

# Child Psychiatric Epidemiology and Canadian Public Policy-Making: The State of the Science and the Art of the Possible

Charlotte Waddell, MSc, MD, CCFP, FRCPC<sup>1</sup>, David R Offord, MD, FRCPC<sup>2</sup>,  
Cody A Shepherd, BA (Hon)<sup>3</sup>, Josephine M Hua, BSc<sup>4</sup>, Kimberley McEwan, MSc, PhD, RPsych<sup>5</sup>

Epidemiological studies have characterized the high burden of suffering that child psychiatric disorders cause—14% of children (1.1 million in Canada) have clinically important disorders at any given time. In this review, we summarize the recent research and discuss several unresolved scientific issues that must be addressed to make epidemiology more useful to policy-makers. We then discuss implications for policy-making to improve children's mental health outcomes. Overall, given the high prevalence rates, increasing clinical services alone will not suffice; rather, a multifaceted mix of strategies is required.

(Can J Psychiatry 2002; 47:825–832)

See page 831 for funding support and page 832 for author affiliations.

## Clinical Implications

- Child psychiatric disorders cause a high burden of suffering.
- Increasing clinical services alone will not reduce the burden of suffering.
- Epidemiology can assist policy-makers to plan a mix of programs and services.

## Limitations

- Several methodological issues need to be resolved in the research.
- More studies are needed on causal factors and patterns of service use.
- Research–policy links need improvement.

**Key Words:** *child psychiatry, epidemiology, public policy*

“Politics is the art of the possible.” Bismarck (1)

Epidemiology—the study of the distribution and determinants of health and illness in human populations—plays a crucial role in characterizing the burden of suffering associated with any health problem, including child psychiatric disorders (2). Good-quality epidemiological information is essential for developing sound public policies to improve children's mental health (3). In general, the intended outcomes of children's mental health policies are optimal development and well-being for all children, a reduction in the impairments associated with mental disorders, and the effective and efficient use of public funds toward these ends (4–6). Good qual-

ity epidemiological information can assist policy-makers in achieving each of these outcomes. In particular, the following kinds of information are important for policy-making: data on prevalence to estimate needs, data on causal risk and protective factors to inform the design of effective prevention and treatment programs, and data on patterns of service use to monitor outcomes (4).

Several challenges complicate policy-making in children's mental health. Development is an overarching issue that must always be considered in planning any programs or services for children (7). Moreover, because children develop in close interaction with their environment, their needs cannot be considered separately from conditions at home, at school, and in

the community (8). Children's mental health policies must therefore take both development and broader perspectives on the determinants of health into account (9,10). In addition, children's services are typically provided by a diverse array of sectors, including health, education, social services, and (sometimes) child protection and justice services. This situation requires significant coordination among the multiple sectors involved (5,6). These challenges make it even more crucial for policy-makers in children's mental health to have access to good-quality epidemiological information to guide planning.

Public policy-making is inherently complex, occurring in a crucible of competing ideas, interests, and institutional structures, where scientific information such as that derived from epidemiology is only one of many influences (11). Children's mental health must compete with other health care needs, as well as with a myriad of other issues facing legislative and administrative policy-makers, issues such as education, the environment, fiscal restraint, and even road repair. The "art of the possible" for policy-makers concerned with children's mental health often involves making trade-offs in dynamic, contentious, and nonrational environments.

This review examines how child psychiatric epidemiology can be more useful to policy-makers who craft the art of the possible in the complex context of children's mental health. First, we summarize recent child psychiatric epidemiological research that pertains to Canadian public policy-making. While not all research should have eventual practical applications, the need for sound public policy poses an increasing challenge to the scientific community with respect to the relevance of research topics, methods, and findings. Consequently, we also discuss the state of the science and the issues that need to be resolved to make the research more useful to policy-makers. Finally, we comment on implications for policy-making.

## Review of the Research

### *Background*

The burden of suffering for any health problem may be characterized by its frequency, morbidity, and associated human and fiscal costs (12). According to these criteria, child psychiatric disorders cause a large burden of suffering. In terms of frequency, studies over the past 20 years have suggested that, at any given time, approximately 20% of children may have significant mental disorders (3,13,14). When present, these disorders permeate every aspect of development and functioning at home, at school, and in the community (6). Many childhood disorders also persist, affecting eventual adult productivity and functioning (7). The associated human and fiscal costs are enormous, arguably making psychiatric disorders the leading children's health problem today (5,6).

While previous studies have covered a wide range of populations and problems, they have not always focused on issues directly pertinent to Canadian children. For this reason, we undertook a review of the recent child psychiatric epidemiological research with a specific focus on relevance for Canadian public policy-making.

