Learning Disabilities in Canada: Economic Costs to Individuals, Families and Society

Prepared for the
Learning Disabilities Association of Canada

by
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Final Report and Executive Summary

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Contents

Executive Summary

This research provides an estimate of the incremental direct and indirect costs of learning disabilities (LD) to individuals who have LD, to their families and to society more broadly.

The focus of the research is on people with LD from birth to retirement.

The research examines the following direct costs to individuals with LD (and their families) and costs to public (and private) programs:

- Hospital services
- Services of medical doctors
- Miscellaneous health-related and social services
- Medications
- Education services
- Criminal justice services
- Income transfers through the Canada Pension Plan, Employment Insurance, Workers Compensation and provincial Welfare programs
- Services provided by community agencies to assist with everyday activities because of disability.

Key indirect costs to people with LD and their families that are examined are:

- Reduced earnings of people with LD
- Reduced household incomes

In addition to the simple incremental costs of LD, the research calculated the "present value" of those costs. This involves looking at future costs in terms of today's dollars.

It is estimated that the simple incremental cost of LD from birth to retirement is $1.982 million per person with LD. At a 5 per cent discount rate the present value of the incremental cost is approximately $455,208 per person with LD in year 2000 dollars.

The research found that individuals with LD and their families shoulder 61.4 per cent of the costs. Public programs carry most of the remainder (38.5 per cent); 0.1 per cent can be attributed to private sector insurers for medication costs.

Assuming an LD prevalence rate of 5 per cent, the simple incremental cost of LD (to all individuals with LD, their families and to public and private programs in Canada) is about $3,080 billion from birth to retirement. The present value cost at a 5 per cent discount rate is about $707 billion in year 2000 dollars.

The research found that the $707 billion figure is a conservative, middle range estimate of the (present value) cost of LD in Canada. Available evidence suggests that these costs could be contained through policy and funding measures to prevent significant disruptions to the education of people with LD and to improve educational attainment.

I Introduction

This research provides an estimate of the incremental direct and indirect costs of learning disabilities (LD) to individuals who have LD, to their families and to society more broadly.

The general approach was to estimate various average costs per person with LD and to multiply those costs by the number of people with LD in Canada. This approach was taken as prevalence estimates of LD vary. It was reasoned that, once a realistic per-person estimate has been generated, that number can be multiplied by the upper and lower prevalence estimates to yield a range of total costs of LD in Canada.

In addition to the simple costs of LD, the research calculated the "present value" of those costs. This involves looking at future costs in terms of today's dollars. Present value is discussed in more detail in Section II of this report.

The research focuses on people with LD from birth to retirement. Retirement age was selected as the upper limit for the analysis because, looking at the individual as the unit of analysis, a major component of the cost of LD is earnings loss; the present value of earnings loss becomes much less significant a consideration after about age 65.

Section II of the report defines terms used throughout. Section III presents findings by various cost streams, and presents selected "text tables" which illustrate points of methodology. Section IV presents a summary of findings and section V provides detailed tables that support the conclusions. The Appendix provides further details on methodology.

The report was researched and written by Cameron Crawford (President, The Roeher Institute). Shawn Pegg (Researcher, The Roeher Institute) identified and helped organize background information on costs of educational services. Professor Ernie Lightman (University of Toronto, School of Social Work) brought his expertise to the design of the methodology, in fielding queries about methodological issues that arose, and in reviewing and providing helpful comments on the findings.

II Defining Terms

Several terms are used throughout this report. To spare the reader from having to undergo repeated definitions, this section of the report explains commonly used terms up front.

A. Surveys Used

Raw microdata from the following Statistics Canada population surveys were drawn upon for this research:

- The Health and Activity Limitation Survey (HALS) of 1991

  The Health and Activity Limitation Survey (HALS) provides information on the nature and severity of disabilities, as well as the barriers that persons with disabilities encounter. Such barriers include household tasks, employment, education, accommodation, transportation, finances and economic self-sufficiency, out-of-pocket expenses related to disability, recreation and lifestyles, as well as their use of and need for assistive devices. The file also includes selected demographic data from the 1991 Census as well as Census data for persons without disabilities.

- The National Population Health Survey (NPHS) of 1996-97

  The National Population Health Survey (NPHS) is designed to enhance the understanding of the processes affecting health. The survey collects cross-sectional as well as longitudinal data. For cross-sectional purposes, data were collected for a total of 81,000 household residents in all provinces (except people on First Nations reserves or on Canadian Forces bases) in 1996/97. Data are presented on perceived health, chronic conditions, injuries, repetitive strains, depression, smoking, alcohol consumption, physical activity, consultations with medical professionals, use of medications and use of alternative medicine.

  Owing to the relatively small sub-sample of people with disabilities in the 1998 survey, the research did not use that source.

- The National Longitudinal Survey of Children and Youth (NLSCY 1998 edition for 1995-96 reference years)

  The National Longitudinal Survey of Children and Youth (NLSCY), developed jointly by Human Resources Development Canada and Statistics Canada, is a comprehensive survey which follows the development of children in Canada and paints a picture of their lives. The survey monitors children's development and measures the incidence of various factors that influence their development, both positively and negatively.

- The Survey of Labour and Income Dynamics (SLID Longitudinal Job and Person files for 1993-94 and the Cross Sectional Person file for 1994)

  Starting in 1993, the Survey of Labour and Income Dynamics (SLID) is an ongoing longitudinal survey that interviews each sample member over a six year period. The longitudinal nature of the survey as well as the extensive data content offer a vast potential for analysis of issues related to labour market and income patterns, including low income, and changes in income and employment patterns over time.

  The 1998 SLID public use file was not used as the disability variable in that data set has been suppressed.

The acronyms HALS, NPHS, NLSCY and SLID are used throughout this report.

The Roeher Institute assumes full responsibility for any derivations and analysis based on raw data from these files.

B. Age Groups

Each of the surveys used for the research has its own way of organizing information about the age of respondents.

In SLID, the age groups for those 16 and older are reported by one-year intervals. The NLSCY reports by one-year intervals from birth to age 11[1]. The NPHS Health file reports figures by five year intervals, with some exceptions in the early years: 0-3, 4-5, 6-9, 10-11, 12 -14, 15-19, 20-24 … 60-64. The HALS Adults file reports by very broad age groupings: 15-34, 35-54, 55-64.

C. Children and Adults

Children are defined as people from birth to 15 years of age. Adults are defined as those from 15 to age 65 years of age, those at age 65 being at the typical age of retirement.[2]

[1] Much of the NLSCY information pertains to children from 4 to 11 years of age.
[2] It is recognized that seniors are adults, but seniors are not within the focus of this research.

D. Disability Status

1. Persons with Disabilities

The research takes at face value the definitions that Statistics Canada has used in its surveys to categorize respondents as having disabilities or activity restrictions. While Statistics Canada's definitions of "disability" and "activity restriction" are not fully consistent across surveys, they are reasonably close for the purposes of the present research. Generally those definitions represent long term conditions that limit the amount or kind of activity that people can do at home, school, work or in other activities.

2. Learning Disability

Definitions of Learning Disability (LD) are not static. The definition that was recently approved in the Canadian context is available at the Website of the Learning Disabilities Association of Canada (http://www.ldac-taac.ca/lddefined/index.html).

The definition is complex and lengthy, but generally connotes:

- Difficulties with perceiving, thinking, remembering or learning, which may interfere with oral language, reading, written language or mathematics, organizational skills, social perception, social interaction and perspective.
- These difficulties may exist concurrently with attentional or emotional disorders, sensory impairments or other medical conditions. The difficulties arise from one or more conditions that are inherent in the individual and are concurrent with at least average intelligence. LD is therefore not to be equated with global intellectual deficiency.

3. LD Proxy

As is the case in other major population surveys, the surveys used for this research do not enable precise identification of cases that meet prevailing definitions of LD. A "point blank" question on LD was included on HALS for adults:

> Has a teacher or health professional (such as a doctor, nurse, social worker or counsellor) ever told you or your family that you have a learning disability (such as dyslexia, a perceptual handicap, attention problems or hyperactivity)?

However, total "yes" responses to the question fall short of typical prevalence estimates. Moreover, many people's learning disabilities have not been formally diagnosed through professional assessment.

A direct question on LD was asked in the HALS children's survey, but that survey was not released for public use; direct statistical inquiries into costs of LD with those data have not been done. Similarly, the LD identifier in the NLSCY has been suppressed in the public use file owing to small sub-sample size.

Accordingly, LD Proxy variables were developed for the surveys. These variables create sub-samples of survey respondents whose profiles resemble as closely as possible people with LD, given:

- the descriptors of LD currently accepted or which have been proposed, and
- other statistical information aside from "point blank" questions about LD status (e.g., information about cognition and memory, perception and various other disability-related issues).

Details on the derivations of LD Proxy variables are provided in the Appendix.

4. Persons Without Disabilities / Without Cognitive Difficulties

Persons without disabilities are defined for the purpose of statistical analysis as those whose codes are set to "no" in the disability/activity restriction questions. Persons without cognitive difficulties are defined as those assigned that classification by Statistics Canada on the questions about cognition in the NPHS or NLSCY.

E. Interpolations and Extrapolations

1. Interpolation

An interpolation is defined as an estimate of missing values in a series of known values. For instance, if we know that the whole numbers in a series are 1,3,5,7 and 9, and that between those numbers are numbers we have to determine, we can interpolate that the missing numbers are 2, 4, 6, 8. The interpolation is based on a straight line approach, a function available in Microsoft Excel, which simply fills in missing values between any two known values.

All interpolations in this research are straight line (i.e., linear) interpolations.

2. Age Referenced Interpolation

An age referenced interpolation is defined as the interpolated values between reported values for any two age groups. For instance we may know that a 25 year old earns $20,000 per year on average and that a 35 year old earns $30,000. However, we do not know what those aged 26, 27… 34 earn. By using the known information for the two age groups, we can interpolate that the 26 year old earns $21,000 on average, the 27

year old earns $22,000, the 28 year old earns $23,000 and so on. The research used Microsoft Excel's "Fill - Trend" function to automatically calculate (interpolate) the values for empty spreadsheet cells between known values.

Unless stated otherwise, where the average values are known (or are estimated on the basis of reported information) for any two adjacent age groups, the research:

- Plotted the values in the middle of each age group (e.g., at age 22 where values are known for the 20 - 24 age group; at age 27 for the 25 - 30 age group); and
- Interpolated between these two middle points (e.g., from age 22 to 27).

3. Extrapolation

An extrapolation is defined as a calculation of values that lay outside the range of those known (or interpolated). For instance, if we know (or interpolate) that the whole numbers in a series are 1,2,3,4,5,6,7 and 8, we can extrapolate, using a straight line approach, that the next three numbers are 9,10,11.

All extrapolations conducted in this research are straight line (linear) extrapolations.

4. Age Referenced Extrapolation

Age referenced extrapolations are defined as calculations of unknown values that lay beyond a series of known or interpolated values. For instance, having interpolated in the example in age referenced interpolations that people's average earnings between age 25 and 35 increase by $1,000 increments (e.g., $20,000, $21,000, $22,000 … $30,000), we could extrapolate that the 40 year old earns on average $35,000. The research used Microsoft Excel's "Fill - Trend" function to automatically calculate (extrapolate using a straight line approach) the values for empty spreadsheet cells that lay beyond known or interpolated values.

5. Trend

A trend is defined as the general direction or tendency of all known, interpolated and extrapolated figures in a series. In the examples given above, the general trend of incomes is to increase by about $1,000 per year for between 25 and 40 years of age.

In some cases, known values in a series can vary erratically from one reported interval to another, obscuring the underlying trend.[3] In such cases the research used the feature

[3] Values can swing erratically owing to survey design issues, small sample sizes and the basic accuracy of the information that respondents report.

of Excel which over-writes the original (reported) values in a series, creating a "best fit" linear series in the process. Text Table 1 provides an example.

Text Table 1. Example of extrapolation

Age	Known Values	Best fit trend to age 30	Extrapolated
25	$25,000	$22,095	$22,095
26	$21,500	$25,024	$25,024
27	$32,000	$27,952	$27,952
28	$27,000	$30,881	$30,881
29	$29,000	$33,810	$33,810
30	$42,000	$36,738	$36,738
31			$39,667
32			$42,595
33			$45,524
34			$48,452
35			$51,381
Total	**$176,500**	**$176,500**	**$404,119**

F. Costs, Present Value and Discounting

1. Direct Cost

A direct cost is defined as the money paid for a given item or service. For example, cash payments for medications are direct costs. Direct costs that are examined in this research are:

Direct costs to public programs in terms of:

- Hospital services
- Services of medical doctors
- Miscellaneous health-related and social services
- Medications
- Education services
- Criminal justice services
- Income transfers through the Canada Pension Plan, Employment Insurance, Workers Compensation and provincial Welfare programs
- Services provided by publicly funded community agencies to assist with everyday activities because of disability

Direct costs to individuals and families in terms of:

- Medications
- Services provided by privately financed community agencies to assist with everyday activities because of disability.

