

The 2014 Ontario Child Health Study—Methodology

Michael H. Boyle, PhD, Professor Emeritus¹

Katholiki Georgiades PhD, Associate Professor¹

*Laura Duncan, MA, PhD Student and Research Coordinator^{1,2}

Jinette Comeau, PhD, Assistant Professor and Associate Scientist³

Li Wang, MSc, PhD Student and Analyst^{1,2}

2014 Ontario Child Health Study Team⁴

Word count: 3,933

¹ McMaster University, 1280 Main Street West, Hamilton Ontario, L8S 4K1, Offord Centre for Child Studies & Department of Psychiatry & Behavioural Neurosciences

² McMaster University, 1280 Main Street West, Hamilton Ontario, L8S 4K1, Department of Health Research Methods, Evidence & Impact

³ King's University College at Western University, 266 Epworth Avenue, London, Ontario N6A 2M3, Department of Sociology; Western University, Children's Health Research Institute, 800 Commissioners Road East, London, Ontario N6C 2V5, Children's Health and Therapeutics

⁴ (in alphabetical order) Tracie O. Afifi (University of Manitoba), William R. Avison (Western University), Kathryn Bennett (McMaster University), Terry Bennett (McMaster University), Khrista Boylan (McMaster University), Michael H. Boyle (McMaster University), Michelle Butt (McMaster University), John Cairney (University of Toronto), Corine Carlisle (University of Toronto), Kristin Cleverley (Centre for Addiction and Mental Health, University of Toronto), Ian Colman (University of Ottawa), Jinette Comeau (King's University College at Western University), Charles Cunningham (McMaster University), Scott Davies (University of Toronto), Claire de Oliveira (Centre for Addiction and Mental Health, University of Toronto), Melanie Dirks (McGill University), Eric Duku (McMaster University), Laura Duncan (McMaster University), Jim Dunn (McMaster University), Mark A. Ferro (University of Waterloo), Katholiki Georgiades (McMaster University), Stelios Georgiades (McMaster University), Andrea Gonzalez (McMaster University), Geoffrey Hall (McMaster University), Joanna Henderson (Centre for Addiction and Mental Health, University of Toronto), Magdalena Janus (McMaster University), Jennifer Jenkins (University of Toronto), Melissa Kimber (McMaster University), Ellen Lipman (McMaster University), Harriet MacMillan (McMaster University), Ian Manion (Royal's Institute of Mental Health Research), John McLennan (University of Ottawa), Amelie Petitclerc (Northwestern University), Anne Rhodes (McMaster University), Graham Reid (Western University), Peter Rosenbaum (McMaster University), Roberto Sassi (McMaster University), Louis Schmidt (McMaster University), Cody Shepherd (Simon Fraser University), Noam Soreni (McMaster University), Peter Szatmari (Centre for Addiction and Mental Health, Hospital for Sick Children, University of Toronto), Brian Timmons (McMaster University), Juliana Tobon (McMaster University), Ryan Van Lieshout (McMaster University), Charlotte Waddell (Simon Fraser University), Li Wang (McMaster University), Christine Wekerle (McMaster University).

***Correspondence** concerning this article should be addressed to: Laura Duncan, MA, Offord Centre for Child Studies, McMaster University, 1280 Main Street West, MIP 201A, Hamilton Ontario, Canada, L8S 4K1
Email: duncanlj@mcmaster.ca; Phone: 1 905 525 9140; Fax: 1 905 574 6665

Abstract

Objective: To describe the methodology of the 2014 Ontario Child Health Study (OCHS)—a province-wide, cross-sectional, epidemiologic study of child health and mental disorder among 4 to 17 year olds living in household dwellings.

Method: Implemented by Statistics Canada, the 2014 OCHS was led by academic researchers at the Offord Centre for Child Studies (McMaster University). Eligible households included families with children 4 to 17 years old listed on the 2014 Canadian Child Tax Benefit File. The survey design included area and household stratification by income and 3-stage cluster sampling of areas and households to yield a probability sample of families.

Results: The 2014 OCHS included 6,537 responding households (50.8%) with 10,802 4 to 17 year olds. Lower income families living in low-income neighbourhoods were less likely to participate. In addition to measures of child mental disorder assessed by the *Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID)* and *OCHS Emotional Behavioural Scales (OCHS-EBS)*, the survey contains measures of neighbourhoods, schools, families and children, and includes administrative data held by the Ministries of Education and Health and Long-Term Care.

Conclusions: The complex survey design and differential non-response of the 2014 OCHS required the use of sampling weights and adjustment for design effects. The study is available throughout Canada in the Statistics Canada Research Data Centres (RDCs). We urge external investigators to access the study through the RDCs or to contact us directly to collaborate on future secondary analysis studies based on the OCHS.

(Abstract 244 words)

Keywords Methodology, Complex surveys, Epidemiology, Ontario, Child health

Introduction

The past 30 years have witnessed changes in Canada's demography that may pose threats to the mental health of children and adolescents (herein child/ren), including steady increases in: income inequality,¹ family dissolution,² discrimination linked to visible minority status³ and neighbourhood poverty.⁴ During this same time, the federal government allocated substantial resources to child development initiatives (e.g., \$3.5B 2001-2007⁵) and provincial governments, such as Ontario, developed strategies (e.g., Poverty Reduction, Comprehensive Mental Health and Addictions Strategy), created programs (e.g., Ontario Early Years Centres) and increased funding to child mental health and child welfare services. These government initiatives were a response in part to concerns about high levels of child mental health need identified in the 1983 Ontario Child Health Study (OCHS).^{6,7} At present, nothing is known about the net impact of demographic changes and government allocations on child mental disorders in Canada. The 2014 OCHS—a sequel to the original 1983 OCHS—was implemented to update our knowledge about the epidemiology of child mental disorders in Ontario and to inform policy decisions aimed at improving child mental health. The 2014 OCHS had five objectives:

1. Estimate the prevalence of childhood mental disorders in 2014;
2. Quantify changes in prevalence of mental disorders between 1983 and 2014 and the extent to which they are associated with changes in socioeconomic (SES) disadvantage;
3. Evaluate the responsiveness of the healthcare system to child and youth mental health need;
4. Assess the burden associated with childhood mental disorders and their co-occurrence (e.g., societal costs, and loss of social and academic functioning);
5. Determine the potential influence of families, neighbourhoods and schools on child and youth mental disorder and identify modifiable contextual variables to inform the development and evaluation of evidence-based prevention programs and policies.