### *Methodology*

We used the following approach to select studies for review: original articles published in English over the past 20 years were initially identified using Medline. We used the following search terms: mental disorders, epidemiology, prevalence, and child (age 0 to 18 years). Reference lists in recent key review articles (3,7,13,14) were also searched by hand.

We wanted to focus on studies that were large-scale, rigorously designed, and reasonably comprehensive in terms of ages and disorders assessed. Further, we wanted to focus on studies conducted in populations that were comparable with Canadian children. Consequently, the following criteria were used to select studies for more detailed review: studies had to assess representative community samples of at least 1000 children from Canada, the US, Great Britain, Australia, or New Zealand. In addition, studies had to include both children and adolescents and both boys and girls. They had to employ standardized assessment protocols for evaluating clinically important symptoms based on the DSM (III, or later editions, or equivalent) (15). To further ensure that only clinically important disorders were included, studies had to specifically assess impairment. They also had to incorporate reports from multiple informants, such as children, parents, and teachers. Studies had to report overall prevalence rates and rates for 2 or more disorders. Finally, they had to examine associated factors, patterns of service use, or both.

A total of 1263 relevant publications were initially identified using Medline. Most large-scale studies were described in several different publications. As a result, publications were grouped according to study and then assessed by the first and third authors. We identified 15 unique studies as being likely to meet criteria (13 from Medline and 2 from the hand search). Of these 15 studies, 6 met criteria for inclusion in our review. Final decisions about which studies to include were reached by consensus among the first, second, and third authors.

### *Summary of Findings*

The following 6 studies met criteria for inclusion in our review: the Ontario Child Health Study (OCHS) (16–19), the NIMH Methods for the Epidemiology of Child and Adolescent Mental Disorders (MECA) Study (20–22), the Great Smoky Mountains Study (GSMS) (23–26), the Virginia Twin Study of Adolescent Behavioural Development (VTSABD) (27), the Quebec Child Mental Health Survey (QCMHS) (28), and the British Child Mental Health Survey (BCMHS)

(29–32). We were unable to include a recent Australian study—the Child and Adolescent Component of the National Survey of Mental Health and Well-being (33)—which would have met criteria if impairment had been assessed.

Table 1 summarizes study characteristics, methodology, and overall prevalence rates for all 6 studies. Table 2 provides disorder-specific prevalence rates. Table 3 summarizes associated factors. Table 4 presents patterns of service use.

Some key findings emerged with respect to the prevalence of children’s mental disorders, associated factors, and patterns of service use. Table 1 shows that the overall community prevalence rates for clinically important mental disorders (based on assessment of both symptoms and impairment) ranged from 10% to 20%. This table also reveals the

considerable heterogeneity among studies regarding sample size, age of children, basic methodology, and time frame.

Table 2 shows that the estimated overall prevalence rate for all disorders was 14%, which translates into approximately 1.1 million Canadian children who may be affected. Table 2 also outlines estimated disorder-specific prevalence rates compiled from all 6 studies. Anxiety, attention, conduct, and depressive disorders were the most common.

Two studies also reported overall comorbidity rates and found that 47% to 68% of children with mental disorders had 2 or more disorders (18,27). In addition, OCHS found that children with mental disorders also experienced more chronic physical health and school problems (18).

All studies except MECA reported on factors that were significantly associated with increased prevalence of mental

Characteristic	Studies reviewed					
	OCHS	MECA	GSMS	VTSABD	QCMHS	BCMHS
Survey location	Ontario, Canada	Connecticut, Georgia, New York, Puerto Rico, US	North Carolina, US	Virginia, US	Quebec, Canada	England, Scotland, and Wales
Sampled population	All children living in a household	All children living in a household in 8 urban counties	All children attending public school in 11 rural counties	All families with twins	All children living in a household	All children living in a household
Excluded from sample	Residence on a First Nations reserve or in an institution	Primary language other than English or Spanish	First Nations children (surveyed separately)	Ethnicity other than "white"	Mental or sensory disabilities, residence on a First Nations reserve or in a remote area	No postal code for household address
Sample size	2679	1285	1015	2762	2004	10 438
Age of subjects	4–16 years	9–17 years	9, 11, 13 years	8–16 years	6–14 years	5–15 years
Follow-up	After 4 years	—	Longitudinal cohort study	Longitudinal cohort study	na	After 18 months
Diagnostic criteria	DSM-III	DSM-III-R	DSM-III-R	DSM-III-R	DSM-III-R	DSM-IV, ICD-10
Assessment of symptoms	Scales based on CBCL	DISC	CAPA	CAPA	DISC, Dominic	DAWBA, SDQ
Assessment of impairment	Rutter severity criteria	DISC, CGAS	CAPA, CGAS, CAFAS, SIS	CAPA	DISC	DAWBA, SDQ
Informants	Children (12–16 years), parents, teachers	Children, parents	Children, parents	Children, parents, teachers	Children, parents, teachers (6–11 years)	Children (11–16 years), parents, teachers
Definition of "caseness"	Clinician judgement, child, parent, or teacher report	Computer algorithms, child or parent report	Computer algorithms, child or parent report	Computer algorithms, child or parent report	Prevalence rates reported separately by informant	Computer-assisted clinician ratings of all reports
Time frame (months)	6	6	3	3	6	6
Overall prevalence (%)	18.1	12.8	20.3	14.2	12.7	9.5