The approach taken in this research is conservative in that direct costs have not been calculated for assessments, re-evaluations, reports to employers or a range of other costs (e.g., accommodation costs to employers, universities and colleges).[4]

2. Indirect Cost

An indirect cost is defined as income lost or foregone. For instance, income lost is an indirect cost to an unemployed person. Key indirect costs examined in the research are:

- Reduced earnings of people with LD
- Reduced household incomes (e.g., foregone income as a result of providing care and support to a family member with LD) once the personal incomes of persons with LD are removed from the family income picture.

3. Incremental Cost

An incremental cost of LD is defined as the cost (or savings) over and above that which would be expected to accrue to persons without disabilities. Incremental costs can be direct or indirect. For example, a person with LD may earn on average less than their non-disabled counterpart in a given age group. The average difference in earnings is an incremental (indirect) cost of LD. A person with LD may pay more for prescription medications than their non-disabled counterpart in a given age group. The difference in the amount paid is an incremental (direct) cost of LD.

4. Simple Incremental Cost

A simple incremental cost is defined as the difference between two money values. For example, it might be estimated that the average earnings of a 25 year old with LD is $5,732 and the earnings of their counterpart without disabilities $15,324. The simple incremental cost of earnings lost to the average 25 year old with LD is $15,324 — $5,732 = $9,592.

5. Present Value

The present value of a given amount is defined as the amount that a future cost is worth now. Analogies are the value of a loan in today's dollars to the lender over the term of the loan, or the cash value to an insurer of a lump sum payment for a claimant's anticipated earnings loss in the future.

[4] Background scans undertaken for the present report found no researched cost estimates concerning such services and accommodations for people with LD in Canada.

For example, in the case of the average 16 year-old with LD, it might be estimated that they earn $290 less than their age-peer without a disability. If $276 were invested for 1 year at 5% interest, at the end of one year that investment would be worth $290. The present value of the $290 is $276; this is the same as $290 ÷ 1.05.

However, if we are talking about a child with LD in their first year of life, that loss of income will be experienced sixteen years from now. Accordingly, the present value of $290 sixteen years from now is ($290 ÷ 1.05^{16}) = $133.
To put it another way, if $133 was put in an investment account and left to mature for sixteen years at 5 per cent interest compounded annually, that $133 would be worth $290 at maturity.

Present value is used widely in health economics research into costs and is used by insurers for calculating payments for estimated future costs (e.g., for earnings replacement in the future).

For incremental costs that occur in the future, the present value of those costs is a much more meaningful figure than the simple differential. The reader is urged to focus on the present value of the incremental costs of LD, figures that are provided throughout this report.

6. Discount Rate

The discount rate is defined as the rate of interest that is used to determine the present value of a future expense or revenue. The rate used in the research was 5%, a figure that is widely used in health economics, though other, higher or lower, rates can also be used. The final results of any calculations should not vary dramatically with small changes in the interest rate chosen.

7. Derivations of Income

The research draws chiefly from three kinds of income: employment income, total personal income and economic family (or household) income:

- Employment income is defined as the sum of *all wages and salaries the survey respondent* has received in the reference year.
- Total personal income is defined as the sum of *any money the survey respondent* has received in the reference year (i.e., from earnings, social assistance / Welfare, EI, pensions, investments, tax credits, and from any other source).
- Family (or household) income is defined as the sum total of *all income received by the survey respondent and their family/economic household members* in the reference year (i.e., all family members' earnings, Welfare, EI, pensions, investments, tax credits and incomes from all other sources).

Each of the surveys used in the research has its own way of reporting incomes. SLID is most precise in that it reports total personal and family incomes by various streams (e.g., earnings, EI, Welfare, investments, etc.) in discrete amounts to the nearest dollar. Derivations of incomes were generally not necessary for analysis based only on SLID data.

However, the other surveys report figures by income groups. Where incomes are reported in groupings, the research derived dollar value estimates so that those figures could be manipulated. The principles that guided the derivations were as follows:

- Incomes for any reported income grouping of zero or less than zero were assigned values of $0.
- Incomes for any reported income grouping greater than $0 but less than the highest grouping is assigned the middle value for the income group reported. For instance, the estimated employment income for HALS respondents whose employment incomes fall in the $15,000 to $19,999 group is $17,500.
- Upper income group estimates are estimated on the basis of the other income data that were available. See the Appendix for further details.

8. Constant Dollars

The data available for the research span several years. Accordingly, the research adjusted cost estimates based on figures for any given reporting period to constant year 2000 dollars. The research consulted Statistics Canada's Consumer Price Index (CPI) Historical Summary[5] to make the adjustments. The term "CPI" is used at the bottom of the Tables in that section of the report to show the factor by which the originally reported values were multiplied to bring the figures to year 2000 values.

[5] Available at http://www.statcan.ca/english/Pgdb/Economy/Economic/econ46.htm

III Findings

A. Direct Costs

1. Hospital Services

Incremental costs of LD in terms of utilization of hospital services were estimated based on the NPHS and data from Statistics Canada's ***Hospital Annual Statistics 1993 — 94***. The latter data on average daily hospital costs are widely available to the general public and roughly coincide with the reference years for data used in this research.

For the LD Proxy group and those without cognitive difficulties, the number of overnight stays was multiplied by $608, which was the total average operating expense per patient day for all hospitals in the reference year. Figures were established for each of the age groups available in the NPHS.

Interval-by-interval interpolations of hospital costs were calculated between age groupings for those in the LD Proxy group and those without cognitive difficulties.

The NPHS only asks questions about hospital utilization of people 12 and older. Estimates were extrapolated backwards based on information for those aged 12 to 22 years.

Results are shown on Table 1.

The simple incremental difference in hospital costs between those with LD and those without cognitive difficulties is $18,381 from birth to retirement age. The present value of those costs is $2,020. While some of those costs may have been carried privately by individuals and families, the research assumed that most of the costs would have been addressed through publicly insured health care programs.

2. Doctor Costs

Costs of physician services were estimated using the NLSCY, the NPHS and figures on physician costs from a table available at the Statistics Canada Website on costs of various health care services ***(i.e., Average payment per medical care service, by category of service*)**.

The average cost of a consultation with a physician in 1995-96 was $66.70.

Both the NLSCY and NPHS have information about the frequency of consultations with various medical doctors (family doctors, eye specialists and other medical doctors). The

research multiplied the average cost per consultation by the number of consultations for those in the LD Proxy group and for those without cognitive difficulties, presenting results by age and LD Proxy status.

As the NLSCY does not provide information about frequency of consultations for children younger than four years of age, a trend line extrapolated the number of consultations for those 4 to 11 years back to birth. Based on the NPHS, age referenced interpolations were developed for those aged 12 and older.

Results are shown on Table 2. The simple difference in the cost of consultations for those in the Proxy LD group is $15,040 over the lifespan until retirement. The present value of those costs is $3,881.

The research assumed that most of these costs would be borne by the publicly insured health care system.

3. Cost of Miscellaneous Health-Related and Social Services

Using data on frequency of consultations per year from the NPHS, the research estimated the incremental cost of LD in terms of utilization of the following services: nurses; dentists/orthodontists; chiropractors; physiotherapists; social workers; psychologists; speech therapists; audio-therapists; and occupational therapists.

As with the estimate of the costs of medical doctors, the procedure involved counting the number of consultations per year that were reported across NPHS variables HCC6G2D-J and multiplying the figure by an average price per consultation. Using the same Statistics Canada table that was used for prices of physician consultations, the research used the figure reported for "miscellaneous health-related services" — $35.60 per consultation in 1995-96.

Table 3 in the Appendix shows the results of these calculations.

The simple incremental cost of LD in terms of the use of these services is an estimated $5,055; the present value of the cost is $1,843.

It should perhaps be pointed out that previous research undertaken by The Roeher Institute for the Learning Disabilities Association of Canada found that families who suspect that their children may have LD are increasingly resorting to privately funded testing and assessment services to identify whether this is indeed the case.[6] Owing to the paucity of economic data on the subject, however, the present research was not able to provide a breakout of costs for such services.

[6] The Roeher Institute (August, 2000). Environmental Scan: Emerging Issues in Learning Disabilities in Canada. Learning Disabilities Association of Canada: Ottawa (Unpublished).

4. Cost of Medications

The research estimated the incremental costs of medications consumed by those with LD. The research drew from the NPHS and from the Canadian Institute for Health Information's (CIHI) recent report ***Drug Expenditures in Canada, 1985 — 2000.*** CIHI's research found that in 2000 the average Canadian spent an estimated $478 on drugs.

Using that figure as a starting point, the present research identified cases in the NPHS where respondents had used medications in the reference year and assigned a value of $478 to any "yes" responses and zero to all "no" responses.

Age referenced interpolations were computed to estimate average costs between years where any drug utilization was reported. As drug usage patterns are not reported for those younger than 13 in the NPHS, averages for those in the 13 through 17 age groups were extrapolated backwards to birth. The differences between those in the LD Proxy group and those without cognitive difficulties were calculated to yield an incremental drug cost estimate for those with LD.

Results are shown on Table 4.

The total simple incremental cost of drugs from birth to retirement is an estimated $4,766 for those in the LD Proxy group. The present value of those costs is $1,965.

In establishing the public-private mix of those costs, the CIHI research was consulted[7]. The report provides the following breakdown in terms of the payers for drugs (Text Table 2):

Text Table 2. Expenditure on drugs per capita, by source of finance, 2000

Source of finance	All	Public	Private	Pct of Total	
Public programs	159.57	159.57		33.4%	33.4%
Insurers	122.49		122.49	25.6%	25.6%
Out of pocket: prescribed	87.47		87.47	18.3%	41.0%
Out of pocket: non-prescribed	108.78		108.78	22.7%	
Total	**478.31**	**159.57**	**318.74**	**100.0%**	**100.0%**

Source: Canadian Institute for Health Information, *Drug Expenditures in Canada, 1985 - 2000*, Table A.2 - Part 1

Our best estimate, then, is that 33.4 per cent of the present value of incremental drug costs per person with LD is borne by public programs ($806). Some $656 (41 per cent) are paid out of pocket by individuals and families (i.e., are not reimbursed by any plan), while the remaining $503 (25.6 per cent) are covered by private-sector insurers.

[7] Table A.2 — Part 1.

5. Education Services

The research assumed that costs of regular and special education are additive in most cases because most children who are in special education programs are in regular classrooms as well.[8]

In estimating the incremental costs of education services associated with LD, the research sought out provincial data on general costs of elementary and high school education, numbers of students enrolled in any education programs, costs of special education in particular and the numbers of students in special education programs. Such information was only available for British Columbia, Saskatchewan, Ontario and Nova Scotia; while other jurisdictions had some of this information, they did not have all of it.

The general approach was to establish the cost per student of regular education and special education. To do this, the research:

- Subtracted the total number of students enrolled in special education from the number of students enrolled in any education programs, resulting in the number of students enrolled in non-special (i.e., regular) educational programming.
- Subtracted the total costs of special education from total costs of all education to produce a figure for the total costs of regular education.

Having established the number of students and costs for both regular and special education, per student costs were calculated:

> Total cost of (regular or special) education ÷ total number of students in (regular or special) education = cost of (regular or special) education per student.

Text Table 3 shows the general procedure.

The estimated cost of regular education per student is $6412, and for special education, $6600. Generally, the latter figure is spent in addition to the amount for regular education as most children receiving special education services are receiving regular education services as well.

[8] Information for variable AETCQ23 in the NLSCY code book presents figures that, in percentage terms, indicate that 84.6 per cent of students in special education are in regular classrooms at least some of the time. Some special education students are exclusively in a regular education classroom (16.3%). More than one half are primarily in a regular classroom but spend some time in a special education class or resource room (58.6%). A few are primarily in a special education class or resource room with some integration into a regular education classroom (9.8%). As the variable has been suppressed on the public use file, detailed analysis by particular kind of education arrangement was not possible.