Conceptual Framework

The conceptual framework used to select concepts for the 2014 OCHS combines Bronfenbrenner's⁸ ecological model of human development with a social determinants of health perspective.⁹⁻¹¹ In this framework, disorder results from adverse experiences arising from the interplay between individual characteristics and contextual-level variables found in neighbourhoods, schools and families.^{12,13}

[insert Figure 1.]

Figure 1 depicts the relational structure of key contexts and concepts. For simplicity, neighbourhoods and schools were combined. In these contexts, we emphasized: (a) SES disadvantage which may impact child mental health and well-being through a lack of resources and opportunities (material pathways)¹⁴ or negative responses to income inequality (psychosocial pathways);¹⁵ and (b) assets (e.g., programs and services for families with children) and social processes (e.g., neighbourhood cohesion, antisocial behaviour) that may serve as positive or negative influences on health.

Child health and well-being are multidimensional concepts. The arrows in Figure 1 illustrate how contextual variables might influence child health. For example, policy-makers are concerned about the effect on children of programs and services operating in neighbourhoods and schools. Do these services or 'assets' show evidence of muting the adverse influences of social and economic disadvantage on child health? Although alternative strategies are available, these contextual questions are investigated optimally by selecting individuals nested in groups (cluster sampling) and analyzing responses using multilevel models.

Methods

Concepts and Measures

In the 2014 OCHS, key concepts were measured at the neighbourhood, school, family and individual levels. In addition to evidence of reliability and validity, three priorities guided our selection of measures: 1) maintaining comparability with the 1983 OCHS to assess changes in the epidemiology of child mental disorders; 2) drawing on multiple respondents and methods, including data linkage, to improve measurement scope and quality; and 3) including a structured interview to classify mental disorder based on the Diagnostic and Statistical Manual (DSM).

NEIGHBOURHOOD/SCHOOL LEVEL

We measured neighbourhood-level variables such as the SES and demography of residents using aggregate information contained in dissemination areas (DAs) and census tracts (CTs) from the 2011 Canada Census (e.g., % of households led by a lone parent). To quantify area-level resource allocations to child mental health, we obtained aggregate administrative data from the Ontario Ministry of Children and Youth Services (MCYS). Area-level social processes, such as neighbourliness, collective efficacy and antisocial behaviour, were measured by standard questions and scales completed by parents participating in the 2014 OCHS and by interviewer ratings of the local environment, aggregated up to the area level.

A sub-study, called the School Mental Health Surveys (SMHS),¹⁶ was implemented to obtain information on school SES, demography and school climate. Based on the location of households participating in the OCHS, we identified 359 schools likely to have 10 or more OCHS 4 to 17 year olds in attendance and asked them to participate. We enlisted 248 (69%) schools into the SMHS with 2,266 OCHS children/youth in attendance. All students in grades 6 through 12 in these schools reported anonymously on 5 aspects of school climate; principals, teachers and support staff assessed the school capacity to address student mental health needs; and the province's Education Quality and Accountability Office (EQAO) provided administrative record data on school-level characteristics and student achievement test results. All student (n = 31,124), teacher (n = 3,373) and principal (n = 206) assessments collected within schools were aggregated to the school level, combined with administrative record data and linked to the survey responses of individual 2014 OCHS participants in those particular schools.

FAMILY LEVEL

Standard questions taken from the 2011 Canada Census were used to measure the SES and demographic characteristics of the family, (e.g., parental education, household income, family structure, race/ethnicity, language spoken in the home). We also used standard questions and scales to measure characteristics indicative of parental capacity and family processes.

INDIVIDUAL CHILD LEVEL

The 2014 OCHS collected assessment data on child mental disorder, physical health, social competence, academic functioning for all children, and self-reported adolescent experiences and behaviour for those 12 years and older.

Mental Disorder To classify the most common mental disorders occurring in the past 6 months based on DSM-IV-TR (attention-deficit hyperactivity disorder, oppositional defiant disorder, conduct disorder, major depressive episode, separation anxiety disorder, generalized anxiety disorder, social phobia and specific phobia), we used a modified version of the Mini International Neuropsychiatric Interview for Children and Adolescents (*MINI-KID*).¹⁷ To complement the classifications of disorder measured by the *MINI-KID*, we included the OCHS Emotional Behavioural Scales (*OCHS-EBS*) developed to measure these same disorders.^{18,19} To enable secular comparisons, identical measures of three disorders (conduct disorder, hyperactivity and emotional disorder) included in the 1983 OCHS^{6,7} were embedded in the

OCHS-EBS.

Physical Health To classify child functioning on eight health attributes (vision, hearing, speech, mobility, dexterity, feelings, cognition and pain) and provide an overall numerical estimate of health on a 0 to 1 scale, we used the Health Utilities Index Mark III.²⁰ In addition to collecting survey responses on chronic medical conditions or illnesses lasting more than 6 months, the 2014 OCHS used linkage with the Ontario Health Insurance Plan records to corroborate disease identification.

Social Competence and Academic Functioning The 2014 OCHS collected information on child friendships, interpersonal functioning, bullying and maltreatment. Administrative record data held by the Ministry of Education in the Ontario Student Information System (OnSIS) was used to capture assessments of individual students going back three years on: 1) student achievement (*grades* in English and Math and *EQAO* scores); 2) status [identification as a *student with exceptionalities* and use of *special programs at any time* (e.g., compensatory programs, English as a Second Language (ESL)); and 3) behaviour (*attendance, expulsion, suspensions*).