CBCL = Child Behaviour Checklist; DISC = Diagnostic Interview Schedule for Children; CAPA = Child and Adolescent Psychiatric Assessment; DAWBA = Development and Well-Being Assessment; SDQ = Strengths and Difficulties Questionnaire; CGAS = Children’s Global Assessment Scale; CAFAS = Child and Adolescent Functional Assessment Scale; SIS = Social Interactions Survey

OCHS = Ontario Child Health Study; MECA = National Institute of Mental Health Methods for the Epidemiology of Child and Adolescent Mental Disorders Study; GSMS = Great Smoky Mountains Study; VTSABD = Virginia Twin Study of Adolescent Behavioral Development; QCMHS = Quebec Child Mental Health Survey; BCMHS = British Child Mental Health Survey

Disorder	Prevalence (%)						Estimated prevalence (%) <sup>c</sup>	95% CI <sup>c</sup>	Approximate number in Canada <sup>d</sup>
	OCHS	MECA <sup>a</sup>	GSMS	VTSABD	QCMHS <sup>b</sup>	BCMHS			
Any anxiety disorder	—	9.6	5.7	—	7.0	3.8	6.4	4.2-9.2	507 000
ADHD <sup>e</sup>	6.1	3.3	1.9	1.4	5.4	1.4	4.8	2.7-7.3	380 000
Conduct disorder	5.4	3.2	3.3	4.3	1.0	2.4	4.2	2.4-6.5	333 000
Any depressive disorder	—	4.5	1.5	1.2	2.5	0.9	3.5	1.0-7.1	277 000
Substance abuse	—	1.4	0.1	—	—	—	0.8	0.5-1.3	63 000
PDD <sup>e, f</sup>	—	—	—	—	—	0.3	0.3	—	24 000
OCD <sup>e</sup>	—	—	0.2	—	—	0.2	0.2	0.1-0.3	16 000
Any eating disorder	—	—	0.1	—	—	0.1	0.1	0.1-0.2	8 000
Tourette syndrome	—	—	0.1	—	—	0.1	0.1	0.1-0.2	8 000
Schizophrenia <sup>f</sup>	—	—	0.1	—	—	—	0.1	—	8 000
Bipolar disorder <sup>f</sup>	—	—	< 0.1	—	—	—	< 0.1	—	< 8 000
Any disorder <sup>g</sup>	18.1	12.8	20.3	14.2	12.7	9.5	14.3	11.4-17.6	1 134 000

<sup>a</sup>Symptoms and "moderate" impairment  
<sup>b</sup>Mean of separate rates reported by children, parents (incorporating impairment), and teachers (where available)  
<sup>c</sup>Bayesian approach used to pool prevalence rates and account for sample size (34); rates from 3 or more studies pooled using a flat prior and a random-effects model, in the expectation of significant heterogeneity in sample size, age, methodology, and time frame; otherwise, rates pooled using a flat prior and a fixed-effects model  
<sup>d</sup>Estimated prevalence multiplied by 2001 Canadian census figure of 7 927 000 children aged 0 to 19 years (35)  
<sup>e</sup>ADHD = attention-deficit hyperactivity disorder; PDD = pervasive developmental disorder; OCD = obsessive-compulsive disorder  
<sup>f</sup>Estimated prevalence and approximate number in Canada based on rates from a single study  
<sup>g</sup>May include disorders other than those listed above

Factor	Relationship Between Factor and Prevalence of One or More Disorders <sup>a</sup>				
	OCHS	GSMS	VTSABD	QCMHS	BCMHS
Age	Younger > older (boys) Older > younger (girls)	Younger = older	Older = younger (behavioural) Older > younger (emotional)	Younger > older (boys) Older > younger (girls)	Older > younger
Sex	Boys > girls (younger) Girls > boys (older)	Boys > girls	Boys > girls (behavioural) Girls > boys (emotional)	Boys > girls (overall) Girls > boys (older)	Boys > girls
Residence	Urban > rural	Urban = rural	—	Urban = rural	Urban = rural
Family Income	Public income assistance > no public income assistance	Below poverty line > above poverty line	—	—	Neither parent working for pay > one working > both working
Ethnicity	—	Native American = "White" <sup>b</sup> African American = "White" <sup>b</sup>	—	—	"Black" = "White" = South Asian

