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Preventing Mental Disorders in Children

A Systematic Review to Inform Policy-Making

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ABSTRACT

Background: At any given time, 14% of Canadian children experience clinically significant mental disorders, which frequently persist into adulthood. Canadian public policy has emphasized specialized treatment services, yet these services only reach 25% of children with disorders. Prevention programs hold potential to reduce the number of children with disorders in the population. To inform policy-making, we systematically reviewed the best available research evidence on programs for preventing conduct disorder (CD), anxiety and depression, three of the most prevalent mental disorders in children.

Methods: We systematically identified and reviewed randomized controlled trials (RCTs) on programs intended to prevent CD, anxiety and depression in children aged 0-18 years.

Results: Fifteen RCTs met selection criteria: nine (on eight programs) for preventing CD; one for anxiety; four (on three programs) for depression; and one for all three. Ten RCTs demonstrated significant reductions in child symptom and/or diagnostic measures at follow-up. The most noteworthy programs, for CD, targeted at-risk children in the early years using parent training (PT) or child social skills training (SST); for anxiety, employed universal cognitive-behavioural training (CBT) in school-age children; and for depression, targeted at-risk school-age children, also using CBT. Effect sizes for these noteworthy programs were modest but consequential. There were few Canadian studies and few that evaluated costs.

Discussion: Prevention programs are promising but replication RCTs are needed to determine effectiveness and cost-effectiveness in Canadian settings. Four program types should be priorities for replication: *targeted PT* and *child SST* for preventing CD in children's early years; and *universal* and *targeted CBT* for preventing anxiety and depression in children's school-age years. Conducting RCTs through research-policy partnerships would enable implementation in realistic settings while ensuring rigorous evaluation. Prevention merits new policy and research investments as part of a comprehensive public health strategy to improve children's mental health in the population.

MeSH terms: Primary prevention; mental disorders; public health; child; adolescent; health policy; review

La traduction du résumé se trouve à la fin de l'article.

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Mental health, or social and emotional well-being, is fundamental to healthy child development. Yet at any given time, an estimated 14% of children (or over 800,000) in Canada experience mental disorders that cause significant symptoms and impair their functioning in multiple domains.[1] The causes and consequences of these disorders impede children's development and prevent them from thriving. Mental disorders frequently persist, causing ongoing distress and disability in adulthood, at considerable cost to individuals and to society.[2-4] In Canada, the direct and indirect costs attributable to mental disorders are estimated to exceed $14 billion annually.[5] Given the prevalence and the persistence throughout the lifespan, mental disorders are arguably the leading health problems that Canadian children face after infancy.

Historically, Canadian public policy for children's mental health has emphasized specialized treatment services for individuals with disorders, yet only 25% of children with disorders have typically accessed such treatment services.[1] Given the number of children affected and the limited reach of specialized treatment services, further investments in the status quo are unlikely to impact the health of the population.[6] Prevention programs hold potential to reduce the number of children with disorders by intervening before disorders emerge to reduce early symptoms and subsequent diagnoses, thereby reducing the number of children in need in the population.[7-9] However, few programs currently exist in Canada with a focus on preventing mental disorders in children.[10] Prevention is also a low priority in Canadian health policy overall — public health, including prevention, comprises just 5.5% of all provincial health expenditures.[11]

Ideally, prevention programs should address causal risk and protective factors starting in childhood.[12] While causal pathways remain uncertain and while risk and protective factors are rarely specific in children, well-designed prevention studies can nevertheless contribute new etiologic knowledge while also determining which programs are effective. Given the relapsing and remitting nature of many mental disorders, it is crucial that prevention studies also measure long-term maintenance of effects.[13] Prevention researchers advocate that policy-makers should implement pro-

grams on the basis of sound prevention trials.[7,8,13] However, beyond single studies, systematic reviews are needed so that policy-making may be informed by accumulated bodies of the best available research evidence.[14]

Given the potential importance of prevention for children's mental health, we undertook this systematic review of the best available research evidence on preventing mental disorders in children in order to inform policy-making. Our goal was to ascertain which programs might be effective and appropriate for implementation in Canada. We considered prevention as one component of a comprehensive public health strategy to improve children's mental health (see Figure 1).[1] To capture high-quality research evidence, we sought randomized controlled trials (RCTs) that evaluated child outcomes at long-term follow-up. To ensure policy relevance, we sought to include a range of mental disorders. Conduct disorder (CD), anxiety and depression are among the most common in Canadian children – with estimated prevalence rates of 4.2%, 6.4% and 3.5% and affecting an estimated 238,000, 340,000 and 186,000 children, respectively.[1] These disorders also represent a spectrum of social and emotional disorders that may be preventable. Therefore we focused on these. Other recent comparable systematic reviews have not focused on prevention exclusively,[15] on this range of disorders[16,17] or on the full range of children's ages (0-18 years).[18-24]

METHODS

We sought articles describing RCTs on programs for preventing CD, anxiety and depression in children aged 0-18 years. Table I outlines the search strategy. We focused on child outcomes at follow-up, requiring assessment of at least two *symptom* measures or at least one *diagnostic* (or proxy of incidence) measure directly related to the disorders of interest. Table II outlines the inclusion criteria. Two reviewers conducted the searches, assessed all relevant abstracts and retrieved all relevant articles. These two reviewers independently applied the inclusion criteria, derived an initial short-list of accepted RCTs and verified the quality of each trial using an adapted version of a standardized checklist.[25] Two additional reviewers then independently applied the inclusion criteria to the short-list to derive the final list of accepted RCTs and extracted data on trial and program characteristics and outcomes. At all stages of the review, agreement was reached on approximately 95% of decisions. Differences were resolved by consensus. All reviewers then interpreted the findings.