Service Utilization, Barriers to Services and Satisfaction with Service Extensive information was collected from 2014 OCHS participants on the use of child health services by provider type (child mental health²¹, child welfare, juvenile justice, family physicians) and locations where services were accessed (e.g., emergency rooms, urgent care, etc.). Information on services received by individual children was also abstracted from administrative record data held by the MOHLTC from 1998 to 2017. These included use of physician services (Ontario Health Insurance Plan), outpatient services (National Ambulatory Care Reporting System) and inpatient care (Discharge Abstract Database).

Survey Design

The *target population* included all children 4 to 17 years old whose usual place of residence was a private household in Ontario; the *sampling unit* consisted of all households occupied by families with 4 to 17 year olds listed in the 2014 Canada Child Tax Benefit (CCTB) file; the *sampling frame* was the 2014 CCTB file; and the *sample selection* was done by stratified, clustered, and random sampling of households from the CCTB file. In the 2011 Census, there were about 2 million children and adolescents in this age range.²² According to the 2011 Census, about 63% of Aboriginal children live in households off reserve²³ and were eligible for inclusion while those living on reserves were not. The CCTB file was used because of evidence that it provides a more reliable and efficient frame for sampling 0 to 17 year olds than other options such as the Census and birth registries.²⁴

The *survey design* (Figure 2) included stratification and cluster sampling of residential areas and siblings within families. Residential areas were defined by census tracts in urban areas and disseminations areas in ‘other’ urban and rural areas. CTs are relatively stable geographic areas, akin to neighbourhoods of 2,500 to 8,000 individuals; they are located in census metropolitan areas and in census agglomerations that have a core population of 50,000 or more. DAs are small, relatively stable geographic units of 400 to 700 individuals drawn from one or more adjacent dissemination blocks; they are the smallest standard geographic area for which all census data are disseminated.

[insert Figure 2.]

Based on the CCTB file, sampling was done in 3 stages. In stage 1, contiguous CTs and DAs throughout Ontario were combined to identify 1,102 primary sampling units (PSUs) having on average 1,066 eligible families (700 to 2,700). PSUs were classified as urban or rural and sub-classified according to family income based on the CCTB: below the 20th percentile of income,

above the 80th percentile of income or between the 20th and 80th percentiles of income (<P20, P20 to P80; >P80). PSUs were selected using probability proportional to size (PPS)—within a particular stratum, the chance of selecting a PSU was based on the number of eligible families in a particular PSU divided by the total number of families within the stratum. A total of 180 PSUs were selected, 153 from urban areas and 27 from rural areas. These PSUs were equally allocated (EA) across the strata, with 60 chosen from each income strata.

In stage 2, the contiguous CTs and DAs that made up each one of the 180 PSUs were grouped separately into 2 sub-strata—those that were consistent versus inconsistent with the income designation of the PSU. The 2 sub-strata contained a total of 939 ‘super elements’. Up to 4 super elements were selected from each PSU—2 consistent with and 2 inconsistent with the income designation of the PSU. This resulted in the selection of 484 super elements for inclusion. The sub-strata were created to ensure that the geographical boundaries selected for study inclusion encompassed homogeneous economic areas. In PSUs with inconsistent CTs and DAs, both were sampled to enable adequate variance estimation at area levels.

In stage 3, within each selected super element, eligible households were stratified by family income in the CCTB file (<P20, P20 to P80; >P80). Within each of these income strata, equal numbers of households were selected using simple random sampling (SRS). About 75% versus 25% of households from any particular ‘area’ were selected from the sub-stratum that was consistent versus inconsistent with the income designation of the primary sampling unit.

Sample and Response

Among the 15,796 households selected from the CCTB, 12,871 were eligible and 6,537 participated (50.8%). Cross-classified by area and family income, Figure 2 shows the number of households and children participating as a percent of those eligible. The numbers in the figure show a gradient of positive response from lower to higher income among households and areas.

To obtain unbiased estimates, Statistics Canada created survey weights based on the probability of selection (dwelling design weight) with adjustments for survey non-response and post-stratification. This ensured that the final survey weights sum to known counts of dwellings with children in Ontario²⁵. Table 1 compares selected socio-demographic characteristics (weighted) of participants in the 2014 OCHS with population estimates derived from the 2011 National Household Survey. The most notable difference is for family income: while the mean level is lower in the OCHS (100.5 versus 106.3), the standard deviation is higher (162.6 versus 128.5).

[insert Table 1.]

Data Collection and Processing

Statistics Canada, the federal statistical agency responsible for collecting and analyzing data at both the national and provincial levels, including the Canada Census and Labour Force surveys, conducted the fieldwork for the 2014 OCHS. Data collection took place from Oct 2014 to Sept 2015. Interviewers were assigned selected households listed on the CCTB file with one or more children aged 4 to 17 years in those residential areas sampled for the study. Interviewers telephoned or visited the household in person, asked to speak with the person most knowledgeable (PMK) about the household, presented the study, screened for eligibility, and through the PMK invited eligible families within these households to participate.

After collecting basic information on all household members and identifying the PMK (mothers in 88.3 % of families), interviewers scheduled home interviews at times convenient to families. A common set of measures were taken on up to 4 children aged 4 to 17 years (selected randomly in families with more than 4). In addition to these common measures, one of these

children was identified randomly as the ‘selected’ child who had enriched assessments that included the parent (of 4 to 17 year olds) and youth (12 to 17 year olds) versions of the *MINI-KID*.

[insert Figure 3.]