<sup>a</sup>> indicates significantly increased prevalence; <sup>b</sup>= indicates no significant differences in prevalence

	OCHS (Ontario, Canada)	MECA (Eastern and Southern US)	GSMS (North Carolina, US)	BCMHS (England, Scotland, and Wales)
Rate of service-use (%)	16	25	22	27
Type of service used	Community mental health clinics, private practitioners, and social service and justice agencies	Community mental health clinics and private practitioners	Community mental health clinics, psychiatric hospitals, residential and foster treatment settings, and private practitioners	Community mental health and pediatric clinics

disorders in children, as shown in Table 3. With respect to sex, boys are at greater risk for mental disorders. Age, however, is also a factor: risks for boys are greater when they are younger, while risks for girls are greater when they are older. There were many disorder-specific rate variations; nevertheless, these data suggest that interactions may exist between age and sex, affecting prevalence of mental disorders. Significant differences in prevalence rates were not found between urban and rural populations in 3 of the 4 studies that measured this variable. However, low family income was associated with significantly higher rates of mental disorder in all 3 studies that measured this variable. Only 2 studies looked at ethnic groups, and no differences were found. Although association does not imply causation, determining associated factors is an important first step in identifying causal risk and protective factors (2). These reports on factors associated with increased prevalence of mental disorders provide useful leads for further prospective research to establish which factors may be causal and thus worth targeting in children's mental health prevention and treatment programs.

All studies except the VTSABD and the QCMHS reported patterns of service use. As Table 4 shows, only 16% to 27% of children with mental disorders received specialized mental health services from community mental health clinics, private practitioners, or related social agencies (although each study used somewhat different criteria to define these services). According to the OCHS, however, 59% of children with mental disorders received primary health care, and 24% received special education services for these problems (18). The BCMHS reported that 40% of children with mental disorders received primary health care, and 50% received education services for mental health problems (31). The education system was described as "the major player" in the system of care for children with mental health problems in the GSMS: for most children who received any mental health care, the school system was the sole provider (23, p 152).

### The State of the Science: Unresolved Research Issues

Based on this review, it appears that progress has been made in child psychiatric epidemiology, particularly with the use of standardized assessments that include measures of impairment and multiple informants. Data have now been collected from various settings, and consistent findings are emerging. In particular, the finding that 14% of children have clinically important mental disorders is robust, based on the 6 studies reviewed here. Concerning associated factors such as sex and age, boys are at greater risk overall, although risks for boys are greater when they are younger, and risks for girls are greater when they are older. Low family income is linked with significantly higher rates of mental disorders for all children. More

research is required to establish causation regarding these and other associated factors. With patterns of service use, it appears that most children with mental disorders do not receive specialized mental health services for their mental health problems, although many receive primary health care and school services.

Despite progress in the research, there are 3 unresolved methodological issues in child psychiatric epidemiology that mitigate its usefulness for policy-makers. The first issue involves defining thresholds for what constitutes a clinically important disorder, or "caseness." Essentially, epidemiological studies must identify children with disorders on the basis of having both significant symptoms and significant impairment (7,13). The use of standardized protocols has improved consistency in assessing symptoms, but there is still no agreement on how to assess impairment or on how to combine measures of both symptoms and impairment (3). This inconsistency contributes to the considerable variation in overall prevalence rates (10% to 20%) found among studies, as Table 1 illustrates.

The use of informants is a second unresolved methodological issue. Most authors agree that multiple informants should be used in child psychiatric epidemiological studies, including children (particularly for older age groups), parents, and teachers (13). Yet, poor agreement among informants is frequently reported (18,21,28). Children, for example, typically report higher rates of internalizing symptoms, such as anxiety and depression, while parents report higher rates of externalizing symptoms, such as conduct problems (34). The basic identification of child psychiatric disorders appears to be greatly influenced by informants' context and perceptions (35). However, as Table 1 illustrates, there is not yet consensus on how to reconcile, or even report, conflicting prevalence data obtained from different informants. This lack of consensus also contributes to variation in prevalence rates reported between studies.

A third unresolved methodological issue in child psychiatric epidemiology involves the lack of standardization among studies regarding which data are collected and how results are reported (3,13). As Table 2 illustrates, each study assessed different disorders or groups of disorders. Some studies were also more comprehensive than were others in terms of the number of mental disorders assessed. Comparing overall prevalence rates then becomes problematic. For instance, the GSMS assessed more disorders than did other studies and, as a result, may report higher overall prevalence rates than do studies assessing fewer disorders (24). As Tables 3 and 4 illustrate, each study also collected and reported data on different associated factors and service-use variables. More consistency in collecting and reporting data would greatly help policy-makers, as well as other researchers, to interpret research findings.