TABLE I

Search Strategy

Sources	• Searches of Medline, PsycINFO, Cochrane Database of Systematic Reviews • Hand searches of previously identified systematic reviews[15-24]
Terms	• Prevention or early child development, and mental disorders or conduct disorder or anxiety disorders or depressive disorders
Limits	• English language articles published 1981 through 2003 • Focus on children aged 0-18 years

TABLE II

Program Trial Inclusion Criteria

- Clear descriptions of participant characteristics, settings and interventions
- Interventions implemented before diagnosable mental disorders emerged in majority of participants
- Random allocation of participants (or clusters) to intervention and comparison groups
- Maximum attrition rates of 20% post-test
- Post-test follow-up of one year or more
- Measures of child symptoms and/or diagnoses related to conduct, anxiety or depressive disorders
- At least two symptom measures and/or one diagnostic (or proxy incidence) measure reported at follow-up
- Child outcomes assessed according to two or more sources (child, parent, teacher and/or clinician-observer)
- Levels of statistical significance reported at follow-up for both intervention and comparison groups

RESULTS

Of 465 articles initially retrieved, 30 articles describing 15 RCTs met inclusion criteria. Nine trials addressed CD,[26-47] one addressed anxiety,[48,49] four addressed depression[50-54] and one addressed all three disorders.[55] Most of the 435 excluded trials failed to meet criteria regarding attrition rates, follow-up rates or reporting of findings at follow-up. Trial and program characteristics are described in Table III. Outcomes for CD are described in Table IV, anxiety in Table V, depression in Table VI and all three in Table VII. Quality scores ranged from 26-36/45 with a median of 32/45, suggesting that all included RCTs were at least of moderate quality. None reported harmful effects. Few specifically assessed risks such as stigmatization and labeling for targeted programs.[6]

Preventing conduct disorder

For CD (see Tables III, IV), nine RCTs on eight different programs met inclusion criteria.[26-47] Seven trials demonstrated significant reductions in at least two conduct-related symptom and/or one conduct-related diagnostic measure at follow-up,[26-29,32,33,37-47] while two demonstrated reductions in one symptom measure only.[30,31,34-36] One trial comprised a replication.[30,31] Four program trials were particularly noteworthy – for rigorously assessing diagnostic measures (*Fast Track,*[26-28] *Johns Hopkins*[32,33]), or for measuring outcomes over 15 years of follow-up or more (*Nurse Visitation*,[37-39] *Perry Preschool*[40-44]). All four significantly reduced two or more symptom measures, and two (*Fast Track* and *Johns Hopkins*) significantly reduced diagnostic measures. Magnitudes of effect were reported for significant findings in six RCTs.[26-28,30-33,40-47] For significant symptom reductions, magnitudes of effect ranged from effect size (ES) 0.39 for *Johns Hopkins*[32,33] and 28% reductions for *Perry Preschool,*[40-44] to ES 0.12 for *Tri-Ministry*.[46,47] For significant diagnostic reductions, magnitudes of effect ranged from odds ratio 0.4 for *Johns Hopkins*[32,33] to 10% reductions for *Fast Track*.[26-28] The four most noteworthy programs targeted at-risk children on the basis of conduct symptoms and/or low income, employing parent training (PT), child social skills training (SST) or combinations. These programs were typically delivered over one to two years in homes, preschools or schools by clinicians or teachers. Few programs were studied in Canada. Estimates of net fiscal returns were reported for two programs only: *Nurse Visitation* as $180 (US) per parent;[39] and *Perry Preschool* as $7 for each $1 invested.[41]

TABLE III

Trial and Program Characteristics

Program Trial (Country)	Sample		Experimental							Control*	Follow Up	Quality Score	Ref
	Age	Sex	Type	Target	Intervention	N	Length	Delivery	Setting	N			
Conduct disorder													
Fast Track (US)	6-7 y	69% m	Targeted	Child symptoms, low family income	Group child SST & group PT	445	22 s y 1 & 14 y 2	Teachers, clinicians**	Schools, homes	446	3.0 y	32/45	26-28
Incredible Years I (US)	4-5 y	53% m	Targeted	Low family income	Group PT	296	8-9 s	Clinicians	Preschools	130	1.0 y	36/45	29
Incredible Years II (US)***	4-5 y	54% m	Targeted	Low family income	Group PT	191	16 s	Clinicians	Preschools	81	1.0 y	36/45	30,31
Johns Hopkins (US)	5-7 y	53% m	Targeted	Low family income	a:Group child SST b:individual PT	326†	Weekly s over 1 y	a:Teachers b:Teachers, clinicians	Schools	326†	5.0 y	32/45	32,33
Montreal Prevention (Canada)	6-7 y	100% m	Targeted	Child symptoms, low family income	Group child SST & individual PT	43	18 s over 2 y	Clinicians	Schools, homes	205	6.0 y	33/45	34-36
Nurse Visitation (US)	0-2 y	52% m	Targeted	Parent difficulties, low family income	Individual PT	a:100 b:116	a:9 s prenatal b:32 s y 0-2	Clinicians	Homes	184	15.0 y	34/45	37-39
Perry Preschool (US)	3-4 y	46% m	Targeted	Low family income, low child IQ	Preschool, group child SST, PT	58	Daily s over 1-2 y	Teachers	Preschools, homes	65	23.0 y	26/45	40-44
Schools & Homes in Partnership (US)	5-8 y	55% m	Targeted	Child symptoms	Group child SST PT & group	141	14-20 s over 1-2 y	Teachers, trained leaders	Schools	143	1.0 y	29/45	45
Tri-Ministry (Canada)	7-8 y	50% m	Universal	NA	a:Group child SST b:Reading program c:Combined	a:1694 b:1666 c:1785	Weekly s over 1-2 y	Teachers, trained leaders, parents	Schools, homes	4448	2.0 y	32/45	46,47
Anxiety													
Friends (Australia)	10-13 y	53% f	Universal	NA	Group child CBT, PT	432	12 s (child), 3 s (parent)	Teachers	Schools	162	1.0 y	31/45	48,49
Depression													
Coping With Stress I (US)	14-16 y	70% f	Targeted	Child symptoms	Group child CBT	76	15 s	Clinicians	Schools	74	1.0 y	32/45	50
Coping With Stress II (US)***	13-18 y	64% f	Targeted	Child symptoms, parent depression	Group child CBT	45	15 s	Clinicians	Clinics	49	2.0 y	35/45	51
Penn Prevention (Australia)	11-13 y	50% f	Targeted	Child symptoms	Group child CBT	90	12 s	Clinicians	Schools	213	2.5 y	32/45	52,53
Problem Solving For Life (Australia)	13 y	53% f	Universal	NA	Group child CBT	751	6 s	Teachers	Schools	749	1.0 y	32/45	54
All													
Help Starts Here (United Kingdom)	11-12 y	NR	Targeted	Low family income, child symptoms, parent difficulties	Group child drama therapy	58	12 s	Teachers	Schools	62	1.0 y	27/45	55