Figure 3 shows informants linked with selected concepts (see appendix for more detailed information). A computer-assisted personal interview (CAPI) with the PMK was used to obtain information about all participating children aged 4 to 17 years (i.e., birth history, physical health, service use, activities, and school); and the family (i.e., housing, immigrant/refugee status, and socio-demography). To facilitate disclosure, the PMK answered personal questions on a laptop about their substance use, personal mental health and perceptions of neighbourhood characteristics. Parent assessments of child mental disorder were obtained by: 1) an interviewer-administered paper version of the *MINI-KID* about the selected child; and 2) a paper and pencil self-report checklist of emotional and behavioural problems applicable to all participating children (*OCHS-EBS* and items measuring the disorders in the 1983 *OCHS*). A paper and pencil questionnaire was used to keep the mode of data collection (structure, ordering and content) as similar as possible to the 1983 study. Finally, a paper and pencil questionnaire was left for the PMK’s spouse/partner to complete and return by mail [3,133 (62.1%) response among 2-parent households]. This questionnaire included checklist assessments of the selected child’s emotional-behavioural problems, their impact on the family, and the physical and mental health of the spouse/partner, their parenting behaviour and childhood exposure to violence.

All adolescents aged 12 to 17 years willing to participate in the study completed a laptop questionnaire in private. Youth were asked questions on different aspects of their health, school, social relationships and other activities such as work and civic engagement. Modules on sensitive topics such as anti-social behaviour, self-harm, suicidal behaviour and exposure to maltreatment were administered only to youth aged 14 to 17 years. Finally, if the 12 to 17 year old was also the selected child in the family, s/he was administered the youth version of the *MINI-KID*.

Before leaving the household, interviewers asked for signed parental consent to request teacher assessments for children attending elementary school. Based on a mailed survey, we obtained teacher assessments of child emotional and behavioural problems, social relationships and academic achievements on 3,072 children (38.9% of 4-13 year olds). Interviewers also asked parents for their consent to share their identifying information with the MOHLTC [6,173 (94.4%) agreement)] to facilitate linkage with administrative records.

The 2014 *OCHS* was a voluntary survey conducted under the Statistics Act, which provides respondents guarantees of their privacy and confidentiality. Parents and children were asked without coercion for their consent to participate. The study procedures were approved by the Hamilton Integrated Research Ethics Board at McMaster University and Research Ethics Committees at participating School Boards. Interviews were conducted in either English or French, depending on respondent preference. All assessment data underwent qualitative interview testing in a pilot phase and interviewer training, data collection, and information processing used standardized procedures developed by Statistics Canada. A sub-sample of 180 households with 280 children participated in a test-retest reliability study of all the 2014 *OCHS* measures.

Statistical Analyses

The questions posed in the 2014 *OCHS* can be addressed by simple analyses to estimate prevalence or more complex analyses using multilevel modelling (MLM) to test hypotheses about associations between child mental disorders and problem behaviours as functions of

independent variables measured at different levels—children, families, neighbourhoods and schools.

The complex design of the 2014 OCHS (stratification, clustering leading to data dependencies and different household selection probabilities) reduces the precision of estimates and needs to be taken into account by data analysts. This loss of precision is called the survey design effect (ratio of the sampling variance of an estimator under a complex design to the sampling variance of an estimator under simple random sampling).²⁶ Statistics Canada has developed bootstrap weights to generate proper variance estimates (standard errors) for coefficients obtained in analyses conducted at the individual level which do not account for data dependencies. Although MLM do account for data dependencies rendering bootstrap weights inapplicable, sampling weights are still needed to produce unbiased population estimates. Analysts are urged to check the software documentation about specifying the use of sampling weights to generate proper variance estimates.

In our experience with the 2014 OCHS, the Statistics Canada bootstrap weights are associated with substantial losses in precision. There are also model-based approaches that can account for complex sampling in survey estimation.²⁷ Although these approaches offer the possibility of generating unbiased estimates with greater precision, they have yet to be investigated for the 2014 OCHS and are beyond the scope of this report.

Sample Size and Question Non-response

Non-response associated with self-completed modules of the study will affect the sample sizes for secondary analyses. In particular, partial response (80% or more of item non-response was high for the partner questionnaire (23%) and for certain PMK and youth questionnaire components: 10% of computerized questionnaires completed by youth and 6% of parent, family and neighbourhood assessments based on computerized questionnaires completed by PMKs. We estimate that 75-90% of respondents will have complete data depending on the variables under consideration. Researchers using the 2014 OCHS will need to evaluate the extent of missed responses, assess their collective impact on findings and choose an appropriate analysis strategy. In the OCHS reports appearing in this journal issue, we examined complete case analysis (listwise deletion) and 2 options for addressing question non-response: multiple imputation (MI) and full information maximum likelihood (FIML).²⁸ MI imputes values into newly created data sets and is a useful approach for addressing missed responses in descriptive analyses that estimate prevalence. FIML estimates parameters on the basis of the available complete data as well as the implied values of the missing data given the observed data and is a useful approach for addressing missed responses in MLM used to test specific hypotheses. A companion threat in descriptive papers is multiple testing which increases the risk of rejecting a true null hypothesis (Type I error). To ensure that nominal *P* values (levels of significance) remain constant for all tests, researchers are advised to use appropriate methods such as the Benjamini-Hochberg²⁹ procedure. Finally, data users are urged to read the Micro Data User Guide prepared by Statistics Canada²⁵ for the 2014 OCHS.

Discussion

In the past 30 years, there have been many cross-sectional surveys of child mental disorder in the general population. These studies have drawn attention to the mental health needs of children, to variables which increase or decrease risk for mental disorder and to the limited ability of the healthcare system to respond to these needs. This information has proven to be effective for advocacy purposes, raising public concern about the mental health needs of children

and prompting policy and program responses among governments.

Cross-sectional studies in the general population such as the 2014 OCHS also have limitations: they contribute little to our knowledge about developmental processes that could help tailor prevention and early intervention efforts and are unable to represent youth who may have special needs such as aboriginal children on reserves, street youth and children touched by the child welfare and youth justice systems. Finally, as evidenced in our study, non-response has become a serious concern for general population surveys—the past 25 years have seen a precipitous decline in participation, particularly among those experiencing socioeconomic disadvantage.