In addition to these 3 unresolved methodological issues, several important questions remain unanswered in the current child psychiatric epidemiological research, particularly concerning associated factors and patterns of service use. The issue of diversity regarding First Nations and other cultural groups has not been adequately addressed (3). Little is known about the prevalence of mental disorders in younger children (35). Prospective studies still need to be conducted to better understand the role of development, comorbidity, and prognosis (7,36,37). Prospective studies are also needed to determine which associated factors play a causal role in the onset of disorders (38). Finally, patterns of service use are poorly understood. That most children with mental disorders do not receive specialized mental health services but may receive primary health care and school services has significant implications for service planning and thus merits further study (3).

Newer studies such as the GSMS are beginning to address some of these unresolved methodological issues and unanswered questions. The GSMS is assessing children longitudinally. It incorporates structured measures of both symptoms and impairment, using multiple informants. It is also examining different cultural groups and patterns of service use in different sectors (23,24,26). The OCHS follow-up will address many of the same issues in Canada (Boyle MH, Offord DR, Racine Y, personal communication, 2002).

Ultimately, policy-makers need to receive clear messages about which research findings merit action. Ensuring that methodological issues and unanswered questions are resolved are good first steps. However, the communication of research findings must also be improved (an overarching issue in child psychiatric epidemiology, as well as in many other health fields). Typically, the results of child psychiatric epidemiological studies are reported mainly in academic journals in formats that are relatively inaccessible to policy-makers. For policy-makers to appropriately apply research findings, they must first be communicated in user-friendly formats that better suit policy-makers' needs and environments (11). To raise public awareness about the importance of children's mental health, child psychiatric epidemiological research findings also need to be communicated better to popular media and child advocacy groups. Perhaps most important, more research needs to be conducted in closer partnership with policy-makers to help ensure better relevance and dissemination.

### **The Art of the Possible: Implications for Policy-Making**

Child psychiatric epidemiology is crucial for sound policy development in the public sector. Researchers need to do their part by conducting high-quality research and ensuring better communication of research findings to policy-makers and

others. The findings of recent studies, however, also pose a distinct challenge to policy-makers.

Most important, policy-makers must come to terms with the high numbers of children involved. Clearly, there is a policy shortfall, given that 14% of children, or 1.1 million in Canada, likely have clinically important mental disorders and that most of these children do not receive specialized mental health services. However, increased investment in clinical services alone is unlikely to achieve a marked reduction in the burden of suffering (12). At a minimum, the basic human resource and training issues preclude reaching all children in need with clinical services (39). Complicating matters further, evidence is still lacking on effectiveness for many clinical treatments (6).

Instead, tackling the burden of suffering likely requires investing in population (or public) health strategies, in addition to clinical services. Population health models focus on whole populations, or on groups within populations, and on improving family incomes, social supports, early child development, and other nonmedical determinants of health for all children (9,10). Conversely, clinical service models emphasize the provision of diagnostic and treatment services for individuals who have disorders. Historically, population health and clinical models have been seen as entirely distinct from one another (40). Recently, however, consensus has emerged that the 2 approaches can be complementary and that both are needed to improve health outcomes (41).

Offord and colleagues argued for multifaceted approaches in children's mental health, taking both population health and clinical considerations into account (12). They suggested that lowering the burden of suffering can only be achieved with a rational mix of universal programs to promote health for all children, targeted preventive interventions for children at risk, and clinical services for children with severe disorders. They argued that all 3 levels of intervention are necessary and that synergies may exist between the levels. For instance, universal programs involving primary health care and early child development may "till the soil," so that targeted programs can be more effective, which may in turn reduce the need for specialized clinical services. Jenkins agreed that mental health policies should be multifaceted (4). She proposed that community-based programs and services, including schools, should focus on mental health promotion and prevention, while primary health care practitioners should handle most basic mental health problems, and specialists should focus on supporting primary care and providing services to those with the highest needs.

In coming to terms with the high numbers of children involved, policy-makers must ensure the effective and efficient use of public funds. Recent reports from major American

organizations, such as the National Institute of Mental Health and the United States Surgeon General, have highlighted the numerous administrative problems that hamper children's mental health service delivery efforts with regard to effectiveness and efficiency (5,6). Problems include fragmentation among children's mental health and related services, discipline insularity, lack of evidence-based practice, and inability to monitor outcomes (5,6,39). These recent reports suggest that coordination is urgently needed among the various sectors involved with children. These sectors may include (depending on the child's developmental stage and need for services) public health, primary care, early child development, social support, school, specialized mental health, child protection, justice, hospital, and other programs and services. These reports discuss the need to promote interdisciplinary approaches and they advocate for redirecting public funds toward interventions that have demonstrated effectiveness, based on the best available research evidence. In addition, the inability to monitor outcomes over the long term hampers planning in most jurisdictions. Attention to all these issues is imperative if children's mental health outcomes are to improve.