Text Table 3. Estimated costs of regular and special education for selected jurisdictions

Province/Territory	Average daily enrollment	Total cost of education	Cost of special education (reported)	Number of special education students (reported)	Special ed cost per student	Non-special ed costs	Number students not in special ed	Cost of regular ed per student
BC	613,607	4,267,894,379	468,711,503	66,350	7,064	3,799,182,876	547,257	6,942
SK	188,594	559,420,000	81,000,000	3,591[9]	22,556	478,420,000	185,003	2,586
ON	1,962,425	13,168,974,101	1,215,000,000	188,000	6,463	11,953,974,101	1,774,425	6,737
NS	158,205	799,100,000	73,961,734	20,628	3,586	725,138,266	137,577	5,271
Sub-totals	**2,922,831**	**18,795,388,480**	**1,838,673,237**	**278,569**		**16,956,715,243**	**2,644,262**	
Average cost per student					**6,600**			**6,412**

Next, the research turned to the NLSCY for information on children in regular and special education[10] and for information on grade retention[11]. Again, as most children who are in special education programs are in regular classrooms as well, the research assumed that costs of regular and special education are additive. Education costs were assigned to cases in NLSCY according to the following algorithm (Text Table 4):

Text Table 4. Estimated costs of education per student year

Ever repeated a grade	Attends special education	Regular education cost	Special education cost	Total education cost
No	No	$6,412	$0	$6,412
Yes	No	$12,824	$0	$12,824
No	Yes	$6,412	$6,600	$13,012
Yes	Yes	$12,824	$6,600	$19,424

The $12,824 figures in the "regular education cost" column for those who have repeated a grade represent a doubling of the regular education cost. The NLSCY does not report how many grades a given child has repeated, so it was conservatively estimated that a child who had repeated a grade had done so only once.

Neither does the NLSCY tell how many years a child has been in special education, so the research conservatively assumed that the reported year in special education is the only year the child has spent in such programming.

[9] This figure represents only the number of students with "low incidence" disabilities. Presumably these are young people with fairly severe levels of disability.

[10] I.e., the child receives special education because of a physical, emotional, behavioural or some other problem that limits the kind or amount of school work he/she can do (per variable AEDCQ20).

[11] I.e., the child has ever repeated a grade at school, including kindergarten (per variable AEDCQ06).

Average per student costs of education for those in the LD Proxy group and those without cognitive difficulties were computed.

Table 5 shows the results.

As the upper age of children in the NLSCY is 11 years of age, a linear series "best fit" extrapolation was used to estimate education costs for those aged 12 to 18. The trend line was extrapolated backwards to age 4 and 5 for the LD Proxy group, as skip patterns in the survey resulted in empty cells for education costs for children in those two age increments for the LD Proxy group. Original values were over-written.

The estimated simple incremental cost of education services is $39,537 for those with LD in the 4 to 18 age group. The present value of that figure is $22,380.

6. Criminal Justice Services

The research on costs of criminal justice services focussed on people aged 12 to retirement age on the assumption that costs for criminal justice services would not generally be incurred until people reach adolescence.[12] The research did not attempt to assign costs to the physical injuries and psychological traumas associated with youth delinquency and adult crime.

The research drew from a report by the John Howard Society of Alberta on the cost of criminal justice services to the Canadian economy (***Cost of Criminal Justice, 1997***), a report that was based on information from the Canadian Centre for Justice Statistics.

The John Howard Society's total estimated cost of criminal justice services was $9,942,423,000 in 1997, a figure that includes costs of police, courts, adult and youth corrections, Legal Aid and prosecutions.

The Roeher Institute's research also drew from a report by Ostiguy[13], which reports a general prevalence of LD ranging from 5 to 10 per cent in the general population but 25 per cent in federal prisons. Our research assumed the same prevalence rate of inmates with LD in provincial correctional facilities and in other criminal justice services (e.g., courts), as we found no clear evidence to the contrary.

Assuming that those with LD in criminal justice services account for 25 per cent of the total cost of criminal justice services, the estimated total cost is about $2,485,606,000 for people with LD in that system.

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[12] The Young Offenders Act pertains to young people aged 12 to 17 inclusive. For useful information, see the Glossary at the Forensic Nursing Education Site (University of Calgary) at http://www.forensiceducation.com/glossary/y.htm.

[13] Julie Ostiguy, "The Cognitive Skills-Building and Reintegration Program", Let's Talk, vol. 25 no. 2, Sector Reports, Correctional Operations and Programs Sector, Correctional Service Canada.

Assuming an LD prevalence rate of 5 per cent of the general population, approximately 1,085,000 Canadians aged 12 to retirement have LD. The latent share[14] of criminal justice services per person with LD in the general community is therefore an estimated $2,290 ($2,485,605,750 ÷ 1,085,000 people).

The share of costs for each other Canadian in the general community is ((75% x $9,942,423,000 = $7,456,817,250) ÷ 20,625,196 people) = $362 per person without LD aged 12 to retirement.

Table 6 shows the results of the figures as applied to those with and without LD for the 12 - 64 age group.

The simple incremental cost of LD in terms of criminal justice services is an estimated $109,821 from age 12 to retirement, assuming that a discount factor of 1.05[12] (i.e., 1.8) comes into effect at age 12 and that no costs are sustained before age 12. The present value of the incremental criminal justice costs is $22,075 per person with LD.

7. Income Transfers (from C/QPP, EI, Workers Compensation, provincial Welfare)

The research estimated the direct costs of income received by working-age people with LD and with no disabilities the Canada/Quebec Pension Plan (C/QPP), Employment Insurance (EI), Workers' Compensation (WCB) and from provincial social assistance or Welfare programs. It was assumed that children would not generally have received such income transfers.

The research drew from SLID and HALS in the analysis.

Cases were identified where income was reported from any of these social programs in SLID; total incomes from all four sources were added together. To safeguard against the statistical software program dropping from the computation people whose income data from such sources was not applicable (i.e., because they received no such income) or whose income was simply unknown, cases on a given variable with missing values were set to zero. Average transfer incomes for those with and without disabilities were then generated for each age interval from 16 to 64 years.

Next, the estimated amount received by HALS respondents from the four programs in question was computed. HALS had to be consulted because SLID has no information that would allow for the derivation of an LD Proxy group. As the HALS public use file does not report the transfer amounts that individuals received,[15] the research assumed

[14] I.e., if the costs of criminal justice services were to be spread across those with LD aged from 12 to retirement, assuming a greater per-person risk among those with LD of becoming involved with the criminal justice system.

[15] The Public Use HALS file simply indicates whether respondents did or did not receive such income (i.e., yes or no).

that people who received any money from such programs in the reference year aside from employment earnings would have had transfer incomes that consisted primarily of money transferred from these programs. Accordingly, a transfer income variable was derived which filtered cases for working age people who:

- Had no job earnings, but
- Had personal incomes, and
- Received income from any of the four social programs in question.

Estimated total personal incomes (i.e., from CPP, EI, WCB and Social Assistance) were then calculated for the LD proxy group and for those with any disability across each of the broad HALS age groups.

Transfer incomes to those with LD were expressed as a percentage of the transfer incomes received by people with disabilities as a whole. For example, it was found that the estimated average income from these programs to people in the LD Proxy group was 79.3 per cent of the transfer income of those with any disability in the 15 to 34 age group.

Taking as a reference point the transfer income and age data from SLID for peope with any disability, percentages for LD transfer incomes were plotted at the midway point for each of the three broad age groupings available in HALS.

For instance, the 79.3 per cent figure was inputted at age 25, the midway point between 15 and 34 years of age. Age referenced interpolations were used to generate percentages for unknown values between the figures that were derived; extrapolations estimated missing values beyond the series (i.e., from 25 to 15 years and from 60 to 64 years).

Estimated percentages were then multiplied by SLID transfer incomes for people with disabilities at each age interval to yield estimates of transfer incomes for the LD Proxy group at each age interval. For instance, the SLID average transfer income of those with disabilities at age 25 was $2,361. That figure multiplied by 79.3% yields an estimated transfer income for 25 year olds with LD ($1,873). Those without disabilities have average transfer incomes of $1,549. The simple incremental cost of LD in terms of transfer incomes for a 25 year old with LD is $1,873 — $1,549 = $324.

Table 7 provides details.

The estimated simple incremental cost of selected income transfers per person with LD from birth to retirement is $132,939. The present value of that figure is $18,497. These costs are borne entirely by public programs.

8. Services Provided by Community Agencies to Assist with Everyday Activities

The cost of agency-based help with everyday activities was estimated. Help with everyday activities is defined as assistance with any of the following because of disability: meal preparation; shopping for groceries or other necessities; everyday housework; heavy household chores; personal finances such as banking or paying bills; assistance with personal care such as washing, grooming, dressing or eating; and help to move about in the personal home.

In constructing the estimate, numerical values were assigned to HALS indicators of frequency of help received. HALS indicators of frequency are: daily, at least once a week, less than once a week, at least once a month and less than once a month. A conservative approach was adopted in which it was estimated that those providing assistance through community agencies would have invested about two hours per episode of helping, regardless of frequency. The algorithm used to calculate estimated hours is as follows:

- Daily: 365 days x 2 hours
- At least once a week: 52 weeks x 2 hours
- Less than once a week: (52 weeks ÷ 2) x 2 hours
- At least once a month: 12 x 2 hours
- Less than once a month: (12 months ÷ 2) x 2 hours

It was assumed that people who need help moving about in their personal home would have required such assistance daily, involving at least two hours per day.

A value of zero was assigned to cases where the frequency of help provided by community agencies was not applicable (i.e., respondents received no such services) or not stated.

An average hourly rate of pay was established, taking information from a table on Statistics Canada's Website (i.e*.,* ***Average weekly earnings (including overtime), health and social services***) which is based on Statistics Canada, CANSIM II, tables 281-0002 and 281-0006.

The category of labour selected was for health and social services associations and agencies, in which the average weekly wage (including overtime) was $596.68 in the year 2000.

We assumed an average working week of 32 hours, a figure calculated by taking the SLID average hours worked at all jobs for pay in the health and welfare services industries in 1994 (1,652 hours) and by dividing that figure by 52 weeks.

The estimated average hourly wage of those who provide help through community agencies is therefore $596.68 ÷ 32 hours = $18.65 per hour.

The research assumed that those without any cognitive disabilities may acquire some level of disability as they age and may accordingly require some level of assistance with everyday activities at some point in the lifespan.

Based on HALS, average hours of help provided per person by community agencies to the LD Proxy group and those without any cognitive disabilities are as follows for the three working age groupings available in HALS:

Text Table 5. Average hours of help received for everyday activities from community agencies, by LD Proxy status and age group (based on HALS 1991)

Age group	LD Proxy	Others
15 - 34	272	18
35 - 54	245	56
55 - 54	168	27

Using Microsoft Excel, the research developed age referenced interpolations and extrapolations of hours of services used across the lifespan to retirement age.

Results are shown on Table 8.

The simple incremental cost of agency-based help provided to persons in the LD Proxy group is an estimated $311,997 over the lifespan to retirement. The present value of those costs is $109,342.

The HALS public use file renders it problematic to establish the private-public mix of these expenditures. However, it is possible using HALS to establish that 23 per cent of those in the LD Proxy group who received assistance through community agencies paid for the services without reimbursement from any source. A reasonable estimate of the present value of costs that fall to individuals and their families is therefore 23 per cent of the present value of total expenditures ($25,149); the remainder falling to a combination of public and private service programs ($84,194). It was assumed that the majority of those costs would have fallen to publicly funded programs.

B. Indirect Costs

1. Reduced Earnings

The research estimated the incremental cost of LD in terms of earnings loss. As in the calculations of direct costs through income transfers, the general approach involved the following steps:

- Using SLID, obtain average earnings for those with and without disabilities at year-by-year intervals from age 16 to retirement.
- Establish the percentage of earnings for those in the LD Proxy group in relation to all working age people with disabilities, by age group.

- Plot the percentage of LD earnings in relation to the earnings of people with disabilities, inputting values at the middle range of the age groupings given in HALS.
- Use age-referenced interpolations to generate expected percentage differences in cells where data are unknown.
- Extrapolate beyond the series to establish values for those in the 15 to 24 and 60 - 65 age groups.
- Multiply the earnings of persons with disabilities per LD percentages to yield year-by-year estimates of the earnings of people with LD.
- Subtract the estimated earnings of those with LD from those without disabilities, resulting in a simple incremental cost of LD on a yearly basis.
- Discount the simple incremental cost to produce the present value of earnings lost per working age person with LD throughout the working years to retirement.

Table 9 shows the results.

Overall the research estimates that the simple incremental cost of LD in the working years is $714,106. The present value of the incremental cost is $104,440. While these are costs that are born by individuals with LD and their families, society more generally experiences the effects: there are that many fewer dollars available to the consumer economy and tax system.

2. Indirect Cost to the Family

The indirect cost of LD to the family was calculated using several data sources. First, for children up to age 15, NPHS total family income data were used for the LD Proxy group and for children without any cognitive difficulties. The research assumed that family incomes consisted primarily of the incomes of household members aside from children. It was reasoned that the average income differences between families of children with and without disabilities represent the opportunity costs to families caring for children with LD.