* Waitlist, usual programs or no intervention
** Social workers, nurses or psychologists
*** Replication trial
† authors only reported total sample of 653
NA Not applicable
NR Not reported
CBT Cognitive-behavioural therapy
f Female
m Male
PT Parent training
s Sessions
SST Social skills training

Preventing anxiety

For anxiety (see Tables III, V), one RCT on the universal *Friends* program met inclusion criteria.[48,49] This trial demonstrated significant reductions in anxiety (and depression) symptom measures and in rigorous anxiety (and depression) diagnostic measures at one-year follow-up. Magnitudes of effect were reported for diagnostic reductions as 8% for the whole sample, but 54% for at-risk children, implying considerably greater effects when targeted at children with symptoms. *Friends* employed cognitive-behavioural training (CBT) delivered by teachers over 12 sessions with school-age children in Australia. Costs were not estimated.

Preventing depression

For depression (see Tables III, VI), four RCTs on three different programs met inclusion criteria.[50-54] Two trials on the *Coping with Stress* program first demonstrated significant reductions in rigorous depression diagnostic measures at one-year follow-up,[50] then significant reductions in three depression symptom measures as well as one rigorous diagnostic measure at two-year follow-up.[51] Magnitudes of effect were reported for the diagnostic measures in both trials: 11% reductions;[50] and 17% reductions with a hazards ratio 2.2.[51] In the two other RCTs, significant reductions were demonstrated in only one (anxiety, not depression) symptom measure,[52,53] or no measures.[54] *Coping with Stress* targeted school-age children with depressive symptoms[50] or with symptoms and depressed parents,[51] employing child CBT delivered by clinicians over 15 sessions in schools or clinics. The other two programs also employed school-based CBT but with fewer sessions[52,53] or in universal format.[54] Costs were not estimated for any programs. Both *Coping with Stress* trials were conducted in the United States (US), the others in Australia.

TABLE IV

Outcomes for Preventing Conduct Disorder

Fast Track (26-28)

Measure	Child Outcome	Source	Group	Continuous* I vs. C		Dichotomous* I	C		
				p	ES	%	%	p	ES
TRF	Conduct symptoms	Teacher	NA	ns	0.01	NA	NA	NA	NA
TOCA	Conduct symptoms	Teacher	NA	0.01	0.19	NA	NA	NA	NA
TR-CBC	Conduct symptoms	Teacher	NA	0.01	0.27	NA	NA	NA	NA
PR-CBC	Conduct symptoms	Parent	NA	0.01	0.20	NA	NA	NA	NA
PDR	Conduct symptoms	Parent	NA	0.05	0.15	NA	NA	NA	NA
SED	Requiring special education	Teacher	NA	NA	NA	NR	NR	0.05	0.14
DISC**	Diagnosis any conduct disorder	Clinician, parent	NA	NA	NA	NR	NR	ns	0.07
Other**	Problem-free DISC, SED, TOCA, PDR	All	NA	NA	NA	37.0	27.0	0.01	0.21

Incredible Years I (29)

Measure	Child Outcome	Source	Group	Continuous* I vs. C		Dichotomous** I	C		
				p	ES	%	%	p	ES
CBCL	Conduct symptoms	Parent	NA	ns	NR	NA	NA	NA	NA
ECBI	Conduct symptoms	Parent	NA	ns	NR	NA	NA	NA	NA
DPICS	Conduct symptoms	Clinician	NA	0.05	NR	NA	NA	NA	NA
CII	Conduct symptoms	Clinician	NA	0.05	NR	NA	NA	NA	NA
TRF	Conduct symptoms	Teacher	NA	ns	NR	NA	NA	NA	NA
DPICS	30% reduction in conduct problems	Clinician	High DPICS	NA	NA	73.0	69.0	ns	NR

Incredible Years II* (30, 31)**

Measure	Child Outcome	Source	Group	Continuous* I vs. C		Dichotomous* I	C		
				p	ES	%	%	p	OR
ECBI	Conduct symptoms	Parent	NA	ns	NR	NA	NA	NA	NA
CBCL	Conduct symptoms	Parent	NA	ns	NR	NA	NA	NA	NA
CII	Conduct symptoms	Clinician	NA	ns	NR	NA	NA	NA	NA
DPICS	Conduct symptoms	Clinician	NA	ns	NR	NA	NA	NA	NA
DPICS	30% reduction in conduct problems	Clinician	High DPICS	NA	NA	80.0	48.0	0.01	NR

Johns Hopkins (32, 33)

Measure	Child Outcome	Source	Group	Continuous* I vs. C		Dichotomous* I	C		
				p	ES	%	%	OR	p
TRCB-CF	Conduct symptoms	Teacher	Child SST	0.01	0.39	NA	NA	NA	NA
			PT	0.05	0.29	NA	NA	NA	NA
DISC**	Diagnosis of conduct disorder	Child, parent	Child SST	NA	NA	NR	NR	0.42	0.05
			PT	NA	NA	NR	NR	0.69	ns

Montreal Prevention (33-36)

Measure	Child Outcome	Source	Group	Continuous* I vs. C		Dichotomous* I	C		
				p	ES	%	%	p	OR
SBQ	Conduct symptoms	Teacher	NA	ns	NR	NA	NA	NA	NA
Self-report	Conduct symptoms	Child	NA	0.05	NR	NA	NA	NA	NA
Court records	Conduct symptoms	Justice records	NA	ns	NR	NA	NA	NA	NA