Ultimately, to guide their efforts at improving mental health outcomes for children, policy-makers need timely and relevant research information that is communicated clearly on an ongoing basis. Researchers need to do their part to facilitate this process. By establishing ongoing collaborative partnerships with researchers, policy-makers can also contribute to improved timeliness and relevance by ensuring that their concerns are incorporated into the design, conduct, and dissemination of the research at provincial and national levels. Meanwhile, policy-makers have a responsibility to ensure that the mechanisms are in place within their organizations to work effectively with researchers and to apply research information as it becomes available.

## Conclusions

Returning to the art of the possible, child psychiatric epidemiology provides much in the way of rational evidence, but public policy-making involves many overriding nonrational political processes, as well. Although there will always be limits to the usefulness of any research evidence in policy-making, the science of epidemiology has the potential to help policy-makers by describing children's mental health needs in the population and by providing the basis for long-term strategies to improve outcomes. More pragmatically, the data on prevalence rates and patterns of service use may be persuasive in obtaining additional resources for children's mental health in times of fiscal restraint. Similarly, these data can provide the rationale for balanced responses when interest groups lobby for a single disorder or for a single service approach.

Researchers can make child psychiatric epidemiology more useful to policy-makers by resolving the outstanding issues that limit the state of the science. Meanwhile, policy-makers in children's mental health must grapple with a high burden of suffering that demands multifaceted public policy strategies in response. Moreover, both researchers and policy-makers can benefit from forming better partnerships to ensure ongoing research relevance, dissemination, and application.

The common goal of researchers and policy-makers is to reduce the burden of suffering associated with children's mental disorders. In contrast to Bismarck, Galbraith commented: "Politics is not the art of the possible. It consists in choosing between the disastrous and the unpalatable" (43). If Galbraith is right, at the very least, child psychiatric epidemiology can assist policy-makers to navigate between the unpalatability of diverting resources from competing priorities and the disaster of not investing enough in children's mental health. Otherwise, the burden of suffering associated with children's mental disorders in Canada will remain unacceptably high.

## Funding and Support

British Columbia's Ministry for Children and Family Development provided funding to support this work. A Career Scholar Award from the Michael Smith Foundation for Health Research also supports Charlotte Waddell. Dan Offord is supported by the Human Growth and Development Program of the Canadian Institute for Advanced Research.

## Acknowledgements

We thank George McLaughlin for comments on earlier drafts of this manuscript and Paul Waraich for advice on reporting data.

## References

1. Bismarck O. In conversation with M. Waldeck, August 11, 1867. Oxford Reference Online. Oxford: Oxford University Press. Retrieved September 3, 2002, from <http://www.oxfordreference.com/>.
2. Bhopal RS. Concepts of epidemiology: an integrated introduction to the ideas, theories, principles, and methods of epidemiology. New York: Oxford University Press; 2002.
3. Roberts RE, Attkisson CC, Rosenblatt A. Prevalence of psychopathology among children and adolescents. *Am J Psychiatry* 1998;155:715-25.
4. Jenkins R. Making psychiatric epidemiology useful: the contribution of epidemiology to government policy. *Acta Psychiatr Scand* 2001;103:2-14.
5. United States Department of Health and Human Services. Mental health: a report of the Surgeon General. Rockville (MD): Department of Health and Human Services; 1999.
6. National Institute of Mental Health. Blueprint for change: research on child and adolescent mental health. Washington (DC): National Institute of Mental Health; 2001.
7. Angold A, Costello EJ. Developmental epidemiology. *Epidemiol Rev* 1995;17:74-82.
8. Shirk S, Talmi A, Olds D. A developmental psychopathology perspective on child and adolescent treatment policy. *Dev Psychopathol* 2000;12:835-55.
9. Evans RG, Barer ML, Marmor TR, editors. Why are some people healthy and others not? The determinants of health of populations. Hawthorne (NY): Aldine De Gruyter; 1994.
10. Hertzman C. The case for child development as a determinant of health. *Can J Public Health* 1998;89:S14-S19.
11. Lomas J. Improving research dissemination and uptake in the health sector: beyond the sound of one hand clapping. Commentary C97-1. Hamilton (ON): McMaster University Centre for Health Economics and Policy Analysis; 1997.
12. Offord DR, Kraemer HC, Kazdin AE, Jensen PS, Harrington R. Lowering the burden of suffering from child psychiatric disorder: trade-offs among clinical,