Owing to the erratic patterns in the children's family incomes, two linear series "best fit" estimates of family incomes were calculated — a trend line for the LD Proxy group and another line for children without cognitive difficulties.

For people 16 years and older a different approach was followed. The procedure was based on the principle that, once the personal incomes of survey respondents are subtracted from household incomes, the remainder represents the combined incomes of all other household members. This report uses the term "residual family income" as short hand for referring to that amount.

It was reasoned that any difference in the residual family incomes of those with and without LD represents the opportunity costs of LD to the family unit. Such costs could arise because one or more family members leave the labour force for periods of time, or

take fewer hours of work, in order to provide the support needed by those with LD (e.g., for visits to doctors, consultations with educators, counsellors, social workers, etc.). Similarly, family members with weaker attachment to employment would have lower pension and investment incomes.

In order to calculate residual family incomes, HALS total personal incomes were subtracted from total family incomes. The same procedure was followed based on SLID.

The next steps were much the same as those taken in calculating the incremental costs of earnings loss:

- Plot the percentage of residual family incomes of those with LD in relation to the residual family incomes of people with disabilities, inputting values at the middle range of the age groupings given in HALS.
- Use age-referenced interpolations to generate expected percentage differences in cells where figures are unknown.
- Extrapolate beyond the series to establish percentage values for those in the 15 to 24 and 60 - 65 age groups.
- Multiply the residual family incomes of persons with disabilities in SLID by the percentages for persons with LD to yield year-by-year estimates of the residual family incomes of people with LD.
- Subtract the estimated residual family incomes of those with LD from those without disabilities, resulting in a simple incremental cost (opportunity cost) of LD to the family unit on a yearly basis.
- Discount the simple incremental costs to produce the present value of the opportunity cost of LD from birth to retirement.

Text Table 6 shows the HALS figures in dollar values and expressed as percentages. For instance, for those in the Proxy LD group aged 35 to 54 years, the residual family income is $14,266. For those with disabilities as a whole in this age group the figure is $17,111. The residual family income of those in the LD proxy group is 14266 ÷ 17111 = 83.4 per cent that of people with disabilities in the age group taken as a whole.

Text Table 6. Residual family incomes of those in the LD Proxy Group and those with disabilities as a whole, by age grouping, showing factors

Age Group	Proxy LD	All w/disab.	LD Proxy as Percent of All w/Disab.
15 - 34	$23,581	$22,284	105.8
35 - 54	$14,266	$17,111	83.4
55 - 64	$12,455	$16,250	76.6

Results of the procedure using the NPHS, SLID and HALS are shown on Table 10.

The simple difference in family incomes of those in the LD Proxy group and those without any disabilities is $630,285 over the lifespan to retirement age. The present value of that cost is $168,765.

The research then estimated the extent to which this cost was offset by government transfers to the family members of survey respondents. The research filtered the SLID data for working age people with residual family incomes greater than zero. It found that, of the average of $30,542 in residual family incomes for those with disabilities taken as a whole, $9,728 was received through various government transfers (e.g., CPP, EI, Welfare, various tax credits). The private cost to the family per person with a disability is therefore ($30,542 — $9,728) = $20,814 = 68.1 per cent of $30,542; the remaining 31.9 per cent falls to public programs.

Assuming that those percentages apply to those in the LD Proxy group, the present value of the indirect (i.e., opportunity) cost of LD to the family unit over the lifespan to retirement age is 68.1 per cent of $168,765 = $114,929. The average cost of public transfers to a family of people with LD, excluding transfers to individuals with LD themselves, amounts to a further $53,836.

Again, while families experience the loss of income first hand, the rest of society experiences the effects secondarily as fewer dollars are available to the consumer economy and tax system.

It is worth pointing out that the NLSCY shows children in the LD Proxy group as nearly twice as likely as children with no cognitive difficulties to be in single parent families (27.8 compared with 15.4 per cent respectively). It is reasonable to infer that the private costs of LD to the family unit fall with particular weight to single parent families.

IV Summary of Findings and Further Considerations ~~and~~

Tables 11 and 12 summarize the results of the research. It is estimated that the simple incremental cost of LD from birth to retirement is $1.982 million per person. At a 5 per cent discount rate the present value of the incremental cost of LD is approximately $445,208 per person with LD (Table 11).

Taking the present value of costs as the baseline, individuals with LD and their families shoulder 61.4 per cent of those costs. Public programs carry most of the remainder (38.5 per cent) and 0.1 per cent can be attributed to private sector insurers for medication costs (Table 11).

If we consider the total costs of LD in the population as a whole — i.e., the estimated incremental cost per person times the number of people in the population with LD — the costs are considerable. Assuming an LD prevalence rate of 5 per cent, the simple incremental cost is about $3,080 billion. The present value of costs at this prevalence rate and at a 5 per cent discount rate is about $707 billion (Table 12).

Estimated present values of the cost of LD swing considerably on either side of that estimate, depending on the discount rate and LD prevalence rate used. In terms of LD prevalence rate, Porterfield (1999) provides estimates that range from 1 per cent to as high as 20 per cent or more of the general population.[16] Taking 5 per cent as a widely accepted prevalence rate[17] and dividing that rate by 2 and multiplying it by 2 to yield prevalence rates of 2.5, 5.0 and 10 per cent, Text Table 7 shows the variations by three discount rates.

Text Table 7. Sensitivity Analysis, showing estimated present values of incremental LD costs, by discount rates and estimates of LD prevalence in the general population

			Present Value of Incremental Costs of LD (in $Billions)		
			@ Discount Rate		
		Population counts	3%	5%	7%
Total population		31,081,900			
Share with LD					
- Low estimate as a %	2.5%	777,048	582.2	353.7	238.3
- Mid-range estimate as a %	5.0%	1,554,095	1,164.4	707.4	476.5
- High estimate as a %	10.0%	3,108,190	2,328.9	1,414.9	953.1

The incremental, present value cost of LD ranges from a low of $238 billion to a high of $2,329 billion.

The estimated $707 billion cost of LD provided by the present research represents the numerical midway point in the cost estimates shown on Text Table 7 and is a figure lower than the average of all estimated costs shown on the table ($913.3 billion).

The present research's estimated $707 billion cost of LD represents a conservative, middle range estimate.

These costs do not accumulate in a vacuum. They occur in the context of a policy, program, social and economic system where, compared with two or three years ago, provincial and selected local affiliates of the Learning Disabilities Association of Canada are finding that:[18]

- Regular teachers are less likely to have the skills and knowledge needed to meet the needs of students with LD in the classroom, have less one-on-one time with these like other students, and are therefore experiencing more difficulties in responding to the needs of students with LD;

[16] See Porterfield, K (1999). *Straight Talk About Learning Disabilities.* New York: Facts on File, Inc. p. 5.

[17] See Smith, C, and Strick, L (1997). *Learning Disabilities: A to Z — A Parent's Complete Guide to Learning Disabilities from Preschool to Adulthood*, New York: Simon & Schuster Inc. They report a minimum prevalence rate of 5 per cent (p. 5).

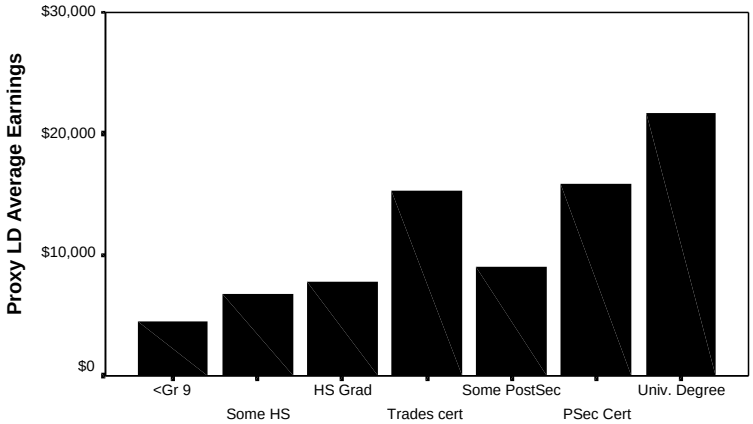
[18] The Roeher Institute (August, 2000). Environmental Scan: Emerging Issues in Learning Disabilities in Canada. Learning Disabilities Association of Canada: Ottawa (Unpublished).

- Specific educational services that are needed to meet the needs of students with LD are less available, as are the services of school psychologists to assess the needs of these students and to address the behavioural issues the students can present where their educational needs are not effectively addressed;
- School boards are having more difficulty raising the money needed to meet the educational needs of students with LD;
- Parents are experiencing increased financial pressures to meet the educational needs of their children with LD, resorting to private schools, privately purchased special education and assessment services because these are less available in the publicly funded sphere;
- Society generally seems to hold more negative or skeptical attitudes and perceptions towards students with LD;
- Gifted students with LD are having increased difficulty accessing programs geared to their needs, in a philosophical and policy context in education where LD has been reduced to one of many "different learning styles", and where the latter notion does not necessarily connote the need for or availability of specific instructional measures and resources to address the particular learning needs of young people with LD; and where
- Parents are increasingly turning to courts and to provincial Human Rights Commissions to address the problems they face.

A reasonable inference to be drawn from the research is that while the costs of LD to individuals, families and to society are considerable, effective educational and social supports for children with LD and their families could help to improve ~~the educational outcomes of people with LD early in life. Those~~ outcomes later in life~~would likely reap dividends later in life~~. For instance, o~~;~~ other research has already shown that educational attainment is a key factor that fosters the paid employment of people with disabilities.[19] Figure 1 confirms that finding for people in the LD Proxy ~~group in particular~~group.

Figure 1. Average earnings by level of education,

working age people with learning disabilities



Source: The Roeher Institute based on HALS 1991

[19] Fawcett, G awa: Canadian Council on Socia mployment-Related Programs for Pe

Generally, young adults in the LD proxy group who had educational histories that were not susceptible to major delays and disruptions (Text Table 8) have better economic outcomes as young adults and are less likely to be attached to the disability income system (e.g., social assistance and other income support programs). Those who access additional training do particularly well in terms of personal earnings, although in some instances there may also be increased attachment to income programs as well.[20]

Text Table 8. Economic outcomes among young adults with learning disabilities (age 15 - 34), by various educational and training conditions (HALS)

	Conditions Apply?			
	Yes	No	Yes	No
Conditions	**Employment Earnings in Reference Year**		**Percent Receiving Disability Pensions/ Benefits in Reference Year**	
Began school later than most people their age	5,606*	6,448	37.8%	25.3%
Education interrupted for long periods of time	4,900	6,937	42.1%	21.5%
Changed schools	6,175	6,548	33.0%	22.1%
Changed course of studies	5,519	6,762	30.1%	25.1%
Attended special school or special classes in regular school	6,138	6,743	29.9%	21.8%
Took fewer courses or subjects at school or college	5,399	6,912	39.3%	19.6%
Left community to attend school	6,582	6,331	31.7%	21.6%
Went back to school for re-training	8,187	5,892	34.5%	25.4%
Ever took work-related training	8,507	6,890	31.9%	40.9%

Text Table 8 provides average earnings for the average person with LD at a moment in time. It should be remembered that any loss or gain in earnings will be cumulative in each successive year for that person throughout the working years. Detailed examination of these additive losses and gains for all people LD affected by the scenarios in the Table is beyond the scope of the present research.

Having said this, while significant economic costs are likely to remain for all concerned parties living with and working to address issues of LD, the available evidence suggests that measures can be implemented to address the issue. It does appear that public

[20] Perhaps those who left their communities for schooling found services geared to need that were simply not available in their original community. While the personal earnings of these people are slightly higher than earnings of those who did not have to move, so is the level of attachment to various income programs.

policy and investments to further the education of people with LD, and to prevent major delays and disruptions to their learning, hold promise for improving economic outcomes for people with LD later in life, and for reducing long-term public costs through income support programs. Other areas worth exploring in more detail are measures to enable parents of young people with LD to continue with their caregiving responsibilities while minimizing the costs to the family unit and ultimately to the economy as a whole.