Acknowledging the inherent limitations associated with cross-sectional surveys, a number of design elements and unique features were built into the 2014 OCHS to strengthen its usefulness and impact. One, cluster sampling was used to enlist all 4 to 17 year olds in families and to over-sample families in the same residential areas to assess contextual influences. This enables us to estimate the potential population health impact of attending to these contextual influences when developing new child mental health policies and programs. Two, stratification by income was used to select relatively more neighbourhoods and families cross-classified at the lower and higher ends of the continuum. This design element provides a more reliable basis to better understand the adverse effects of socio-economic disadvantage and the potential for other contextual variables (e.g., neighbourhood safety) to mute these effects. Three, some of the measurement and data collection strategies used in the original 1983 OCHS were replicated to facilitate an examination of differences between 1983 and 2014 in prevalence and socio-economic gradients for child mental disorder. Four, record linkage to administrative files was used to strengthen measurement (e.g., diagnosis of chronic diseases) and to capture variables not studied previously (e.g., service use and physician billings). Five, survey assessments provided by 2014 OCHS respondents were included to represent important process-related contextual variables in neighbourhoods such as collective efficacy that are unavailable through census statistics. Six, a separate study of schools (School Mental Health Surveys) was done to create new variables for study (e.g., quantity of school mental health services) and an opportunity to disaggregate neighbourhood from school influences. Seven, the study was led by a large, diverse group of academic researchers in close collaboration with Statistics Canada and policy partners—the Ontario Ministries of Children and Youth Services (MCYS), Health and Long-Term Care (MOHLTC), Education (EDU) in an effort to increase the policy relevance and impact of the study. Finally, we are counting on the use of statistical methods (i.e., use of sampling weights and control variables) and over-sampling of households with low income to compensate and adjust for selective sample losses associated with income. These methods work well as long as participants and non-participants defined by the characteristics linked to nonresponse (e.g., income) are similar to one another on other variables (e.g., health).

Conclusion

The 2014 OCHS represents a large public research investment in child mental health. The anticipated dividend of this investment will be the knowledge gained in future secondary analysis studies that capitalize on the data opportunities and enhancements built into the 2014 OCHS. The study is accessible in Canada through the Statistics Canada Research Data Centres (RDC) program to all investigators vetted by Statistics Canada. We urge interested researchers to help maximize the usefulness of the 2014 OCHS by conducting secondary analyses in the years ahead.

Data Access. Data access available through Statistics Canada Research Data Centres.

Acknowledgements. The authors would like to acknowledge Dr. James Carpenter and Dr. Paul Allison for advice regarding handling missing data, and Nancy Pyette for technical assistance with editing and proofreading the manuscript.

Conflict of Interest Disclosure. The primary authors (MB, KG, LD, JC and LW) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding. This study was funded by research operating grant 125941 from the Canadian Institutes of Health Research (CIHR), Health Services Research Grant 8-42298 from the Ontario Ministry of Health and Long-Term Care (MOHLTC) and from funding from MOHLTC, the Ontario Ministry of Children and Youth Services and the Ontario Ministry of Education. Dr. Boyle was supported by CIHR Canada Research Chair in the Social Determinants of Child Health and Dr. Georgiades by the David R. (Dan) Offord Chair in Child Studies.

References

1. Heisz A. Income inequality and redistribution in Canada: 1976 to 2004. Ottawa (ON): Ministry of Industry; 2007.
2. Statistics Canada. Canada year book 2010. Ottawa (ON): Ministry of Industry; 2010. Statistics Canada catalogue no. 11-402-XWE.
3. Beaujot R, Kerr D. The changing face of Canada: Essential readings in population. Toronto (ON): Canadian Scholars' Press; 2007.
4. Heisz A, McLeod L. Low-income in Census Metropolitan Areas, 1980-2000. Ottawa (ON): Statistics Canada; 2004. Statistics Canada Catalogue No. 89-613-MIE, No. 001.
5. Early childhood development. ECD Home. 2018. http://www.dpe-agje-ecc-elcc.ca/eng/ecc/ecc_home.shtml (accessed 2018 Mar 8).
6. Boyle MH, Offord DR, Hofmann HF, et al. Ontario Child Health Study: I. Methodology. Arch Gen Psychiatry. 1987;44(9):826–831.
7. Offord DR, Boyle MH, Szatmari P, et al. Ontario Child Health Study: II. Six-month prevalence of disorder and rates of service utilization. Arch Gen Psychiatry, 1987;44(9):832–836.
8. Bronfenbrenner U. The ecology of human development: Experiments by nature and design. Cambridge (MA): Harvard University Press; 1979.
9. Commission on the Social Determinants of Health. Closing the gap in a generation: Health equity through action on the social determinants of health. Final report of the Commission on Social Determinants of Health. Geneva (CH): World Health Organization; 2008.
10. Irwin A, Scali E. Action on the social determinants of health: Learning from previous experiences. Social determinants of health discussion paper 1 (Debates). Geneva (CH): World Health Organization; 2010.
11. Solar O, Irwin A. A conceptual framework for action on the social determinants of health. Social determinants of health discussion paper 2 (Policy and Practice). Geneva, (CH): World Health Organization; 2010.
12. Earls F, Carlson M. The social ecology of child health and well-being. Annu Rev of Public Health. 2001;22:143–166.
13. Kim D. Blues from the neighborhood? Neighborhood characteristics and depression. Epidemiol Rev. 2008;30:101–117.
14. Lynch JW, Davey Smith G, Kaplan GA, et al. Income inequality and mortality: Importance to health of individual income, psychosocial environment, or material conditions. BMJ. 2000;329:1200–1204.
15. Marmot M, Wilkinson RG. Psychosocial and material pathways in the relation between income and health: A response to Lynch et al. BMJ. 2001;322:1233–1236.
16. Georgiades K, Boyle MH. School influences on child and youth mental health. Canadian Institutes of Health Research Operating Grant (2014-2016) 2014. http://webapps.cihr-irsc.gc.ca/decisions/p/project_details.html?applId=304411&lang=en (accessed 2018 Jul 18).
17. Sheehan DV, Sheehan KH, Shytle RD, et al. Reliability and validity of the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID). J Clin Psychiatry. 2010;71(3):313–326.
18. Duncan L, Georgiades K, Wang L, et al. The 2014 Ontario Child Health Study Emotional Behavioural Scales (OCHS-EBS) Part I: A checklist for dimensional measurement of selected DSM-5 disorders. Can J Psychiatry. 2018; <https://doi.org/10.1177/0706743718808250>
19. Boyle MH, Duncan L, Georgiades K, et al. The 2014 Ontario Child Health Study Emotional

