



Systematic Review of Universal Resilience-Focused Interventions Targeting Child and Adolescent Mental Health in the School Setting

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Objective: To examine the effect of universal, school-based, resilience-focused interventions on mental health problems in children and adolescents.

Method: Eligible studies were randomized controlled trials (RCTs) of universal, school-based interventions that included strategies to strengthen a minimum of 3 internal resilience protective factors, and included an outcome measure of mental health problems in children and adolescents aged 5 to 18 years. Six databases were searched from 1995 to 2015. Results were pooled in meta-analyses by mental health outcome (anxiety symptoms, depressive symptoms, hyperactivity, conduct problems, internalizing problems, externalizing problems, and general psychological distress), for all trials (5–18 years). Subgroup analyses were conducted by age (child: 5–10 years; adolescent: 11–18 years), length of follow-up (short: post-≤12 months; long: >12 months), and gender (narrative).

Results: A total of 57 included trials were identified from 5,984 records, with 49 contributing to meta-analyses. For all trials, resilience-focused interventions were effective relative to a control in reducing 4 of 7 outcomes: depressive symptoms, internalizing problems, externalizing problems, and general psychological distress. For child trials (meta-analyses for 6 outcomes), interventions were effective for anxiety symptoms and general psychological distress. For adolescent trials (meta-analyses for 5 outcomes), interventions were effective for internalizing problems. For short-term follow-up, interventions were

effective for 2 of 7 outcomes: depressive symptoms and anxiety symptoms. For long-term follow-up (meta-analyses for 5 outcomes), interventions were effective for internalizing problems.

Conclusion: The findings may suggest most promise for using universal resilience-focused interventions at least for short-term reductions in depressive and anxiety symptoms for children and adolescents, particularly if a cognitive-behavioral therapy-based approach is used. The limited number of trials providing data amenable for meta-analysis for some outcomes and subgroups, the variability of interventions, study quality, and bias mean that it is not possible to draw more specific conclusions. Identifying what intervention qualities (such as number and type of protective factor) achieve the greatest positive effect per mental health problem outcome remains an important area for future research.

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Key words: mental health, universal intervention, school, resilience, meta-analysis

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Worldwide, 10% to 20% of children and adolescents experience mental health problems,¹ with age of onset for many disorders reported to be from 12 to 24 years.² Mental health problems in children and adolescents have been shown to contribute to lower achievement in education, and increased rates of engagement in health risk behaviors, self-harm, and suicide,^{2,3} with

the impacts of such problems often persisting into adulthood.^{4,5} Thus, the prevention of mental health problems in children and adolescents is integral to promoting positive life outcomes for young people.

In recent decades, there has been a shift in the focus of mental health research from risk and psychopathology to the promotion of positive outcomes such as resilience.⁶ Although much variation exists in the operationalization of resilience,⁷ researchers commonly refer to the construct as dynamic⁸ and multifactorial,⁷ involving the maintenance of, or return to, positive mental health following adversity by using a collection of multiple internal (personal



Supplemental material cited in this article is available online.

characteristics or strengths) and external (qualities of wider family, social, and community environments) resilience protective factors (assets and resources) that enable an individual to thrive and to overcome disadvantage or adversity.⁹⁻¹⁴ Findings of studies that have quantitatively examined the association between specific resilience protective factors and mental health outcomes are consistent with suggestions that the strengthening of resilience protective factors may reduce mental health problems in children and adolescents.¹⁵ For example, studies have reported high levels of protective factors (strong attachment to family,¹⁶ high levels of pro-social behavior in family, school, and community,¹⁶ high social skills/competence,¹⁶⁻¹⁸ strong moral beliefs,¹⁶ high levels of religiosity,¹⁶ positive personal disposition,^{17,18} positive social support,^{17,18} and strong family cohesion¹⁶⁻¹⁸) to be associated with lower levels of anxiety symptoms, depressive symptoms, stress, and obsessive-compulsive disorder in children and adolescents.¹⁶⁻¹⁸

Resilience-focused interventions target the strengthening of multiple protective factors, often termed “building resilience,” and are one suggested approach for reducing mental health problems in children and adolescents.^{7,19} Resilience-focused interventions take many forms and vary by intervention mode (e.g., curriculum-based lessons, or broader capacity-building strategies to enable schools to identify school-specific needs and to use their own and external resources to sustain strategies to target protective factors), length, and frequency of curriculum-based lessons, overall duration of intervention, facilitator, and delivery (e.g., face-to-face, online). Such interventions are commonly school based and adopt universal frameworks, targeting whole populations or groups not identified as having, or being at risk for, mental health problems.²⁰ Schools provide access to children and adolescents for prolonged periods at critical times in development and have existing resources, infrastructure, and values that are conducive to supporting the development of positive health, mental health, and resilience in young people.²¹⁻²³

Many universal, school-based, resilience-focused interventions have been implemented internationally. Two meta-analyses^{24,25} have reported the effectiveness of randomized controlled trials of the universal application of one particular resilience-focused school-based intervention, the PENN Resiliency Program (PRP). The PRP is a 12-week program based on cognitive-behavioral principles implemented in the United States, and targeting internal protective factors of children and adolescents (8–18 years) through structured curriculum activities within group sessions.²⁶ The first meta-analysis examined the effect on the single outcome of depressive symptoms at immediate postintervention, 6- to 8-month follow-up, and 12-month follow-up,²⁴ finding a reduction in depressive symptoms at 12-month follow-up only.²⁴ The second, a more recent meta-analysis, examined 2 outcomes, namely, anxiety symptoms and depressive symptoms, and found no evidence of effect on either at immediate postintervention.²⁵ No later follow-up data points were examined. No systematic review has quantitatively synthesized the effect of universal, school-based,

resilience-focused interventions more generally, nor considered a broader range of mental health outcomes in children and adolescents.

