), Joanne Pfeiderer (Mathematica Policy Research). The authors would like to acknowledge the help of the many people who commented on early drafts of the paper. Jennie Connor is an epidemiology training fellow with the Australasian Faculty of Public Health Medicine and Patricia Priest is an Oxford Nuffield Medical Fellow.

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