- Behavioural Scales (OCHS-EBS) Part II: Psychometric adequacy for categorical measurement of selected DSM-5 disorders. *Can J Psychiatry*. 2018; <https://doi.org/10.1177/0706743718808251>
20. Horsman J, Furlong W, Feeny D, et al. The Health Utilities Index (HUI®): Concepts, measurement properties and applications. *Health and Quality of Life Outcomes*. 2003;1(54):1–13.
 21. Reid GJ, Tobon JI, Shanley DC. What is a mental health clinic? How to ask parents about help-seeking contacts within the mental health system. *Adm Policy Ment Health*. 2008;35(4):241–249.
 22. Statistics Canada. Focus on geography series, 2011 Census. Ottawa (ON): Statistics Canada; 2012. Statistics Canada catalogue no. 98-310-XWE2011004.
 23. Turner A, Crompton S, Langlois S. Aboriginal peoples in Canada: First nations people, Métis and Inuit, National Household Survey 2011. Ottawa (ON): Statistics Canada; 2013. Statistics Canada catalogue no. 99-011-X2011001.
 24. Pantel M. Evaluation of the Canada Child Tax Benefit Data Base as a frame for the survey of young Canadians. *International Methodology Symposium*; 2010. Ottawa, (ON): Statistics Canada; 2010.
 25. Statistics Canada. Microdata User Guide 2014 Ontario Child Health Study. Ottawa (ON): Special Surveys Division; 2017.
 26. Statistics Canada. Survey methods and practices. Ottawa (ON): Minister of Industry; 2010. Statistics Canada catalogue no. 12-587-X. 27.
 27. West BT, Sakshaug JW, Aurelien GAS. Accounting for complex sampling in survey estimation: A review of current software tools. *J Off Stat*. 2018;34(3): 721–752.
 28. Johnson DR, Young, R. Toward best practices in analyzing datasets with missing data: Comparisons and recommendations. *J Marriage Fam*. 2011;73(October):926–945.
 29. Benjamini Y, Hochberg Y. Controlling the false discovery rate: a practical and powerful approach to multiple testing. *J R Stat Soc Series B Stat Methodol*. 1995;57(1):289–300.

Table 1. Sample characteristics

Characteristics	Weighted Sample [95% CI]	Population Estimates ^a
Super Elements <i>n</i> = 484		
% families below the poverty line	21.9 [19.9 – 23.9]	21.0
% lone-parent families	22.5 [20.5 – 24.5]	24.4
% families living in a rented dwelling	21.9 [19.5 – 24.4]	24.3
Families <i>n</i> = 6,537		
Family income in \$1,000s (M)	100.5 [95.5 – 105.5]	106.3
% one or both parents born outside Canada	44.6 [42.4 – 46.8]	43.2
% one or both parents visible minority	35.4 [34.2 – 38.4]	35.7
% families living in a rented dwelling	18.1 [16.6 – 19.6]	21.8
% rural	12.4 [11.1 – 14.0]	12.8
% small and medium urban	16.3 [14.5 – 18.1]	16.5
Children <i>n</i> = 10,802		
% male	51.3 [49.6 – 53.0]	51.6
Age in years (Mean)	10.6 [10.5 – 10.8]	10.8

^aNational Household Survey 2011

CI=Confidence Interval

Figure 1. Theoretical framework for the 2014 OCHS.