V Tables

Table 1. Estimated hospital costs per person year

	Hospital Costs / Year						
	Reported		Interpolations & Extrapolations				
Age	No cog difficulty	No cog difficulty	No cog difficulty	LD Proxy	Incremental LD	Compounding interest	Present value of LD incremental hospital svcs
1			28	15	($14)	1.05	($13)
2			34	23	($11)	1.10	($10)
3			39	32	($7)	1.16	($6)
4			44	40	($4)	1.22	($4)
5			50	49	($1)	1.28	($1)
6			55	57	$2	1.34	$2
7			60	66	$5	1.41	$4
8			66	74	$8	1.48	$6
9			71	83	$12	1.55	$7
10			76	91	$15	1.63	$9
11			82	100	$18	1.71	$10
12			87	108	$21	1.80	$12
13	88	93	93	117	$24	1.89	$13
14			98	125	$27	1.98	$14
15			103	134	$31	2.08	$15
16			109	142	$34	2.18	$15
17	122	179	114	151	$37	2.29	$16
18			119	159	$40	2.41	$17
19			125	168	$43	2.53	$17
20			130	176	$46	2.65	$17
21			135	185	$50	2.79	$18
22	137	191	141	193	$53	2.93	$18
23			150	208	$58	3.07	$19
24			163	226	$63	3.23	$19
25			176	243	$67	3.39	$20
26			189	261	$72	3.56	$20
27	202	278	202	278	$76	3.73	$20
28			221	329	$108	3.92	$28
29			240	381	$141	4.12	$34
30			259	432	$173	4.32	$40
31			278	484	$206	4.54	$45
32	297	535	297	535	$238	4.76	$50
33			279	509	$231	5.00	$46
34			260	484	$224	5.25	$43
35			242	458	$216	5.52	$39
36			223	433	$209	5.79	$36
37	205	407	205	407	$202	6.08	$33
38			202	375	$173	6.39	$27
39			199	343	$144	6.70	$21
40			197	312	$115	7.04	$16
41			194	280	$86	7.39	$12
42	191	248	191	248	$57	7.76	$7
43			192	483	$292	8.15	$36
44			193	719	$526	8.56	$61
45			193	954	$761	8.99	$85
46			194	1,190	$995	9.43	$106
47	195	1425	195	1,425	$1,230	9.91	$124
48			220	1,311	$1,091	10.40	$105
49			245	1,198	$952	10.92	$87
50			271	1,084	$814	11.47	$71
51			296	971	$675	12.04	$56
52	321	857	321	857	$536	12.64	$42
53			338	793	$454	13.27	$34
54			355	728	$373	13.94	$27
55			373	664	$291	14.64	$20
56			390	599	$210	15.37	$14
57	407	535	407	535	$128	16.14	$8
58			390	598	$208	16.94	$12
59			374	662	$288	17.79	$16
60			357	725	$368	18.68	$20
61			341	789	$448	19.61	$23
62	324	852	324	852	$528	20.59	$26
63			307	915	$608	21.62	$28
64			291	979	$688	22.70	$30
65			274	1,042	$768	23.84	$32
			$13,067	$29,586	$16,518		$1,815
						CPI	1.1
					$18,381		$2,020

Table 2. Estimated costs of medical doctor services per person year

	Doctor Costs / Year						
	Reported		Interpolations & Extrapolations				
Age	No cog difficulty	LD Proxy	No cog difficulty	LD Proxy	LD Increment	Compounding interest	Present value of LD incremental doctor svcs
1			295	721	$426	1.05	$406
2			280	668	$388	1.10	$352
3			265	615	$349	1.16	$302
4	239	449	251	561	$311	1.22	$256
5	246	925	236	508	$272	1.28	$213
6	227	293	221	455	$233	1.34	$174
7	208	237	207	402	$195	1.41	$138
8	197	323	192	348	$156	1.48	$106
9	168	222	178	295	$117	1.55	$76
10	158	215	163	242	$79	1.63	$48
11	153	335	148	188	$40	1.71	$23
12			152	182	$30	1.80	$17
13	156	176	156	176	$20	1.89	$11
14			166	189	$22	1.98	$11
15			177	201	$25	2.08	$12
16			187	214	$27	2.18	$12
17	197	226	187	226	$40	2.29	$17
18			192	232	$40	2.41	$16
19			198	237	$40	2.53	$16
20			203	243	$40	2.65	$15
21			209	248	$40	2.79	$14
22	201	254	201	254	$53	2.93	$18
23			209	256	$47	3.07	$15
24			216	258	$42	3.23	$13
25			224	260	$36	3.39	$11
26			231	262	$31	3.56	$9
27	239	264	239	264	$25	3.73	$7
28			240	340	$100	3.92	$26
29			242	417	$175	4.12	$43
30			243	493	$250	4.32	$58
31			245	570	$325	4.54	$72
32	246	646	246	646	$400	4.76	$84
33			240	602	$362	5.00	$72
34			235	559	$324	5.25	$62
35			229	515	$286	5.52	$52
36			224	472	$248	5.79	$43
37	218	428	218	428	$210	6.08	$35
38			215	422	$207	6.39	$32
39			212	417	$205	6.70	$31
40			209	411	$202	7.04	$29
41			206	406	$200	7.39	$27
42	203	400	203	400	$197	7.76	$25
43			203	430	$227	8.15	$28
44			203	460	$257	8.56	$30
45			202	490	$288	8.99	$32
46			202	520	$318	9.43	$34
47	202	550	202	550	$348	9.91	$35
48			208	585	$377	10.40	$36
49			214	620	$406	10.92	$37
50			221	656	$435	11.47	$38
51			227	691	$464	12.04	$39
52	233	726	233	726	$493	12.64	$39
53			241	723	$482	13.27	$36
54			250	720	$471	13.94	$34
55			258	718	$459	14.64	$31
56			267	715	$448	15.37	$29
57	275	712	275	712	$437	16.14	$27
58			275	645	$370	16.94	$22
59			275	578	$303	17.79	$17
60			276	512	$236	18.68	$13
61			276	445	$169	19.61	$9
62	276	378	276	378	$102	20.59	$5
63			276	311	$35	21.62	$2
64			276	244	($32)	22.70	($1)
65			277	178	($99)	23.84	($4)
			$14,602	$28,409	$13,807		$3,563
						CPI	1.1
					$15,040		$3,881

Table 3. Estimated costs of misc. health and social services per person year

	Misc. svcs. cost						
	Reported		Interpolations & Extrapolations				
Age	No cog difficulty	LD Proxy	No cog difficulty	LD Proxy	LD Increment	Compounding interest	Present value of LD increment misc. svcs
1			92	297	$205	1.05	$195
2			91	282	$191	1.10	$173
3			90	267	$177	1.16	$153
4	89	252	89	252	$163	1.22	$134
5			87	237	$149	1.28	$117
6			86	221	$135	1.34	$101
7	85	206	85	206	$121	1.41	$86
8			86	194	$108	1.48	$73
9			88	182	$95	1.55	$61
10	89	170	89	170	$81	1.63	$50
11			94	149	$56	1.71	$32
12			99	129	$30	1.80	$17
13	103	108	103	108	$5	1.89	$2
14			105	125	$20	1.98	$10
15			106	142	$36	2.08	$17
16			107	159	$52	2.18	$24
17	108	176	108	176	$68	2.29	$30
18			104	165	$62	2.41	$26
19			99	155	$56	2.53	$22
20			95	144	$50	2.65	$19
21			90	134	$44	2.79	$16
22	86	123	86	123	$38	2.93	$13
23			88	123	$34	3.07	$11
24			91	123	$31	3.23	$10
25			94	122	$28	3.39	$8
26			97	122	$25	3.56	$7
27	100	122	100	122	$22	3.73	$6
28			102	130	$28	3.92	$7
29			104	137	$33	4.12	$8
30			106	145	$39	4.32	$9
31			108	152	$45	4.54	$10
32	110	160	110	160	$50	4.76	$11
33			112	170	$58	5.00	$12
34			114	180	$66	5.25	$13
35			116	190	$74	5.52	$13
36			118	200	$82	5.79	$14
37	120	210	120	210	$90	6.08	$15
38			122	199	$77	6.39	$12
39			123	188	$65	6.70	$10
40			125	177	$52	7.04	$7
41			126	166	$40	7.39	$5
42	128	155	128	155	$27	7.76	$4
43			126	164	$38	8.15	$5
44			124	173	$50	8.56	$6
45			122	183	$61	8.99	$7
46			120	192	$72	9.43	$8
47	118	201	118	201	$83	9.91	$8
48			120	210	$90	10.40	$9
49			122	218	$96	10.92	$9
50			124	227	$103	11.47	$9
51			126	235	$109	12.04	$9
52	129	244	129	244	$115	12.64	$9
53			125	221	$96	13.27	$7
54			122	198	$76	13.94	$5
55			118	175	$57	14.64	$4
56			115	152	$37	15.37	$2
57	111	129	111	129	$18	16.14	$1
58			111	143	$31	16.94	$2
59			112	157	$45	17.79	$3
60			112	170	$58	18.68	$3
61			112	184	$72	19.61	$4
62	113	198	113	198	$86	20.59	$4
63			113	212	$99	21.62	$5
64			113	226	$113	22.70	$5
65			113	239	$126	23.84	$5
			$7,000	$11,640	$4,641		$1,692
						CPI	1.1
					$5,055		$1,843

Table 4. Estimated drug costs per person year

	Drug Costs / Year						
	Reported		Interpolations & Extrapolations				
Age	No cog difficulty	LD Proxy	No cog difficulty	LD Proxy	LD Increment	Compounding interest	Present value of LD incremental drug costs
1			203	414	$211	1.05	$201
2			214	413	$200	1.10	$181
3			224	413	$188	1.16	$163
4			235	412	$177	1.22	$146
5			245	411	$166	1.28	$130
6			256	410	$155	1.34	$115
7			266	410	$143	1.41	$102
8			277	409	$132	1.48	$90
9			287	408	$121	1.55	$78
10			298	407	$110	1.63	$67
11			308	407	$99	1.71	$58
12			319	406	$87	1.80	$49
13	329	405	329	405	$76	1.89	$40
14			340	404	$65	1.98	$33
15			350	404	$54	2.08	$26
16			361	403	$42	2.18	$19
17	371	402	371	402	$31	2.29	$14
18			368	404	$36	2.41	$15
19			365	406	$41	2.53	$16
20			363	409	$46	2.65	$17
21			360	411	$51	2.79	$18
22	357	413	357	413	$56	2.93	$19
23			358	420	$62	3.07	$20
24			359	427	$68	3.23	$21
25			360	433	$73	3.39	$22
26			361	440	$79	3.56	$22
27	362	447	362	447	$85	3.73	$23
28			362	441	$79	3.92	$20
29			362	436	$73	4.12	$18
30			363	430	$68	4.32	$16
31			363	425	$62	4.54	$14
32	363	419	363	419	$56	4.76	$12
33			361	415	$55	5.00	$11
34			359	412	$53	5.25	$10
35			356	408	$52	5.52	$9
36			354	405	$50	5.79	$9
37	352	401	352	401	$49	6.08	$8
38			354	406	$52	6.39	$8
39			356	412	$55	6.70	$8
40			359	417	$59	7.04	$8
41			361	423	$62	7.39	$8
42	363	428	363	428	$65	7.76	$8
43			362	422	$59	8.15	$7
44			361	415	$54	8.56	$6
45			361	409	$48	8.99	$5
46			360	402	$43	9.43	$5
47	359	396	359	396	$37	9.91	$4
48			364	410	$46	10.40	$4
49			368	423	$55	10.92	$5
50			373	437	$64	11.47	$6
51			377	450	$73	12.04	$6
52	382	464	382	464	$82	12.64	$6
53			382	454	$73	13.27	$5
54			381	445	$64	13.94	$5
55			381	435	$54	14.64	$4
56			380	426	$45	15.37	$3
57	380	416	380	416	$36	16.14	$2
58			382	420	$39	16.94	$2
59			383	425	$42	17.79	$2
60			385	429	$44	18.68	$2
61			386	434	$47	19.61	$2
62	388	438	388	438	$50	20.59	$2
63			390	442	$53	21.62	$2
64			391	447	$56	22.70	$2
65			393	451	$58	23.84	$2
			$22,549	$27,314	$4,766		$1,965
						CPI	1
				Constant $$	$4,766		$1,965
				Private	$1,590		$656
				Insurers	$1,220		$503
				Public	$1,955		$806
					$4,766		$1,965