Nurse Visitation (37-39)

Measure	Child Outcome	Source	Group	Continuous* I vs. C		Dichotomous* I	C		
				p	ES	%	%	p	OR
PINS	Conduct symptoms	Child	To birth	ns	NR	NA	NA	NA	NA
			To 2 y	ns	NR	NA	NA	NA	NA
PINS	Conduct symptoms	Justice records	To birth	ns	NR	NA	NA	NA	NA
			To 2 y	ns	NR	NA	NA	NA	NA
Running away	Conduct symptoms	Child	To birth	0.01	NR	NA	NA	NA	NA
			To 2 y	0.01	NR	NA	NA	NA	NA
Police contact	Conduct symptoms	Child	To birth	ns	NR	NA	NA	NA	NA
			To 2 y	ns	NR	NA	NA	NA	NA
Arrests	Conduct symptoms	Child	To birth	0.05	NR	NA	NA	NA	NA
			To 2 y	0.05	NR	NA	NA	NA	NA
Arrests	Conduct symptoms	Parent	To birth	ns	NR	NA	NA	NA	NA
			To 2 y	0.05	NR	NA	NA	NA	NA
Arrests	Conduct symptoms	Justice records	To birth	ns	NR	NA	NA	NA	NA
			To 2 y	ns	NR	NA	NA	NA	NA
Convictions	Conduct symptoms	Child	To birth	0.01	NR	NA	NA	NA	NA
			To 2 y	0.01	NR	NA	NA	NA	NA
School suspensions	Conduct symptoms	School records	To birth	ns	NR	NA	NA	NA	NA
			To 2 y	ns	NR	NA	NA	NA	NA
CBCL	Conduct symptoms	Parent	To birth	ns	NR	NA	NA	NA	NA
			To 2 y	ns	NR	NA	NA	NA	NA

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Preventing all three disorders

For preventing internalizing and externalizing disorders (see Tables III, VII), one RCT on the *Help Starts Here* program met inclusion criteria but did not demonstrate significant reductions in any symptom or diagnostic measures.[55] This program targeted low-income school-age children who had symptoms and whose parents had difficulties. The program employed child drama therapy, delivered by teachers in schools in the United Kingdom. Costs were not estimated.

TABLE IV – continued

Outcomes for Preventing Conduct Disorder

Perry Preschool (40-44)

Measure	Child Outcome	Source	Group	Continuous* I vs. C		Dichotomous* I	C		
				p	ES	%	%	p	OR
5+ Arrests	Conduct symptoms	Child, justice records	NA	0.05	28%	NA	NA	NA	NA
Income	Low income	Child, state records	NA	0.05	22%	NA	NA	NA	NA
Welfare income	Ever on welfare	Child, state records	NA	0.05	21%	NA	NA	NA	NA

Schools & Homes in Partnership (45)

Measure	Child Outcome	Source	Group	Continuous* I vs. C		Dichotomous* I	C		
				p	ES	%	%	p	OR
TRF	Conduct symptoms	Teacher	NA	ns	0.04	NA	NA	NA	NA
CBCL	Conduct symptoms	Parent	NA	ns	0.03	NA	NA	NA	NA
PDR	Conduct symptoms	Parent	NA	0.01	0.24	NA	NA	NA	NA
CB	Conduct symptoms	Parent	NA	0.05	0.18	NA	NA	NA	NA

Tri-Ministry (46, 47)

Measure	Child Outcome	Source	Group	Continuous* I vs. C		Dichotomous* I	C		
				p	ES	%	%	p	OR
CISSAR	Conduct symptoms	Clinician	Child SST	ns	0.30	NA	NA	NA	NA
			Reading	ns	-0.10	NA	NA	NA	NA
			Combined	ns	-0.02	NA	NA	NA	NA
DSM Scale	Conduct symptoms	Teacher	Child SST	0.05	0.12	NA	NA	NA	NA
			Reading	ns	-0.04	NA	NA	NA	NA
			Combined	ns	-0.18	NA	NA	NA	NA
		Parent	Child SST	0.05	0.16	NA	NA	NA	NA
			Reading	ns	-0.13	NA	NA	NA	NA
			Combined	ns	0.01	NA	NA	NA	NA

*	Direction favouring intervention unless negative sign	CISSAR	Code for Instructional Structure in Student Academic Response
**	Diagnostic (or proxy incidence) measure	CII	Coder Impression Inventory
***	Replication	DISC	Diagnostic Interview Schedule for Children
I	Intervention	DPICS	Dyadic Parent-Child Interactive Coding System
C	Control	ECBI	Eyberg Child Behavior Inventory
ES	Effect size	PDR	Parent Daily Report
OR	Odds ratio	PINS	Person in Need of Supervision
NA	Not applicable	PR-CBC	Parent Rating of Child Behavior Change
NR	Not reported	SBQ	Social Behavior Questionnaire
ns	Not significant (p>0.05)	TOCA	Teacher Observation of Classroom Adaptation
CB	Coercive Behavior	TR-CBC	Teacher Rating of Child Behavior Change
CBCL	Child Behavior Checklist	TRF	Teacher Report Form

DISCUSSION

To inform policy-making, we systematically reviewed the best available research evidence on programs for preventing CD, anxiety and depression, three of the most prevalent mental disorders in children. Fifteen RCTs met our criteria: nine (on eight programs) for preventing CD; one for anxiety; four (on three programs) for depression; and one for all three. Ten RCTs demonstrated significant reductions in child symptom and/or diagnostic (or proxy) measures at follow-up. The most noteworthy programs, for CD, targeted at-risk children in the early years using parent training (PT) or child social skills training (SST) (*Nurse Visitation*, *Perry Preschool*, *Fast Track*, *Johns Hopkins*); for anxiety, employed universal cognitive-behavioural training (CBT) in school-age children (*Friends*); and for depression, targeted at-risk school-age children, also using CBT (*Coping with Stress*). Effect sizes for many noteworthy programs were modest but consequential. For example, given current Canadian prevalence rates,[1] even 10% incidence reductions (e.g., *Fast Track*) could result in 24,000 fewer cases of CD, while 8% reductions (e.g., *Friends*) could result in 27,000 fewer cases of anxiety, and 11% reductions (e.g., *Coping with Stress*) could result in 20,000 fewer cases of depression. Overall, however, there were few Canadian studies and few that evaluated costs.