- targeted and universal interventions. *J Am Acad Child Adolesc Psychiatry* 1998;37:686–94.
13. Costello EJ. Developments in child psychiatric epidemiology. *J Am Acad Child Adolesc Psychiatry* 1989;28:836–41.
  14. Brandenburg NA, Friedman RM, Silver SE. The epidemiology of childhood psychiatric disorders: Prevalence findings from recent studies. *J Am Acad Child Adolesc Psychiatry* 1990;29:76–83.
  15. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders*. (4th ed. Text revision). Washington (DC): American Psychiatric Association; 2000.
  16. Boyle MH, Offord DR, Hofmann HG, Catlin GP, Byles JA, Cadman DT, and others. Ontario Child Health Study. I. Methodology. *Arch Gen Psychiatry* 1987;44:826–31.
  17. Offord DR, Boyle MH, Szatmari P, Rae-Grant NI, Links PS, Cadman DT, and others. Ontario child health study. Six-month prevalence of disorder and rates of service utilization. *Arch Gen Psychiatry* 1987;44:832–6.
  18. Offord DR, Boyle MH, Fleming JE, Monroe Blum H, Rae Grant N. Ontario child health study: summary of selected results. *Can J Psychiatry* 1989;34:483–91.
  19. Offord DR, Boyle MH, Racine Y, Fleming JE, Cadman DT, Monroe Blum H, and others. Outcome, prognosis, and risk in a longitudinal follow-up study. *J Am Acad Child Adolesc Psychiatry* 1992;31:916–23.
  20. Lahey BB, Flagg EW, Bird HR, Schwab-Stone ME, Canino G, Dulcan MK, and others. The NIMH Methods for the Epidemiology of Child and Adolescent Mental Disorders (MECA) study: background and methodology. *J Am Acad Child Adolesc Psychiatry* 1996;35:855–64.
  21. Shaffer D, Fisher P, Dulcan MK, Davies M, Piacentini J, Schwab-Stone ME, and others. The NIMH Diagnostic Interview Schedule for Children Version 2.3 (DISC-2.3): description, acceptability, prevalence rates, and performance in the MECA Study. *J Am Acad Child Adolesc Psychiatry* 1996;35:865–77.
  22. Leaf PJ, Alegria M, Cohen P, Goodman SH, McCue Horwitz S, Hoven C, and others. Mental health service use in the community and schools: results from the four-community MECA study. *J Am Acad Child Adolesc Psychiatry* 1996;35:889–97.
  23. Burns BJ, Costello EJ, Angold A, Tweed D, Stangl D, Farmer E, and others. Children's mental health service use across sectors. *Health Affairs* 1995;14:147–59.
  24. Costello EJ, Angold A, Burns BJ, Stangl DK, Tweed DL, Erkanli A, and others. The Great Smoky Mountains Study of Youth: goals, design, methods, and the prevalence of DSM-III-R disorders. *Arch Gen Psychiatry* 1996;53:1129–36.
  25. Costello EJ, Farmer EMZ, Angold A, Burns BJ, Erkanli A. Psychiatric disorders among American Indian and White youth in Appalachia: The Great Smoky Mountains Study. *Am J Public Health* 1997;87:827–32.
  26. Ezepeleta L, Keeler G, Erkanli A, Costello EJ, Angold A. Epidemiology of psychiatric disability in childhood and adolescence. *J Child Psychol Psychiatr* 2001;42:901–14.
  27. Simonoff E, Pickles A, Meyer JM, Silberg JL, Maes HH, Loeber R, and others. The Virginia Twin Study of Adolescent Behavioural Development: influences of age, sex, and impairment on rates of disorder. *Arch Gen Psychiatry* 1997;54:801–8.
  28. Breton JJ, Bergeron L, Valla JP, Berthiaume C, Gaudet N, Lambert J, and others. Quebec child mental health survey: prevalence of DSM-III-R mental health disorders. *J Child Psychol Psychiatr* 1999;40:375–84.
  29. Goodman R, Ford T, Richards H, Gatward R, Meltzer H. The Development and Well-Being Assessment: description and initial validation of an integrated assessment of child and adolescent psychopathology. *J Child Psychol Psychiatry* 2000;41:645–55.
  30. Goodman R, Ford T, Simmons H, Gatward R, Meltzer H. Using the Strengths and Difficulties Questionnaire (SDQ) to screen for child psychiatric disorders in a community sample. *Br J Psychiatry* 2000;177:534–9.
  31. Meltzer H, Gatward R, Goodman R, Ford T. *Mental health of children and adolescents in Great Britain*. London (UK): The Stationery Office; 2000.
  32. Goodman R, Ford T, Meltzer H. Mental health problems of children in the community: 18 month follow up. *BMJ* 2002;324:1496–7.
  33. Sawyer MG, Arney F, Baghurst PA, Clark JJ, Graetz BW, Kosky RJ, and others. The mental health of young people in Australia: key findings from the child and adolescent component of the national survey of mental health and well-being. *Aust N Z J Psychiatry* 2001;35:806–14.
  34. Offord DR, Boyle MH, Racine Y, Szatmari P, Fleming JE, Sanford MN, and others. Integrating assessment data from multiple informants. *J Am Acad Child Adolesc Psychiatry* 1996;35:1078–85.
  35. Offord DR, Bennett KJ. Epidemiology and prevention. In: Lewis M, editor. *Child and adolescent psychiatry: a comprehensive textbook*. 3rd edition. Philadelphia (PA): Lippincott, Williams and Wilkins; 2002. p 1320–35.
  36. Angold A, Costello EJ, Erkanli A. Comorbidity. *J Child Psychol Psychiatr* 1999;40:57–87.
  37. Costello EJ, Angold A. Developmental psychopathology and public health: past, present and future. *Dev Psychopathol* 2000;12:599–618.
  38. Kraemer H, Kazdin A, Offord DR, Kessler R, Jensen P, Kupfer D. Coming to terms with the terms of risk. *Arch Gen Psychiatry* 1997;54:337–43.
  39. Burns BJ, Hoagwood K, Mrazek PJ. Effective treatment for mental disorders in children and adolescents. *Clin Child Fam Psychol Rev* 1999;2:199–254.
  40. Predy G, Rasmussen L, Langer F, Edwards J, Jones DB. Population health: making it relevant in an integrated health system. *Ann R Coll Physicians Surg Can* 2002;35:86–9.
  41. New York Academy of Medicine. *Medicine and public health*. New York : Health Administration Press; 1998.
  42. Galbraith JK. Letter to President Kennedy, March 2, 1962. Oxford Reference Online. Oxford University Press. Retrieved September 3, 2002, from <http://www.oxfordreference.com/>.
  43. Eddy DM, Hasselblad V, Shachter R. Meta-analysis by the confidence interval method. The statistical synthesis of evidence. San Diego (CA): Academic Press; 1992.
  44. Statistics Canada. Population by sex and age. Retrieved July 15, 2002, from <http://www.statcan.ca/english/Pgdb/People/Population/demo10a.htm>.