Table 5. Estimated cost of education services per person year

	Reported		Interpolations & Extrapolations				
Age	No cog difficulty	LD Proxy	No cog difficulty	LD Proxy	LD Increment	Compounding interest	Present value of LD incremental education cost
1					$0	1.05	$0
2					$0	1.10	$0
3					$0	1.16	$0
4	6,412		6,554	8,064	$1,510	1.22	$1,242
5	6,775		6,641	8,302	$1,661	1.28	$1,301
6	6,693	8,442	6,729	8,541	$1,812	1.34	$1,352
7	6,872	9,043	6,816	8,779	$1,963	1.41	$1,395
8	6,955	9,250	6,904	9,017	$2,114	1.48	$1,431
9	6,928	8,554	6,991	9,256	$2,264	1.55	$1,460
10	7,201	9,639	7,079	9,494	$2,415	1.63	$1,483
11	7,045	9,892	7,166	9,733	$2,566	1.71	$1,500
12			7,254	9,971	$2,717	1.80	$1,513
13			7,341	10,209	$2,868	1.89	$1,521
14			7,429	10,448	$3,019	1.98	$1,525
15			7,516	10,686	$3,170	2.08	$1,525
16			7,604	10,924	$3,320	2.18	$1,521
17			7,691	11,163	$3,471	2.29	$1,515
18			7,779	11,401	$3,622	2.41	$1,505
19					$0	2.53	$0
20					$0	2.65	$0
21					$0	2.79	$0
22					$0	2.93	$0
23					$0	3.07	$0
24					$0	3.23	$0
25					$0	3.39	$0
26					$0	3.56	$0
27					$0	3.73	$0
28					$0	3.92	$0
29					$0	4.12	$0
30					$0	4.32	$0
31					$0	4.54	$0
32					$0	4.76	$0
33					$0	5.00	$0
34					$0	5.25	$0
35					$0	5.52	$0
36					$0	5.79	$0
37					$0	6.08	$0
38					$0	6.39	$0
39					$0	6.70	$0
40					$0	7.04	$0
41					$0	7.39	$0
42					$0	7.76	$0
43					$0	8.15	$0
44					$0	8.56	$0
45					$0	8.99	$0
46					$0	9.43	$0
47					$0	9.91	$0
48					$0	10.40	$0
49					$0	10.92	$0
50					$0	11.47	$0
51					$0	12.04	$0
52					$0	12.64	$0
53					$0	13.27	$0
54					$0	13.94	$0
55					$0	14.64	$0
56					$0	15.37	$0
57					$0	16.14	$0
58					$0	16.94	$0
59					$0	17.79	$0
60					$0	18.68	$0
61					$0	19.61	$0
62					$0	20.59	$0
63					$0	21.62	$0
64					$0	22.70	$0
65					$0	23.84	$0
			$107,496	$145,988	$38,492		$21,788
						CPI	1.03
				Constant $$	$39,537		$22,380

Table 6. Estimated cost of criminal justice services per person year

Age	No cog difficulty	LD Proxy	LD Increment	Compounding Interest	Present value of LD incremental criminal justice costs
1			$0	1.05	$0
2			$0	1.10	$0
3			$0	1.16	$0
4			$0	1.22	$0
5			$0	1.28	$0
6			$0	1.34	$0
7			$0	1.41	$0
8			$0	1.48	$0
9			$0	1.55	$0
10			$0	1.63	$0
11			$0	1.71	$0
12	362	2,290	$1,928	1.80	$1,074
13	362	2,290	$1,928	1.89	$1,022
14	362	2,290	$1,928	1.98	$974
15	362	2,290	$1,928	2.08	$927
16	362	2,290	$1,928	2.18	$883
17	362	2,290	$1,928	2.29	$841
18	362	2,290	$1,928	2.41	$801
19	362	2,290	$1,928	2.53	$763
20	362	2,290	$1,928	2.65	$727
21	362	2,290	$1,928	2.79	$692
22	362	2,290	$1,928	2.93	$659
23	362	2,290	$1,928	3.07	$628
24	362	2,290	$1,928	3.23	$598
25	362	2,290	$1,928	3.39	$569
26	362	2,290	$1,928	3.56	$542
27	362	2,290	$1,928	3.73	$516
28	362	2,290	$1,928	3.92	$492
29	362	2,290	$1,928	4.12	$468
30	362	2,290	$1,928	4.32	$446
31	362	2,290	$1,928	4.54	$425
32	362	2,290	$1,928	4.76	$405
33	362	2,290	$1,928	5.00	$385
34	362	2,290	$1,928	5.25	$367
35	362	2,290	$1,928	5.52	$350
36	362	2,290	$1,928	5.79	$333
37	362	2,290	$1,928	6.08	$317
38	362	2,290	$1,928	6.39	$302
39	362	2,290	$1,928	6.70	$288
40	362	2,290	$1,928	7.04	$274
41	362	2,290	$1,928	7.39	$261
42	362	2,290	$1,928	7.76	$248
43	362	2,290	$1,928	8.15	$237
44	362	2,290	$1,928	8.56	$225
45	362	2,290	$1,928	8.99	$215
46	362	2,290	$1,928	9.43	$204
47	362	2,290	$1,928	9.91	$195
48	362	2,290	$1,928	10.40	$185
49	362	2,290	$1,928	10.92	$177
50	362	2,290	$1,928	11.47	$168
51	362	2,290	$1,928	12.04	$160
52	362	2,290	$1,928	12.64	$152
53	362	2,290	$1,928	13.27	$145
54	362	2,290	$1,928	13.94	$138
55	362	2,290	$1,928	14.64	$132
56	362	2,290	$1,928	15.37	$125
57	362	2,290	$1,928	16.14	$119
58	362	2,290	$1,928	16.94	$114
59	362	2,290	$1,928	17.79	$108
60	362	2,290	$1,928	18.68	$103
61	362	2,290	$1,928	19.61	$98
62	362	2,290	$1,928	20.59	$94
63	362	2,290	$1,928	21.62	$89
64	362	2,290	$1,928	22.70	$85
65	362	2,290	$1,928	23.84	$81
	$19,548	$123,660	$104,112		$20,928
				CPI	1.1
		Constant $$	$109,821		$22,075

Table 7. Estimated income transfers per person year from CPP, EI, WCB and Welfare

	Income Transfers							
Age	SLID No disability	SLID Disability	LD Proxy as % of disab. transfer income		Est. transfer income LD proxy	LD Increment	Compounding Interest	Present value of LD incremental income transfers
1						$0	1.05	$0
2						$0	1.10	$0
3						$0	1.16	$0
4						$0	1.22	$0
5						$0	1.28	$0
6						$0	1.34	$0
7						$0	1.41	$0
8						$0	1.48	$0
9						$0	1.55	$0
10						$0	1.63	$0
11						$0	1.71	$0
12						$0	1.80	$0
13						$0	1.89	$0
14						$0	1.98	$0
15						$0	2.08	$0
16	$43	$350		76.4%	$268	$225	2.18	$103
17	$88	$0		76.7%	$0	($88)	2.29	($38)
18	$200	$750		77.1%	$578	$378	2.41	$157
19	$576	$874		77.4%	$676	$100	2.53	$40
20	$912	$5,554		77.7%	$4,315	$3,403	2.65	$1,283
21	$1,143	$2,933		78.0%	$2,289	$1,146	2.79	$411
22	$1,425	$1,902		78.4%	$1,491	$66	2.93	$23
23	$1,101	$3,177		78.7%	$2,500	$1,399	3.07	$455
24	$1,343	$3,348		79.0%	$2,645	$1,302	3.23	$404
25	$1,549	$2,361	79.3%	79.3%	$1,873	$324	3.39	$96
26	$1,291	$3,370		79.7%	$2,684	$1,393	3.56	$392
27	$1,842	$4,084		80.0%	$3,267	$1,425	3.73	$382
28	$1,575	$7,787		80.3%	$6,253	$4,679	3.92	$1,193
29	$2,140	$7,018		80.6%	$5,659	$3,519	4.12	$855
30	$2,161	$5,356		81.0%	$4,336	$2,175	4.32	$503
31	$1,756	$3,995		81.3%	$3,247	$1,491	4.54	$329
32	$1,539	$4,871		81.6%	$3,975	$2,437	4.76	$511
33	$2,075	$4,523		81.9%	$3,706	$1,630	5.00	$326
34	$1,870	$7,354		82.3%	$6,049	$4,179	5.25	$795
35	$1,648	$4,974		82.6%	$4,108	$2,460	5.52	$446
36	$1,217	$4,374		82.9%	$3,626	$2,409	5.79	$416
37	$1,365	$5,527		83.2%	$4,600	$3,235	6.08	$532
38	$1,417	$3,470		83.6%	$2,900	$1,483	6.39	$232
39	$1,205	$4,127		83.9%	$3,462	$2,257	6.70	$337
40	$1,206	$2,963		84.2%	$2,495	$1,289	7.04	$183
41	$996	$5,671		84.5%	$4,794	$3,798	7.39	$514
42	$897	$3,569		84.9%	$3,029	$2,133	7.76	$275
43	$835	$4,702		85.2%	$4,005	$3,170	8.15	$389
44	$1,000	$5,716		85.5%	$4,888	$3,888	8.56	$454
45	$1,047	$5,932	85.8%	85.8%	$5,092	$4,045	8.99	$450
46	$997	$3,814		85.6%	$3,264	$2,267	9.43	$240
47	$1,286	$4,225		85.3%	$3,603	$2,317	9.91	$234
48	$983	$3,844		85.0%	$3,269	$2,285	10.40	$220
49	$1,229	$7,414		84.8%	$6,284	$5,055	10.92	$463
50	$1,417	$5,018		84.5%	$4,239	$2,822	11.47	$246
51	$1,120	$7,036		84.2%	$5,925	$4,805	12.04	$399
52	$909	$6,097		83.9%	$5,118	$4,209	12.64	$333
53	$1,189	$3,793		83.7%	$3,173	$1,984	13.27	$149
54	$1,223	$5,306		83.4%	$4,425	$3,202	13.94	$230
55	$1,294	$4,214		83.1%	$3,503	$2,209	14.64	$151
56	$925	$8,070		82.9%	$6,686	$5,761	15.37	$375
57	$1,837	$5,180		82.6%	$4,277	$2,440	16.14	$151
58	$1,098	$5,149		82.3%	$4,238	$3,140	16.94	$185
59	$1,188	$6,827		82.0%	$5,601	$4,412	17.79	$248
60	$1,900	$4,156	81.8%	81.8%	$3,398	$1,498	18.68	$80
61	$2,130	$7,772		81.5%	$6,334	$4,204	19.61	$214
62	$2,013	$6,078		81.2%	$4,937	$2,923	20.59	$142
63	$3,548	$5,711		80.9%	$4,623	$1,075	21.62	$50
64	$2,864	$4,591		80.7%	$3,704	$840	22.70	$37
65	$4,064	$5,892		80.4%	$4,738	$674	23.84	$28
						$119,469		$16,622
							CPI	1.1
					Constant $$	$132,939		$18,497

Table 8. Estimated cost per person year of community agency services to assist with everyday activities