On balance, our findings suggest that four types of programs merit consideration in Canadian settings: in the early years for CD, *targeted PT* and *targeted child SST*; and in the school-age years for anxiety and depression, *universal* and *targeted CBT*. These programs appear feasible for Canadian settings. Yet do the available RCTs justify implementation? Applying proposed standards[56] for addressing this question, at a minimum, trials require replication to determine effectiveness and cost-effectiveness in typical Canadian settings. The noteworthy programs we highlight should be priorities for Canadian replications. However, policy-makers *can* implement these programs, ideally maintaining fidelity to the original protocols and concurrently evaluating outcomes using RCT methods. RCTs are costly but arguably warranted given the considerable public investments in many unevaluated programs currently.[7] As well, the opportunity cost of not implementing prevention programs bears consideration. For example, preventing one case of CD may save an estimated $1.5 million (US) in cumulative lifetime costs.[57]

Our findings also raise considerations for researchers. While included RCTs were moderately rigorous, many nevertheless exhibited limitations: lack of blinding; failure to designate and report primary outcome measures at all time points; failure to report magnitudes of effect; and reliance on symptom measures more than diagnostic measures (of incidence). We concur

TABLE V

Outcomes for Preventing Anxiety

Friends (48,49)

Measure	Child Outcome	Source	Group	Continuous* I vs. C		Dichotomous* I	C		
				p	ES	%	%	p	ES/OR
SCAS	Anxiety symptoms	Child	All	0.05	NR	NA	NA	NA	NA
			High SCAS	0.05	NR	NA	NA	NA	NA
RCMAS	Chronic anxiety	Child	All	0.05	NR	NA	NA	NA	NA
			High SCAS	ns	NR	NA	NA	NA	NA
CDI	Depressive symptoms	Child	All	0.05	NR	NA	NA	NA	NA
			High SCAS	0.05	NR	NA	NA	NA	NA
SCAS**	Anxiety score > high-risk cut-off	Child	All	NA	NA	3.8	12.2	0.01	NR
ADIS-C**	Diagnosis anxiety or depression	Clinician, child	High CDI, SCAS	NA	NA	15.0	68.8	0.01	NR

*	Direction favouring intervention	NR	Not reported
**	Diagnostic (or proxy incidence) measure	ns	Not significant (p>0.05)
I	Intervention	ADIS-C	Anxiety Disorders Interview Schedule for Children
C	Control	CDI	Children's Depression Inventory
ES	Effect size	RCMAS	Revised Children's Manifest Anxiety Scale
OR	Odds ratio	SCAS	Spence Children's Anxiety Scale
NA	Not applicable		

TABLE VI

Outcomes for Preventing Depression

Coping with Stress I (50)

Measure	Child Outcome	Source	Group	Continuous* I vs. C		Dichotomous* I	C		
				p	ES	%	%	p	OR
CES-D	Depressive symptoms	Child	NA	ns	NR	NA	NA	NA	NA
HAM-D	Depressive symptoms	Clinician, child	NA	ns	NR	NA	NA	NA	NA
K-SADS-E**	Diagnosis any depressive disorder	Clinician, child	NA	NA	NA	14.5	25.7	0.05	NR

Coping with Stress II* (51)**

Measure	Child Outcome	Source	Group	Continuous* I vs. C		Dichotomous* I	C		
				p	ES	%	%	p	HR
CES-D	Depressive symptoms	Child	NA	0.01	NR	NA	NA	NA	NA
HAM-D	Depressive symptoms	Clinician, child	NA	0.05	NR	NA	NA	NA	NA
CBCL	Internalizing symptoms	Parent	NA	ns	NR	NA	NA	NA	NA
K-SADS- E	Suicide symptoms	Clinician, child	NA	0.04	NR	NA	NA	NA	NA
K-SADS- E**	Diagnosis major depression	Clinician, child	NA	NA	NA	8.0	24.7	0.01	2.16

Penn Prevention (52, 53)

Measure	Child Outcome	Source	Group	Continuous* I vs. C		Dichotomous* I	C		
				p	ES	%	%	p	OR
CDI	Depressive symptoms	Child	All	ns	NR	NA	NA	NA	NA
			High CDI	ns	NR	NA	NA	NA	NA
			Low CDI	ns	NR	NA	NA	NA	NA
RCMAS	Anxiety symptoms	Child	All	0.01	NR	NA	NA	NA	NA
			High CDI	ns	NR	NA	NA	NA	NA
			Low CDI	0.05	NR	NA	NA	NA	NA
CBCL	Internalizing symptoms	Parent	All	ns	NR	NA	NA	NA	NA
			High CDI	ns	NR	NA	NA	NA	NA
			Low CDI	ns	NR	NA	NA	NA	NA

Problem Solving for Life (54)

Measure	Child Outcome	Source	Group	Continuous* I vs. C		Dichotomous* I	C		
				p	ES	%	%	p	OR
BDI	Depressive symptoms	Child	High BDI	ns	NR	NA	NA	NA	NA
			Low BDI	ns	NR	NA	NA	NA	NA
YSR	Internalizing symptoms	Child	High BDI	ns	NR	NA	NA	NA	NA
			Low BDI	ns	NR	NA	NA	NA	NA
BDI**	Depressive score > high-risk cut-off	Child	High BDI	NA	NA	39.8	46.7	ns	NR
ADIS-C**	Diagnosis any depressive disorder	Clinician, child	NA	NA	NA	9.9	8.4	ns	NR