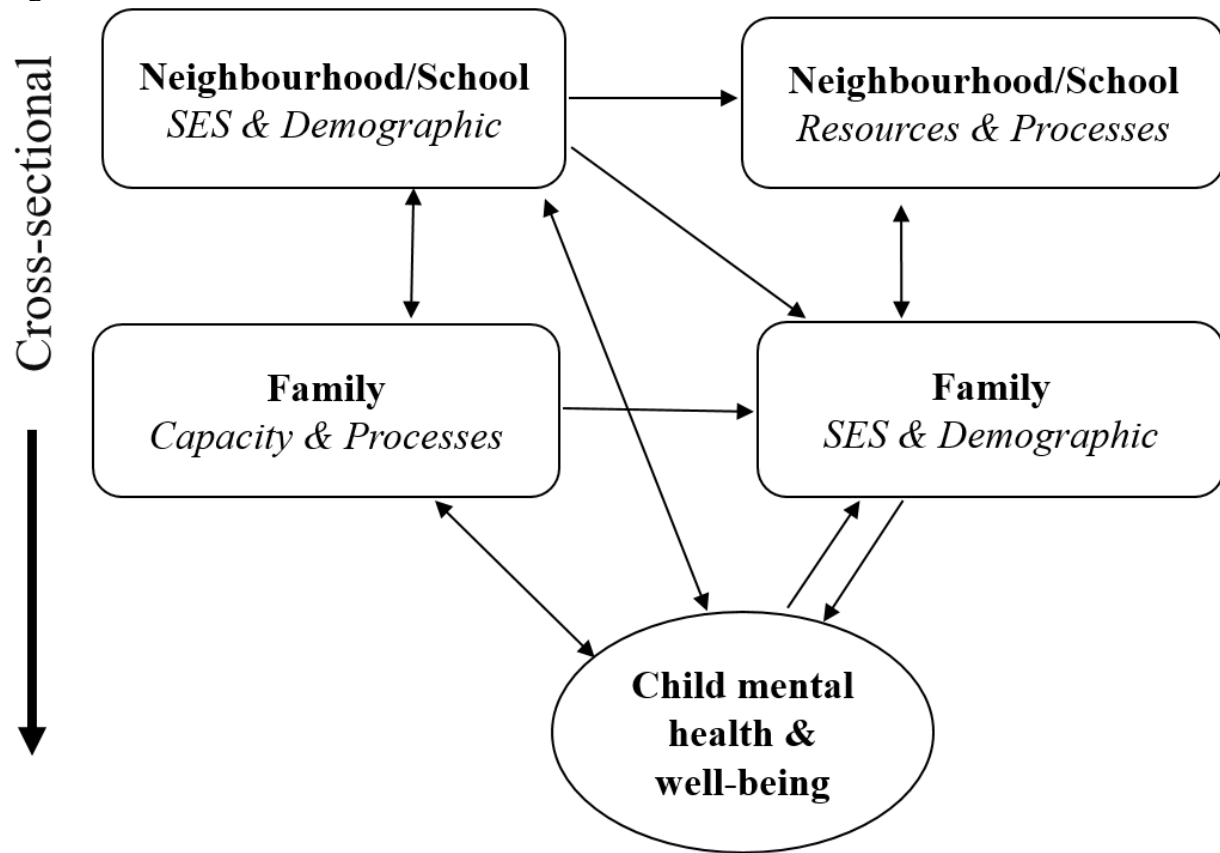


Figure 2. Basic survey design for the 2014 OCHS. Areas (stage 2 rows) and households (stage 3 columns) are cross-classified by income. The bolded numbers in the grid are participating households (percent response); and the italicized numbers are participating children (percent response).²⁴

Note. CT = Census Tract, DA = Dissemination Area, <P20 = below the 20th percentile of income, P20-80 = between the 20th and 80th percentiles of income, >P80 = above the 80th percentile of income.

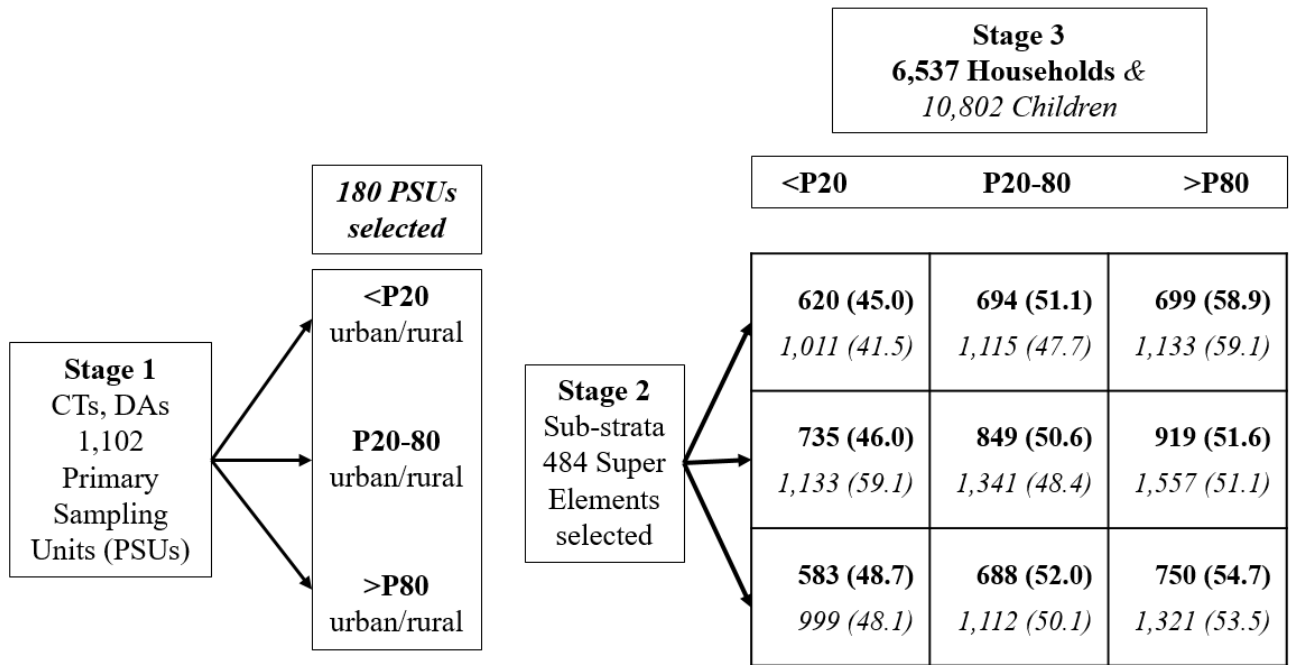
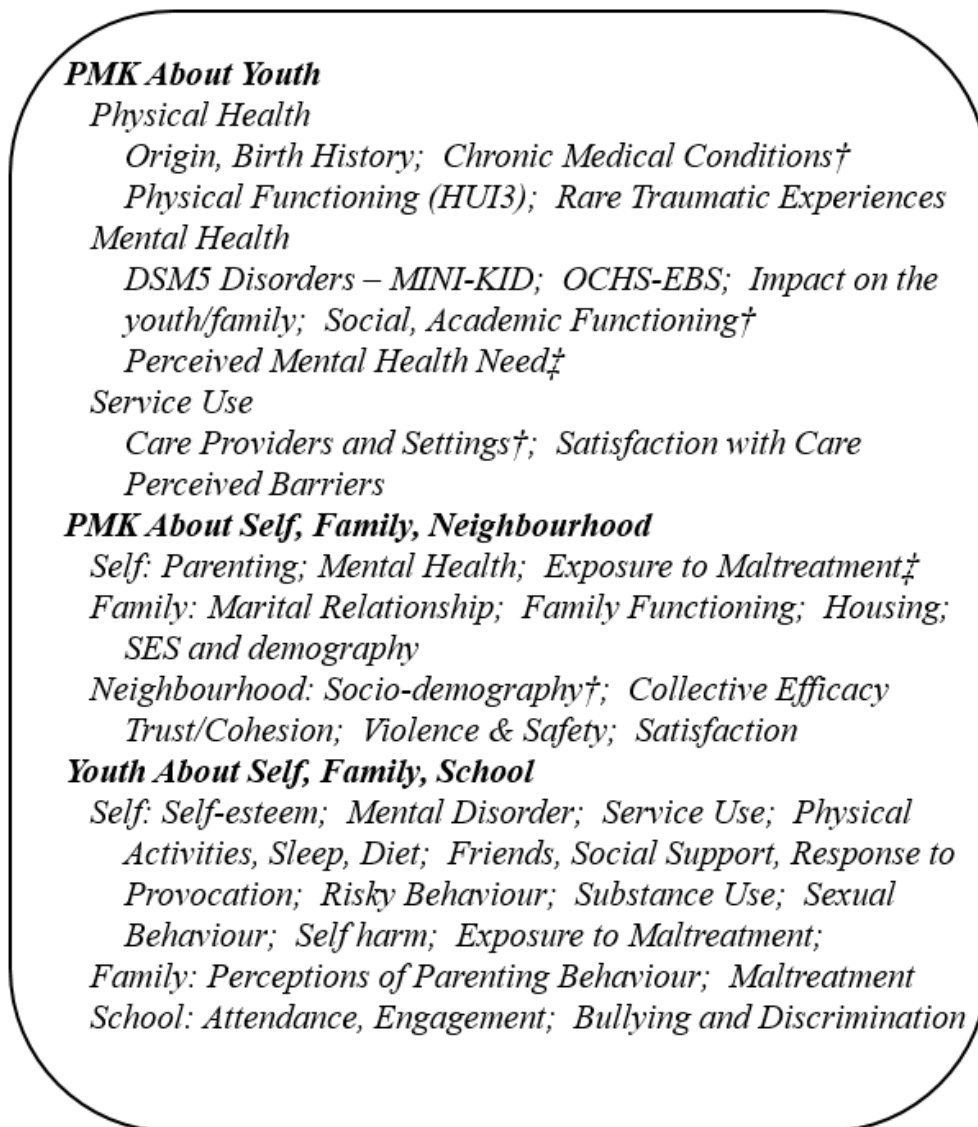