	Hours of Service / Year				Cost of service @ $18.65 / hour				
	Reported		Interpolations & Extrapolations						
Age	No cog difficulty	LD Proxy	No cog difficulty	LD Proxy	No cog difficulty	LD Proxy	LD Increment	Compounding interest	Present value of increm. LD svcs to help with activities
1			0	302	0	5,634	$5,634	1.05	$5,366
2			0	301	0	5,610	$5,610	1.10	$5,088
3			0	299	0	5,585	$5,585	1.16	$4,825
4			0	298	0	5,561	$5,561	1.22	$4,575
5			0	297	0	5,537	$5,537	1.28	$4,338
6			0	296	0	5,513	$5,513	1.34	$4,114
7			0	294	0	5,488	$5,488	1.41	$3,900
8			0	293	0	5,464	$5,464	1.48	$3,698
9			0	292	0	5,440	$5,440	1.55	$3,507
10			0	290	0	5,416	$5,416	1.63	$3,325
11			0	289	0	5,391	$5,391	1.71	$3,152
12			0	288	0	5,367	$5,367	1.80	$2,989
13			0	286	0	5,343	$5,343	1.89	$2,833
14			0	285	0	5,319	$5,319	1.98	$2,686
15			1	284	18	5,294	$5,276	2.08	$2,538
16			3	283	52	5,270	$5,218	2.18	$2,390
17			5	281	87	5,246	$5,159	2.29	$2,251
18			7	280	121	5,222	$5,100	2.41	$2,119
19			8	279	156	5,197	$5,041	2.53	$1,995
20			10	277	191	5,173	$4,983	2.65	$1,878
21			12	276	225	5,149	$4,924	2.79	$1,767
22			14	275	260	5,125	$4,865	2.93	$1,663
23			16	273	294	5,100	$4,806	3.07	$1,565
24	18	272	18	272	329	5,076	$4,747	3.23	$1,472
25			19	271	363	5,052	$4,689	3.39	$1,385
26			21	270	398	5,028	$4,630	3.56	$1,302
27			23	268	432	5,003	$4,571	3.73	$1,224
28			25	267	467	4,979	$4,512	3.92	$1,151
29			27	266	501	4,955	$4,454	4.12	$1,082
30			29	264	536	4,931	$4,395	4.32	$1,017
31			31	263	570	4,906	$4,336	4.54	$955
32			32	262	605	4,882	$4,277	4.76	$898
33			34	260	639	4,858	$4,219	5.00	$843
34			36	259	674	4,834	$4,160	5.25	$792
35			38	258	708	4,809	$4,101	5.52	$743
36			40	257	743	4,785	$4,042	5.79	$698
37			42	255	777	4,761	$3,983	6.08	$655
38			44	254	812	4,737	$3,925	6.39	$615
39			45	253	846	4,712	$3,866	6.70	$577
40			47	251	881	4,688	$3,807	7.04	$541
41			49	250	915	4,664	$3,748	7.39	$507
42			51	249	950	4,640	$3,690	7.76	$475
43			53	247	984	4,615	$3,631	8.15	$446
44			55	246	1,019	4,591	$3,572	8.56	$417
45	56	245	56	245	1,054	4,567	$3,513	8.99	$391
46			55	240	1,017	4,471	$3,454	9.43	$366
47			53	235	980	4,375	$3,395	9.91	$343
48			51	229	944	4,280	$3,336	10.40	$321
49			49	224	907	4,184	$3,277	10.92	$300
50			47	219	871	4,088	$3,218	11.47	$281
51			45	214	834	3,993	$3,159	12.04	$262
52			43	209	797	3,897	$3,100	12.64	$245
53			41	204	761	3,801	$3,041	13.27	$229
54			39	199	724	3,706	$2,981	13.94	$214
55			37	194	688	3,610	$2,922	14.64	$200
56			35	188	651	3,514	$2,863	15.37	$186
57			33	183	615	3,419	$2,804	16.14	$174
58			31	178	578	3,323	$2,745	16.94	$162
59			29	173	541	3,227	$2,686	17.79	$151
60	27	168	27	168	505	3,132	$2,627	18.68	$141
61			25	163	468	3,036	$2,568	19.61	$131
62			23	158	432	2,940	$2,509	20.59	$122
63			21	153	395	2,845	$2,450	21.62	$113
64			19	147	359	2,749	$2,391	22.70	$105
65			17	142	322	2,654	$2,332	23.84	$98
					$29,997	$300,761	$270,764		$94,892
								CPI	1.2
						Constant $$	$311,997		$109,342
						Private	$71,759		$25,149
						Public	$240,238		$84,194

Table 9. Estimated earnings per person year

Age	Earnings							
	SLID No disab.	SLID Disab.	LD Proxy as % of disab. earnings	Est. earnings LD proxy	LD Increment	Compounding Interest	Present value of increm. LD earnings loss
1					$0	1.05	$0
2					$0	1.10	$0
3					$0	1.16	$0
4					$0	1.22	$0
5					$0	1.28	$0
6					$0	1.34	$0
7					$0	1.41	$0
8					$0	1.48	$0
9					$0	1.55	$0
10					$0	1.63	$0
11					$0	1.71	$0
12					$0	1.80	$0
13					$0	1.89	$0
14					$0	1.98	$0
15					$0	2.08	$0
16	$718	$605	70.8%	$428	$290	2.18	$133
17	$1,914	$325	70.5%	$229	$1,685	2.29	$735
18	$3,380	$4,255	70.1%	$2,983	$396	2.41	$165
19	$5,691	$1,856	69.8%	$1,295	$4,396	2.53	$1,740
20	$7,264	$3,646	69.4%	$2,531	$4,734	2.65	$1,784
21	$8,843	$3,200	69.0%	$2,210	$6,633	2.79	$2,381
22	$10,981	$9,830	68.7%	$6,752	$4,229	2.93	$1,446
23	$11,691	$9,894	68.3%	$6,761	$4,930	3.07	$1,605
24	$13,771	$6,032	68.0%	$4,100	$9,670	3.23	$2,999
25	$15,324	$8,476	67.6%	$5,732	$9,592	3.39	$2,833
26	$18,063	$10,469	67.3%	$7,042	$11,021	3.56	$3,099
27	$19,927	$10,990	66.9%	$7,354	$12,574	3.73	$3,368
28	$20,049	$7,766	66.6%	$5,168	$14,881	3.92	$3,796
29	$20,458	$10,904	66.2%	$7,218	$13,240	4.12	$3,217
30	$20,884	$6,915	65.8%	$4,553	$16,331	4.32	$3,779
31	$19,651	$8,790	65.5%	$5,756	$13,895	4.54	$3,062
32	$21,567	$10,064	65.1%	$6,555	$15,012	4.76	$3,150
33	$21,859	$8,071	64.8%	$5,228	$16,632	5.00	$3,324
34	$22,370	$7,181	64.4%	$4,626	$17,744	5.25	$3,378
35	$22,035	$9,592	64.1%	$6,145	$15,891	5.52	$2,881
36	$25,222	$9,165	63.7%	$5,839	$19,383	5.79	$3,347
37	$22,070	$22,515	63.4%	$14,263	$7,807	6.08	$1,284
38	$23,050	$5,597	63.0%	$3,526	$19,524	6.39	$3,058
39	$24,947	$13,870	62.6%	$8,688	$16,259	6.70	$2,425
40	$24,922	$16,193	62.3%	$10,086	$14,837	7.04	$2,107
41	$26,354	$10,088	61.9%	$6,247	$20,107	7.39	$2,720
42	$25,206	$8,875	61.6%	$5,465	$19,742	7.76	$2,544
43	$26,878	$10,865	61.2%	$6,651	$20,228	8.15	$2,482
44	$26,544	$12,515	60.9%	$7,617	$18,928	8.56	$2,212
45	$26,281	$9,618	60.5%	$5,819	$20,462	8.99	$2,277
46	$28,275	$12,850	60.4%	$7,755	$20,520	9.43	$2,175
47	$24,415	$8,492	60.2%	$5,112	$19,303	9.91	$1,949
48	$25,172	$22,678	60.0%	$13,618	$11,554	10.40	$1,111
49	$26,279	$4,021	59.9%	$2,409	$23,870	10.92	$2,186
50	$24,705	$11,200	59.7%	$6,692	$18,013	11.47	$1,571
51	$23,418	$6,516	59.6%	$3,884	$19,534	12.04	$1,622
52	$21,399	$5,652	59.4%	$3,360	$18,039	12.64	$1,427
53	$20,564	$8,045	59.3%	$4,770	$15,795	13.27	$1,190
54	$19,271	$7,955	59.1%	$4,705	$14,567	13.94	$1,045
55	$19,031	$8,933	59.0%	$5,269	$13,761	14.64	$940
56	$19,941	$5,149	58.8%	$3,030	$16,911	15.37	$1,100
57	$16,152	$7,377	58.7%	$4,329	$11,823	16.14	$733
58	$16,020	$5,401	58.5%	$3,162	$12,858	16.94	$759
59	$15,549	$1,588	58.4%	$927	$14,622	17.79	$822
60	$11,586	$8,732	58.2%	$5,085	$6,501	18.68	$348
61	$8,698	$1,416	58.1%	$822	$7,876	19.61	$402
62	$9,970	$1,762	57.9%	$1,021	$8,949	20.59	$435
63	$6,075	$367	57.8%	$212	$5,862	21.62	$271
64	$7,616	$3,535	57.6%	$2,037	$5,579	22.70	$246
65	$5,108	$597	57.5%	$343	$4,765	23.84	$200
					$641,751		$93,858
						CPI	1.1
				Constant $$	$714,106		$104,440

Table 10. Estimated incremental opportunity cost of LD to the family per year, per person with LD

Age	No cog difficulty (NPHS to age 15); No disability (SLID age 16+)	SLID Disability	HALS LD resid family income as % of all w/disab.	LD Proxy (NPHS < 16 years)	Estimated residual family income				Present value of residual family income loss (opportunity cost)
					Interpolations & Extrapolations				
					No cog difficulty or disab	LD Proxy	LD Increment	Compounding interest	
1					48,316	38,473	$9,843	1.05	$9,375
2					48,500	39,153	$9,346	1.10	$8,478
3					48,683	39,834	$8,850	1.16	$7,645
4	47,228			39,931	48,867	40,514	$8,353	1.22	$6,872
5					49,050	41,194	$7,856	1.28	$6,155
6					49,234	41,875	$7,359	1.34	$5,491
7	51,249			50,839	49,417	42,555	$6,862	1.41	$4,876
8					49,601	43,236	$6,365	1.48	$4,308
9					49,784	43,916	$5,868	1.55	$3,782
10	50,685			32,233	49,968	44,597	$5,371	1.63	$3,297
11					50,151	46,188	$3,963	1.71	$2,317
12					50,335	47,780	$2,555	1.80	$1,423
13	50,006			49,371	50,518	49,371	$1,147	1.89	$608
14					50,702	49,361	$1,340	1.98	$677
15					50,885	49,351	$1,534	2.08	$738
16	60,073	42,565	115.9%		60,073	49,342	$10,731	2.18	$4,916
17	58,572	33,500	114.8%		58,572	38,458	$20,114	2.29	$8,776
18	54,644	40,523	113.7%		54,644	46,066	$8,578	2.41	$3,565
19	48,088	33,118	112.6%		48,088	37,276	$10,812	2.53	$4,279
20	47,408	22,604	111.4%		47,408	25,188	$22,219	2.65	$8,374
21	42,916	24,789	110.3%		42,916	27,344	$15,572	2.79	$5,589
22	41,494	15,791	109.2%		41,494	17,242	$24,251	2.93	$8,290
23	37,969	25,081	108.1%		37,969	27,104	$10,865	3.07	$3,537
24	30,162	36,941	106.9%		30,162	39,506	($9,344)	3.23	($2,897)
25	28,974	32,418	105.8%		28,974	34,305	($5,331)	3.39	($1,574)
26	26,761	21,907	104.7%		26,761	22,936	$3,826	3.56	$1,076
27	21,945	26,389	103.6%		21,945	27,332	($5,388)	3.73	($1,443)
28	27,088	7,820	102.5%		27,088	8,012	$19,076	3.92	$4,866
29	22,527	15,590	101.3%		22,527	15,797	$6,730	4.12	$1,635
30	24,534	19,804	100.2%		24,534	19,846	$4,689	4.32	$1,085
31	26,927	13,895	99.1%		26,927	13,768	$13,159	4.54	$2,900
32	27,326	21,808	98.0%		27,326	21,364	$5,962	4.76	$1,251
33	23,131	13,692	96.8%		23,131	13,260	$9,871	5.00	$1,973
34	25,940	13,179	95.7%		25,940	12,615	$13,325	5.25	$2,536
35	25,860	15,045	94.6%		25,860	14,232	$11,629	5.52	$2,108
36	25,235	27,985	93.5%		25,235	26,158	($924)	5.79	($159)
37	27,589	23,575	92.4%		27,589	21,772	$5,817	6.08	$957
38	27,474	13,687	91.2%		27,474	12,487	$14,988	6.39	$2,347
39	26,308	21,135	90.1%		26,308	19,044	$7,264	6.70	$1,083
40	25,514	21,288	89.0%		25,514	18,943	$6,571	7.04	$933
41	27,031	13,839	87.9%		27,031	12,159	$14,872	7.39	$2,012
42	26,515	21,050	86.7%		26,515	18,258	$8,257	7.76	$1,064
43	29,803	23,037	85.6%		29,803	19,723	$10,079	8.15	$1,237
44	28,909	12,291	84.5%		28,909	10,385	$18,524	8.56	$2,165
45	32,698	17,495	83.4%		32,698	14,586	$18,113	8.99	$2,016
46	31,658	30,777	82.9%		31,658	25,522	$6,136	9.43	$650
47	31,910	20,148	82.5%		31,910	16,617	$15,293	9.91	$1,544
48	34,245	26,400	82.0%		34,245	21,655	$12,590	10.40	$1,210
49	30,998	24,211	81.6%		30,998	19,751	$11,247	10.92	$1,030
50	33,587	23,940	81.1%		33,587	19,422	$14,165	11.47	$1,235
51	30,638	16,116	80.7%		30,638	13,003	$17,635	12.04	$1,465
52	32,817	25,683	80.2%		32,817	20,606	$12,211	12.64	$966
53	26,570	22,403	79.8%		26,570	17,874	$8,696	13.27	$655
54	23,699	18,462	79.3%		23,699	14,648	$9,051	13.94	$649
55	31,286	23,798	78.9%		31,286	18,774	$12,512	14.64	$855
56	26,878	21,327	78.4%		26,878	16,729	$10,149	15.37	$660
57	27,401	19,759	78.0%		27,401	15,410	$11,991	16.14	$743
58	24,286	23,626	77.5%		24,286	18,320	$5,965	16.94	$352
59	18,743	18,119	77.1%		18,743	13,969	$4,774	17.79	$268
60	21,270	26,287	76.6%		21,270	20,148	$1,122	18.68	$60
61	23,746	12,320	76.2%		23,746	9,388	$14,358	19.61	$732
62	23,612	23,779	75.8%		23,612	18,012	$5,600	20.59	$272
63	22,782	15,353	75.3%		22,782	11,561	$11,220	21.62	$519
64	25,121	25,505	74.9%		25,121	19,091	$6,029	22.70	$266
65	16,953	14,209	74.4%		16,953	10,572	$6,381	23.84	$268
					$2,261,622	$1,682,981	$578,641		$154,936
								CPI	1.1
					Constant $$		$630,285		$168,765
					Private share		$429,224		$114,929
					Public share		$201,061		$53,836