*	Direction favouring intervention unless negative sign	BDI	Beck Depression Inventory
**	Diagnostic (or proxy incidence) measure	CBCL	Child Behaviour Checklist
***	Replication	CDI	Children's Depression Inventory
I	Intervention	CES-D	Center for Epidemiologic Studies Depression Scale
C	Control	HAM-D	Hamilton Depression Rating Scale
ES	Effect size	K-SADS-E	Schedule Affective Disorders & Schizophrenia Epidemiologic Version
OR	Odds ratio	RCMAS	Revised Children's Manifest Anxiety Scale
NA	Not applicable	YSR	Youth Self-Report
NR	Not reported		

TABLE VII

Outcomes for Preventing All Three Disorders

Help Starts Here (55) Measure	Child Outcome	Source	Continuous* I vs. C p	ES	Dichotomous* I %	C %	p	OR
YSR	Conduct, anxiety, depressive symptoms	Child	ns	0.28	NA	NA	NA	NA
CBCL	Conduct, anxiety, depressive symptoms	Parent	ns	0.14	NA	NA	NA	NA
TRF	Conduct, anxiety, depressive symptoms	Teacher	0.05	-0.08	NA	NA	NA	NA

*	Direction favouring intervention unless indicated by negative sign	NA	Not applicable
I	Intervention	ns	Not significant (p>0.05)
C	Control	CBCL	Child Behavior Checklist
ES	Effect size	TRF	Teacher Report Form
OR	Odds ratio	YSR	Youth Self-Report

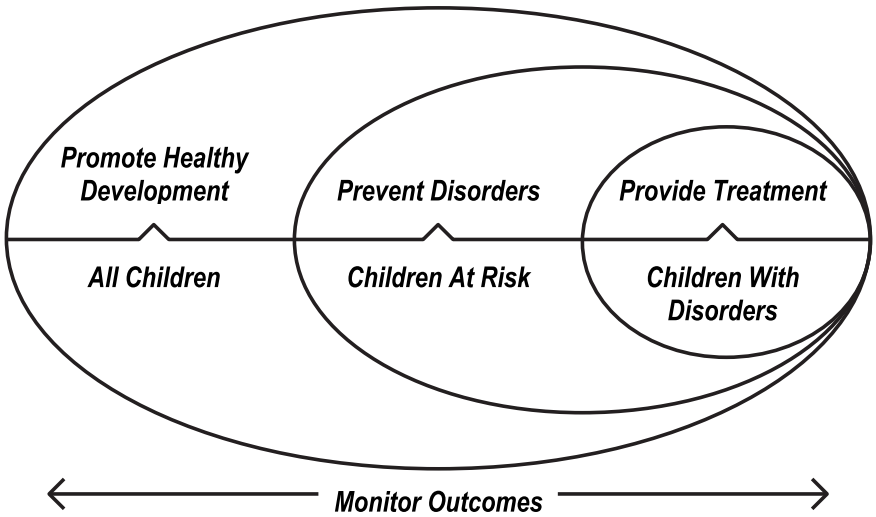

Figure 1. A public health strategy for children's mental health

with others who suggest standardized approaches for prevention RCTs, particularly consistently reporting long-term outcomes and magnitudes of effect, and consistently assessing reductions in incidence.[56] Researchers could also greatly enhance policy relevance by evaluating cost-effectiveness.

The issue remains that current Canadian health investments, with their predominant emphasis on health *care,* are not meeting the mental health needs of children in the general population.[1] Without greater attention to prevention, the unnecessary lifelong distress and disability associated with mental disorders in the population will continue.[6-8] Looking forward, research-policy partnerships would enable program implementation in realistic settings while facilitating rigorous evaluation. Such partnerships could also enable researchers to support policymakers to make difficult choices to advance prevention, such as reallocating funds from treatment services or from unproven programs.[58] Prevention merits new policy *and* research investments if we are to improve the mental health of Canadian children.

REFERENCES

1. Waddell C, McEwan K, Shepherd CA, Offord DR, Hua JM. A public health strategy to improve the mental health of Canadian children. *Can J Psychiatry* 2005;50:226-33.
2. Costello EJ, Mustillo S, Erkanli A, Keeler G, Angold A. Prevalence and development of psychiatric disorders in childhood and adolescence. *Arch Gen Psychiatry* 2003;60:837-44.
3. Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry* 2005;62:593-602.
4. Kim-Cohen J, Caspi A, Moffitt TE, Harrington H, Milne BJ, Poulton R. Prior juvenile diagnoses in adults with mental disorder: Developmental follow-back of a prospective-longitudinal cohort. *Arch Gen Psychiatry* 2003;60:709-17.
5. Stephens T, Joubert N. The economic burden of mental health problems in Canada. *Chron Dis Can* 2001;22:18-23.
6. 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.
7. Andrews G, Wilkinson DD. The prevention of mental disorders in young people. *Med J Aust* 2002;177:S97-S100.
8. World Health Organization. *Prevention of Mental Disorders: Effective Interventions and Policy Options.* Geneva: World Health Organization, 2004.
9. Weissberg RP, Kumpfer KL, Seligman ME. Prevention that works for children and youth. *Am Psychol* 2003;58:425-32.
10. Waddell C, McEwan K, Peters RD, Hua JM, Garland O. Preventing mental disorders in children: A public health priority. *Can J Public Health* 2007;98(3):174-78.
11. Canadian Institute for Health Information. *National Health Expenditure Trends 1975-2005.* Ottawa, ON: Canadian Institute for Health Information, 2005.
12. Kraemer HC, Kazdin AE, Offord DR, Kessler RC, Jensen PS, Kupfer DJ. Coming to terms with the terms of risk. *Arch Gen Psychiatry* 1997;54:337-43.
13. Mrazek PJ, Haggerty RJ (Eds.). *Reducing Risks for Mental Disorders: Frontiers for Preventive Intervention Research.* Washington, DC: National Academy Press, 1994.
14. Lavis JN, Posada FB, Haines A, Osei E. Use of research to inform public policymaking. *Lancet* 2004;364:1615-21.
15. Durlak JA, Wells AM. Primary prevention mental health programs for children and adolescents: A meta-analytic review. *Am J Community Psychol* 1997;25:115-52.
16. Jane-Llopis E, Hosman C, Jenkins R, Anderson P. Predictors of efficacy in depression prevention programmes. *Br J Psychiatry* 2003;183:384-97.
17. Merry S, McDowell H, Hetrick S, Bir J, Muller N. Psychological and/or educational interventions for the prevention of depression in children and adolescents. [Cochrane review] In: *The Cochrane Library*, Issue 1, 2004. Oxford: Update Software.
18. Cuijpers P, Van Straten A, Smit F. Preventing the incidence of new cases of mental disorders: A meta-analytic review. *J Nerv Ment Dis* 2005;193:119-25.
19. Greenberg MT, Domitrovich C, Bumbarger B. The prevention of mental disorders in school-aged children: Current state of the field. *Prevention & Treatment* [online version] 2001;4 [no pagination specified].
20. Crill Russell C (Ed.). *The State of Knowledge About Prevention/Early Intervention.* Toronto, ON: Invest in Kids, 2002.
21. Barlow J, Parsons J. Group-based parent-training programmes for improving emotional and behavioural adjustment in 0-3 year old children. [Cochrane review] In: *The Cochrane Library*, Issue 1, 2004. Oxford: Update Software.
22. Olds D, Robinson J, Song N, Little C, Hill P. Reducing risks for mental disorders during the first five years of life: A review of preventive interventions. Denver, CO: University of Colorado Health Sciences Center, Prevention Research Center for Family and Child Health, 1999.
23. Bilukha O, Hahn RA, Crosby A, Fullilove MT, Liberman A, Moscicki E, et al. The effectiveness of early childhood home visitation in preventing violence: A systematic review. *Am J Prev Med* 2005;28:11-39.
24. Nicholas B, Broadstock M. *Effectiveness of Early Interventions for Preventing Mental Illness in Young People: A Critical Appraisal of the Literature.* Christchurch, NZ: New Zealand Health Technology Assessment, 1999.