Figure 3. Data Sources and Concepts for the 2014 OCHS.



Note: †link with Administrative data ‡report from spouse/partner

Appendix. 2014 OCHS concept list by respondent.

PERSON MOST KNOWLEDGEABLE (PMK)	YOUTH (Age 12-13 & Age 14-17)	TEACHER	SPOUSE/PARTNER	INTERVIEWER
About child (selected child & siblings)	About self	About child	About child	About neighbourhood
A) GENERAL HEALTH & FUNCTIONING Child background, birth history & exposure to stressful experiences Health, developmental & chronic conditions & functioning Social functioning B) MENTAL HEALTH MINI-KID diagnostic interview (selected child only) Emotional & behavioural problems (OCHS-EBS) Impact of problems Perceived problems & need for help E) PARENTING Parenting & disagreements D) SERVICE USE Sources of help (expanded module for selected child only) Child welfare (selected child only) Juvenile justice (selected child only) Perceived barriers to service Prescription medication (selected child only) E) HEALTHY BEHAVIOURS & ACTIVITIES Sleep, diet, exercise & activities F) SCHOOL Academic functioning	A) HEALTH & FUNCTIONING Health Healthy behaviours B) MENTAL HEALTH MINI-KID diagnostic interview (selected child only) Emotional & behavioural problems (OCHS-EBS) Impact of problems Perceived problems & need for help Self-esteem Eating problems (age 14 to 17 only) C) RISKY BEHAVIOURS Substance use Safety (age 14 to 17 only) Sexual behaviour & dating violence (age 14 to 17 only) Self harm & suicidal behaviour (age 14 to 17 only) Exposure to stressful life experiences (age 14 to 17 only) Exposure to violence (age 14 to 17 only) D) SERVICE USE Sources of help (age 14 to 17 only) E) FAMILY Relationships with family members	Student information English/French language learning Student achievement Work habits School expectancies Emotional & behavioural problems Perceived problems & need for help Social functioning Special instruction Learning problems IEP About self & class Language of instruction Teacher background Years of experience	Health Emotional & behavioural problems Impact of problems Perceived problems & need for help Social & academic functioning Parenting About self Health, height & weight Long-term conditions & functional limitations Tobacco use Partner depression K-6 Mental health problems	Neighbourhood rating

Victimization/bullying
School services
Child school activities

About self

A) HEALTH

Health, chronic conditions & functioning
Prescription medications

B) MENTAL HEALTH

PMK depression K-6
Substance use and involvement with the law

Positive mental health

C) RELATIONSHIPS

Exposure to violence
Marital conflict
Family functioning

D) NEIGHBOURHOOD

Collective efficacy & trust/cohesion
Neighbourhood violence, safety & satisfaction

E) HOUSING

Length of time lived in the neighbourhood & reason for moving
About the dwelling
Dwelling satisfaction

F) DEMOGRAPHICS & SES

Race/ethnicity, immigrant & refugee status
Language spoken at home
Religious affiliation and practice
Education
Occupation
Social standing
Discrimination
Household income
Food insecurity

About spouse/partner

DEMOGRAPHICS & SES

Race/ethnicity, immigrant & refugee status
Language spoken at home

Parenting (age 14 to 17 only)

F) SCHOOL

Academic achievement
School engagement
Victimization/bullying
School mental health

G) SOCIAL RELATIONSHIPS

Relationships
Friends and support
Response to provocation (age 12 to 13 only)

H) ACTIVITIES

Civic activities and work (age 14 to 17 only)

Religious affiliation and practice

Education

Occupation