Table 11. Estimated direct and indirect costs per person with LD from birth to retirement, showing simple incremental costs and present values of those costs to various payers

	Simple Incremental Cost to Payers				Present Value of Incremental Cost to Payers				
	Personal and Family	Private Insurers	Public	Total	Personal and family	Private Insurers	Public	Total	
Direct costs									
Hospitals			$18,381	$18,381			$2,020	$2,020	
Doctors			$15,040	$15,040			$3,881	$3,881	
Misc. hlth & soc. svcs			$5,055	$5,055			$1,843	$1,843	
Medications	$1,590	$1,220	$1,955	$4,766	$656	$503	$806	$1,965	
Education			$39,537	$39,537			$22,380	$22,380	
Criminal justice			$109,821	$109,821			$22,075	$22,075	
Income transfers			$132,939	$132,939			$18,497	$18,497	
Agencies helping with activities	$71,759		$240,238	$311,997	$25,149		$84,194	$109,342	
Sub-total	$73,349	$1,220	$562,965	$637,535	$25,804	$503	$155,695	$182,003	40.0%
Indirect costs									
Earnings loss	$714,106			$714,106	$104,440			$104,440	
Family opportunity costs	$429,224		$201,061	$630,285	$114,929		$53,836	$168,765	
Sub-total	$1,143,330	$0	$201,061	$1,344,391	$219,369	$0	$53,836	$273,205	60.0%
Total Costs per Person w/LD	$1,216,679	$1,220	$764,026	$1,981,926	$245,173	$503	$209,531	$455,208	
% of Cost by Payer	61.4%	0.1%	38.5%	100.0%	53.9%	0.1%	46.0%	100.0%	

Table 12. Estimated direct and indirect costs for all people with LD from birth to retirement, showing simple incremental costs and present values of those costs to various payers

			Simple Incremental Cost to Payers				Present Value of Incremental Cost to Payers (@ 5% Discount Rate)			
			Personal and Family	Private Insurers	Public	Total	Personal and family	Private Insurers	Public	Total
		Population counts	Cost of LD in $ Billions				Cost of LD in $ Billions			
Total population		31,081,900								
Share with LD										
- Low estimate as a %	2.5%	777,048	945.4	0.9	593.7	1,540.1	190.5	0.4	162.8	353.7
- Mid-range estimate as a %	5.0%	1,554,095	1,890.8	1.9	1,187.4	3,080.1	381.0	0.8	325.6	707.4
- High estimate as a %	10.0%	3,108,190	3,781.7	3.8	2,374.7	6,160.2	762.0	1.6	651.3	1,414.9

VI Appendix

A. LD Proxy Groups

1. Children

Two derived variables for childhood LD were constructed – one for the NPHS and the other for the NLSCY – to approximate a population of children in the 4 - 11 age group with learning disabilities. On both the NPHS and NLSCY, where children are reported as having no cognitive problems (i.e., a value of "1" on NPHS variable HSC6GCOG; a value of "1" on the NLSCY variable AHLCQ32 *and* "1" or "2" on the NLSCY variable AHLCQ33[21]), these children were coded as having “no cognitive problems". Where children were coded as having significant cognitive difficulties in the NPHS (HSC6GCOG=5), the children were coded on the new NPHS variable as having "major cognitive difficulties". Such children were given a similar classification in the new NLSCY variable if they were reported as very forgetful or unable to remember anything at all, or as having a great deal of difficulty thinking or as completely unable to think or solve problems (AHLCQ32= 3 or 4, or AHLCQ33=4 or 5). All other children were classified as having "some cognitive difficulties" on the new variables.

In that children with "major" cognitive difficulties are likely to be identified as having – or treated as having – an intellectual disability / mental handicap, the research into the costs of learning disability shifted attention to children with "some" level of cognitive difficulty. The assumption was that the latter children are more likely to have profiles consistent with learning disability, and may in some cases have been formally identified as having learning disabilities.

However, children with "some" level of cognitive difficulty represent a very large share of the child population from 4 to 11 years in NLSCY and the NPHS (371,000 in the NLSCY; 382,000 in the NPHS). The 1991 Health and Activity Limitation Survey (HALS) indicates that children who have been identified as having learning disabilities represent about 1.7 per cent of the child population in the birth to 14 age group (96,580 children).[22] Allowing for the different age ranges reported across the HALS children survey and the NLSCY, the HALS figure is roughly consistent with the suppressed number of children aged 4 - 11 in the NLSCY who are identified as having a learning disability (85,534).

Accordingly, it was determined in the feasibility research that a further level of filtering was required to scale back the number of children with "some" level of cognitive difficulty to more closely represent the number of children typically reported as having learning disabilities in any given year. To do this, the average Health Utility Index (HUI)

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[21]It was considered normal for children to have "a little difficulty" thinking or solving day-to-day problems. Records where children have this classification in AHLCQ33 on NLSCY are considered to have no cognitive difficulties if they are also "able to remember most things".

[22]Canadian Institute of Child Health (1994). The Health of Canada's Children - A CICH Profile, 2nd Edition (Ottawa: Canadian Institute of Child Health), Table 8.7.

score was used as a threshold. Records on which it was indicated that children had "some" level of cognitive difficulty and whose HUI score is at or below the average score for such children were classified as proxy LD records (est. 136,000 children in the NLSCY; 123,000 in the NPHS).

As the NLSCY survey data on cognitive difficulty are not available for children from birth to 3 years on that survey, when the research used NLSCY data, it extrapolated from age 3 to birth based on data for children aged 4 to 11.

2. Adults

The feasibility research found that 273,000 adult respondents (age 15+) indicated that they had been professionally identified as having a learning disability in 1991 (HALS variable A24A= "yes"). This probably understates the real magnitude of learning disability as many people with this condition have not had it identified through professional assessment; many people have difficulties with various cognitive tasks but do not know that they have a learning disability

Of those in HALS who self-reported as having been professionally identified with a learning disability, 44.6 percent also said that they have ongoing problems with learning or memory.

The research sought to gauge the extent of cognitive disability consistent with the profile of professionally identified learning disability. Various explorations were conducted in HALS. It was found that 352,000 individuals with some level of disability had either:

- been told by a professional that they have a learning disability *or*
- they
- scored at or above the average (5 or higher) across a range of cognitive tasks with which HALS respondents with professionally-identified LD may have reported some difficulty[23]; *and*
- have not been told they have developmental delay / a mental handicap; *and*
- do not have ongoing problems with learning/memory that are the result of the natural aging process.

Of these people, 57 percent said they have ongoing problems with learning or memory. This broader group of people was included in a derived HALS variable that represents a proxy indicator of learning disability. These are cases where respondents have been

[23]These tasks are: learning how to read; learning how to write; learning how to spell; learning basic mathematics (adding and subtracting); having difficulty telling right from left; often being told that one is not doing the right thing at the right time; having difficulty explaining ideas when speaking; doing activities that have many steps such as following a recipe; often having difficulty solving day to day problems; often needing help to understand people one doesn't know very well; and often needing help to talk to people one doesn't know very well. The maximum derived number of "yes" responses across this battery of questions was 8. People who have been told that they have a learning disability had an average score of 4.75. Other people with disabilities had an average score of 1.00.

told by a professional that they have a learning disability or whose cognitive profile matches the condition, even though they may not have been professionally assessed as such. Data were then filtered for those 15 to 64 years of age, yielding 304,000 working age people in the LD Proxy group.

The closest proxy indicator of learning disability that the research could derive based on the NPHS comprises people 15-64 who have a significant level of cognitive difficulty (i.e., NPHS variable HSC6GCOG=4) and who are not restricted in everyday activities because of the natural aging process (RAC6G5<>4). These people may be restricted in activities for other reasons. As with the derived NPHS variable for children, people with major cognitive difficulties (e.g., people who say they can't think, can't remember = HC6GCOG=5) were not included in the proxy indicator of learning disability. Nor were people who experience a little difficulty with thinking or memory.

The derived proxy indicator for learning disability among working-age people in the NPHS is skewed slightly towards older people and towards women when contrasted with the HALS LD Proxy variable or HALS variable A24a (Appendix Tables 1 and 3). Educational attainment is also somewhat higher than for people represented by either of the HALS variables (Appendix Tables 2 and 4). However, exact symmetry between the two surveys is not critically important as a goal in itself. The main purpose in constructing a plausible proxy indicator of adult learning disability in the NPHS is to enable broad level estimates of incremental costs of living with significant (but not mild or severe) cognitive difficulties compared with costs for people who have no identifiable cognitive difficulties.

Appendix Table 1. Age and gender of people responding to HALS variable A24a (professional assessment of LD) and HALS-derived proxy indicator of LD (showing percentages)

	Professional said respondent has Learning Disability (per HALS variable A24a)		HALS Proxy LD
Age group	**No**	**Yes**	**Yes**
15 - 34	15.8	59.9	50.6
35 - 54	28.1	27.6	29.2
55 - 64	17.9	4.1	6.6
65+	34.7	8.4	13.5
Gender			
- Male	45.5	57.2	55.6
- Female	54.5	42.8	44.4

Appendix Table 2. Highest education of people responding to HALS variable A24a (professional assessment of LD) and proxy indicator of LD (showing percentages)

	Professional said respondent has Learning Disability (per HALS variable A24a)		Proxy LD
Education level	**No**	**Yes**	**Yes**
< Grade 9	19.2	23.8	24.0
Some high school	25.8	34.5	35.2
High school graduate	13.8	12.2	11.6
Trades certificate	12.4	8.0	9.0
Some post-secondary	10.3	9.8	8.7
Post-sec certificate	12.2	9.4	9.3
University degree	6.3	2.3	2.1

Appendix Table 3. Age and gender of working-age people responding to HALS variable A24a (professional assessment of LD), HALS-derived proxy indicator of LD, and NPHS-derived proxy indicator of LD (showing percentages)

	Professional said respondent has Learning Disability (per HALS variable A24a)		Proxy LD	
Age group	**No**	**Yes**	**HALS**	**NPHS**
15 - 34	25.0	65.4	58.6	46.9
35 - 54	44.7	30.1	33.8	40.2
55 - 64	30.3	4.5	7.7	12.8
Gender				
- Male	48.2	58.8	56.6	45.2
- Female	51.8	41.4	43.4	54.8

Appendix Table 4. Highest education of working-age people responding to HALS variable A24a (professional assessment of LD), HALS proxy indicator of LD, and NPHS proxy indicator of LD (showing percentages)[24]

	Professional said respondent has Learning Disability (Per HALS variable A24a)		Proxy LD	
Education level	**No**	**Yes**	**HALS**	**NPHS**
Less than high school graduation	45.0	58.3	59.2	36.0
High school graduate	13.8	12.2	11.6	16.4
Some post-secondary	10.3	9.8	8.7	24.1
Trades or other post-sec certificate	24.6	17.4	18.3	16.5
University degree	6.3	2.3	2.1	5.4

B. Upper Range Estimated Incomes

The incomes that were estimated in HALS, NPHS and the NLSCY for upper income groups are as follows:

Appendix Table 5. Upper range income estimates, based on data for income groups

	Personal Employment $$		Total Personal $$		Family/Household $$	
Survey	**Grouped data**	**Est. Income**	**Grouped data**	**Est. Income**	**Grouped data**	**Est. Income**
HALS	35,000+	50,000	35,000+	50,000	50,000+	60,000
NPHS	Not avail.	Not avail.	Not avail.	Not avail.	80,000+	100,000[25]
NLSCY	Not avail.	Not avail.	Not avail.	Not avail.	80,000+	90,000

[24]The NPHS uses broader categories than HALS for grouping according to educational attainment. HALS data have been re-grouped so they correspond with the categories used in the NPHS.

[25]This amount seems reasonable in that family incomes would be expected to increase as children get older. Accordingly, a lower overall family income would be expected in the NSCY, where the oldest child reported is 11 years of age.