25. Des Jarlais DC, Lyles C, Crepaz N. Improving the reporting quality of nonrandomized evaluations of behavioral and public health interventions: The TREND statement. *Am J Public Health* 2004;94:361-66.
26. Conduct Problems Prevention Research Group. Initial impact of the Fast Track prevention trial for conduct problems: I. The high-risk sample. *J Consult Clin Psychol* 1999;67:631-47.
27. Conduct Problems Prevention Research Group. Evaluation of the first 3 years of the Fast Track prevention trial with children at high risk for adolescent conduct problems. *J Abnorm Child Psychol* 2002;30:19-35.
28. Bierman KL, Coie JD, Dodge KA, Greenberg MT, Lochman JE, McMahon RJ, et al. Using the Fast Track randomized prevention trial to test the early-starter model of the development of serious conduct problems. *Dev Psychopathol* 2002;14:925-43.
29. Webster-Stratton C. Preventing conduct problems in Head Start children: Strengthening parenting competencies. *J Consult Clin Psychol* 1998;66:715-30.
30. Webster-Stratton C, Reid MJ, Hammond M. Preventing conduct problems, promoting social competence: A parent and teacher training partnership in Head Start. *J Clin Child Psychol* 2001;30:283-302.
31. Reid MJ, Webster-Stratton C, Beauchaine TP. Parent training in Head Start: A comparison of program response among African American, Asian American, Caucasian, and Hispanic mothers. *Prev Sci* 2001;2:209-27.
32. Ialongo NS, Werthamer L, Kellam SG, Brown CH, Wang S, Lin Y. Proximal impact of two first-grade preventive interventions on the early risk behaviors for later substance abuse, depression, and antisocial behavior. *Am J Community Psychol* 1999;27:599-641.
33. Ialongo N, Poduska J, Werthamer L, Kellam S. The distal impact of two first-grade preventive interventions on conduct problems and disorder in early adolescence. *J Emotional & Behav Disorders* 2001;9:146-60.
34. McCord J, Tremblay RE, Vitaro F, Desmarais-Gervais L. Boys' disruptive behaviour, school adjustment, and delinquency: The Montreal prevention experiment. *Intern J Behav Development* 1994;17:739-52.
35. Tremblay RE, McCord J, Boileau H, Charlebois P, Gagnon C, Le Blanc M, et al. Can disruptive boys be helped to become competent? *Psychiatry* 1991;54:148-61.
36. Tremblay RE, Pagani-Kurtz L, Masse LC, Vitaro F, Pihl RO. A bimodal preventive intervention for disruptive kindergarten boys: Its impact through mid-adolescence. *J Consult Clin Psychol* 1995;63:560-68.
37. Olds D, Henderson CR, Jr., Cole R, Eckenrode J, Kitzman H, Luckey D, et al. Long-term effects of nurse home visitation on children's criminal and antisocial behavior: 15-year follow-up of a randomized controlled trial. *JAMA* 1998;280:1238-44.
38. Olds DL, Henderson CR, Jr., Kitzman HJ, Eckenrode JJ, Cole RE, Tatelbaum RC. Prenatal and infancy home visitation by nurses: Recent findings. *Future Child* 1999;9:44-65, 190-91.
39. Olds DL, Henderson CR, Jr., Phelps C, Kitzman H, Hanks C. Effect of prenatal and infancy nurse home visitation on government spending. *Med Care* 1993;31:155-74.
40. Schweinhart LJ, Berrueta-Clement JR, Barnett WS, Epstein AS, Weikart DP. Effects of the Perry Preschool program on youths through age 19: A summary. *Topics in Early Childhood Special Ed* 1985;5:26-35.
41. Schweinhart LJ, Weikart DP. The High/Scope Perry Preschool study: Implications for early childhood care and education. *Prevention in Human Services* 1989;7:109-32.
42. Weikart DP. Changing early childhood development through educational intervention. *Prev Med* 1998;27:233-37.
43. Schweinhart LJ, Weikart DP. The High/Scope preschool curriculum comparison study through age 23. *Early Childhood Research Quarterly* 1997;12:117-43.
44. Schweinhart LJ, Weikart DP, Larner MB. Consequences of three preschool curriculum models through age 15. *Early Childhood Res Q* 1986;1:15-45.
45. Barrera M, Jr., Biglan A, Taylor TK, Gunn BK, Smolkowski K, Black C, et al. Early elementary school intervention to reduce conduct problems: A randomized trial with Hispanic and non-Hispanic children. *Prev Sci* 2002;3(2):83-94.
46. Boyle MH, Cunningham CE, Heale J, Hundert J, McDonald J, Offord DR, et al. Helping children adjust – A Tri-Ministry Study: I. Evaluation methodology. *J Child Psychol Psychiatry* 1999;40:1051-60.
47. Hundert J, Boyle MH, Cunningham CE, Duku E, Heale J, McDonald J, et al. Helping children adjust – A Tri-Ministry Study: II. Program effects. *J Child Psychol Psychiatry* 1999;40:1061-73.
48. Lowry-Webster HM, Barrett PM, Dadds MR. A universal prevention trial of anxiety and depressive symptomatology in childhood: Preliminary data from an Australian study. *Behaviour Change* 2001;18:36-50.
49. Lowry-Webster HM, Barrett PMP, Lock S. A universal prevention trial of anxiety symptomology during childhood: Results at 1-year follow-up. *Behaviour Change* 2003;20:25-43.
50. Clarke GN, Hawkins W, Murphy M, Sheeber LB, Lewinsohn PM, Seeley JR. Targeted prevention of unipolar depressive disorder in an at-risk sample of high school adolescents: A randomized trial of a group cognitive intervention. *J Am Acad Child Adolesc Psychiatry* 1995;34:312-21.
51. Clarke GN, Hornbrook M, Lynch F, Polen M, Gale J, Beardslee W, et al. A randomized trial of a group cognitive intervention for preventing depression in adolescent offspring of depressed parents. *Arch Gen Psychiatry* 2001;58(12):1127-34.
52. Roberts C, Kane R, Bishop B, Matthews H, Thomson H. The prevention of depressive symptoms in rural school children: A follow-up study. *Int J Mental Health Promotion* 2004;6:4-16.
53. Roberts C, Kane R, Thomson H, Bishop B, Hart B. The prevention of depressive symptoms in rural school children: A randomized controlled trial. *J Consult Clin Psychol* 2003;71:622-28.
54. Spence SH, Sheffield JK, Donovan CL. Preventing adolescent depression: An evaluation of the problem solving for life program. *J Consult Clin Psychol* 2003;71:3-13.
55. McArdle P, Moseley D, Quibell T, Johnson R, Allen A, Hammal D, et al. School-based indicated prevention: A randomised trial of group therapy. *J Child Psychol Psychiatry* 2002;43:705-12.
56. Flay BR, Biglan A, Boruch RF, Gonzalez Castro F, Gottfredson D, Kellam S, et al. Standards of evidence: Criteria for efficacy, effectiveness and dissemination. *Prev Science* 2005;6:151-75.
57. Cohen MA. The monetary value of saving a high-risk youth. *J Quant Criminology* 1998;14:5-33.
58. Waddell C, Shepherd CA, Barker J. Developing a research-policy partnership to improve children's mental health in British Columbia. *West Can Geograph Series,* in press.