<sup>1</sup>Assistant Professor, Mental Health Evaluation and Community Consultation Unit, Department of Psychiatry, University of British Columbia, Vancouver, British Columbia.

<sup>2</sup>Professor Emeritus, Department of Psychiatry and Behavioural Neurosciences, McMaster University, Hamilton, Ontario; Director, Canadian Centre for Studies of Children at Risk, McMaster University and Hamilton Health Sciences Corporation, Hamilton, Ontario.

<sup>3</sup>Research Assistant, Mental Health Evaluation and Community Consultation Unit, Department of Psychiatry, University of British Columbia, Vancouver, British Columbia.

<sup>4</sup>Research Assistant, Mental Health Evaluation and Community Consultation Unit, Department of Psychiatry, University of British Columbia, Vancouver, British Columbia.

<sup>5</sup>Adjunct Professor, Mental Health Evaluation and Community Consultation Unit, Department of Psychiatry, University of British Columbia, Vancouver, British Columbia.

*Address for correspondence:* Dr C Waddell, Mental Health Evaluation and Community Consultation Unit, Department of Psychiatry, Faculty of Medicine, University of British Columbia, 2250 Wesbrook Mall, Vancouver, BC V6T 1W6 e-mail: cwaddell@interchange.ubc.ca

## Résumé : L'épidémiologie de la pédopsychiatrie et l'élaboration des politiques canadiennes : l'état de la science et l'art du possible

Les études épidémiologiques ont caractérisé le lourd fardeau de souffrances que les troubles pédopsychiatriques occasionnent - 14 % des enfants (1,1 million au Canada) ont des troubles cliniquement importants, en tout temps. Dans cette étude, nous résumons la recherche récente et discutons de plusieurs questions scientifiques irrésolues qu'il faut aborder pour rendre l'épidémiologie plus utile aux décideurs. Nous présentons ensuite les implications pour l'élaboration des politiques qui visent à améliorer l'état de santé mentale des enfants. Globalement, étant donné les taux élevés de prévalence, accroître les services cliniques seulement ne suffira pas. Il faut plutôt un mélange de stratégies multi-dimensionnel.