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RÉSUMÉ

Contexte : En tout temps, 14 % des enfants canadiens éprouvent des troubles mentaux patents, qui persistent souvent jusqu'à l'âge adulte. Les politiques gouvernementales du Canada mettent l'accent sur les services de traitement spécialisés, et pourtant ces services n'atteignent que 25 % des enfants qui présentent des troubles. Les programmes de prévention pourraient réduire le nombre d'enfants atteints de troubles mentaux dans la population. Pour améliorer la formulation des politiques, nous avons systématiquement examiné les meilleurs résultats de recherche disponibles sur les programmes de prévention de trois des troubles mentaux les plus fréquents chez les enfants : le trouble des conduites, l'anxiété et la dépression.

Méthode : Nous avons systématiquement répertorié et examiné les études randomisées et contrôlées (ERC) portant sur les programmes de prévention du trouble des conduites, de l'anxiété et de la dépression chez les enfants de 0 à 18 ans.

Résultats : Quinze ERC respectaient nos critères de sélection : neuf de ces études (associées à huit programmes) portaient sur la prévention du trouble des conduites, une étude portait sur l'anxiété, quatre études (associées à trois programmes) portaient sur la dépression, et une seule étude portait sur les trois troubles à la fois. Dix ERC faisaient état d'une baisse significative des symptômes chez les enfants et/ou des mesures diagnostiques lors du suivi. Pour le trouble des conduites, les programmes dignes de mention ciblaient les jeunes enfants à risque au moyen de la formation parentale ou de l'acquisition de compétences sociales par les enfants; pour l'anxiété, les programmes les plus intéressants faisaient appel à la formation cognitivo-comportementale universelle chez les enfants d'âge scolaire; et pour la dépression, ils ciblaient seulement les enfants d'âge scolaire à risque, mais comme les programmes de prévention de l'anxiété, ils utilisaient la formation cognitivo-comportementale. Tous ces programmes méritoires ont eu des effets modestes, mais indirects. Les études canadiennes étaient peu nombreuses, tout comme les études analysant les coûts des programmes.

Analyse : Les programmes de prévention sont prometteurs, mais pour en déterminer l'efficacité et la rentabilité, il faudrait reproduire les ERC dans un contexte canadien. Quatre types de programmes devraient être étudiés en priorité : ceux qui utilisent la formation parentale et l'acquisition de compétences sociales par les enfants pour prévenir le trouble des conduites chez les enfants en bas âge; et ceux qui utilisent la formation cognitivo-comportementale, universelle ou ciblée, pour prévenir l'anxiété et la dépression chez les enfants d'âge scolaire. Des partenariats entre chercheurs et décideurs permettraient de mener de telles études en milieu naturel et garantiraient leur évaluation rigoureuse. La prévention est une stratégie qui mérite que l'on investisse dans de nouveaux projets de politiques et de recherche s'inscrivant dans une stratégie de santé publique globale pour améliorer la santé mentale des enfants à l'échelle de la population.