In addition, gender differences have been consistently identified in both the prevalence of mental health problems²⁷⁻³³ and in the type of resilience protective factors that children and adolescents use.^{16,18} Knowledge of such differences lends itself well to the suggestion that the effect of resilience-focused interventions targeting mental health problems in children and adolescents may also vary by gender, and hence be valuable to consider in systematic reviews. Likewise, examination of effects separately for children and adolescents can help inform whether resilience-focused interventions may have greater benefit if implemented early in childhood.³⁴ Finally, there is value in understanding the length of any positive intervention effects. Such information can assist in understanding the cost-versus-benefit ratios of these programs.

To address identified evidence gaps, a review was undertaken to assess the effectiveness of universal, school-based, resilience-focused interventions on 7 prevalent and frequently reported mental health problems in children and adolescents (aged 5–18 years). The outcomes were anxiety symptoms, depressive symptoms, hyperactivity, conduct problems, internalizing problems, externalizing problems, and general psychological distress. A secondary aim was to examine the differential effects of such interventions by age (child; adolescent), gender (male; female), and length of follow-up (short-term; long-term).

METHOD

The review was prospectively registered with PROSPERO (reference number CRD42015025908), and the methods are described in detail in the related protocol.³⁵ The Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines were used to guide development of the review protocol³⁶ and reporting of the review findings.³⁷

Study Inclusion Criteria

Study Type. Included studies were randomized controlled trials (RCTs), including cluster randomized controlled trials (CRCTs) that compared a universal, school-based, resilience-focused intervention to a control or an alternative intervention.

Outcome Measures. Studies eligible for inclusion reported the prevalence or extent of occurrence of at least 1 of 7 mental health problems for participants aged 5 to 18 years: depressive symptoms, anxiety symptoms, hyperactivity, conduct problems, internalizing problems, externalizing problems, or general psychological distress.

Setting and Intervention. Included trials assessed interventions that addressed at least 3 internal resilience protective factors. These criteria were established a priori³⁵ and were based on literature suggesting resilience as multifactorial,¹⁹ as well as the minimum number of internal resilience protective factors targeted in previously identified studies of resilience-focused interventions with mental health outcomes in children and adolescents.^{9,11,26,38} Interventions conducted in war zones were excluded because of their unique context and the differences in conceptual approaches to strengthening resilience in such environments.³⁹

Search Methods

Six databases were searched from January 1995 to December 2015: Medline, PsycINFO, ERIC, EMBASE, CINAHL, and the Cochrane Central Register of Controlled Trials (CENTRAL, The Cochrane Library). Various other sources were searched: the first 200 articles from Google Scholar; relevant past reviews^{24,40-50}; volumes from the past 5 years of 3 key journals; and the reference lists of included studies. Authors of included studies were contacted to check for further related publications and other potential studies. A total of 31 publications were received from authors and screened for eligibility, with 2 publications forming included trials in the review.

Study Selection Process

Records were retrieved using the described search strategy, duplicates removed, and the remaining records uploaded to the online program Covidence.⁵¹ Titles, abstracts, and relevant full texts were screened by 2 authors for eligibility against predetermined criteria.³⁵ Authors were contacted when eligibility was unclear.

Data Extraction

Data were extracted from the longest follow-up data point, and the publication reporting these outcomes was classified as the primary paper, with supplementary details extracted where needed from related publications. Data were extracted for each relevant mental health outcome using a Microsoft Excel–based data extraction form (Microsoft Corp., Redmond, WA). An independent research assistant checked each stage of data extraction (approach used in recent Cochrane reviews^{42,52,53}), with disagreements resolved via consensus.

Where insufficient data existed, attempts were made to contact authors. Where data reported at the longest follow-up remained missing, data from the penultimate point of follow-up was extracted. A number of studies reported data from multiple measures of one outcome (e.g., 2 measures of depressive symptoms) or data from multiple informants for one outcome (e.g., child and teacher and/or parent report). In such studies, data were selected according to the following hierarchy: (1) data were extracted from the outcome identified as primary or included in the sample size calculation; or (2) where no outcome was explicitly identified as primary, the measure consistently described first in the measures and/or results tables was used; or (3) where no outcome was identified as primary and the order of outcomes varied throughout a publication, data were extracted from the outcome or informant for which the longest follow-up was provided.

Data Analysis and Synthesis

Intervention effects were assessed in separate meta-analyses for each of the 7 mental health problem outcomes (primary outcomes), with data from comparable mental health measures pooled. Trials were categorized into 2 groups: resilience-focused interventions relative to a control (primary comparison), or resilience-focused interventions relative to alternative resilience-focused interventions (secondary comparison), and meta-analyses were conducted separately for each group.

Meta-analyses were prespecified³⁵ and conducted to compare effect sizes across all trials (5–18 years) and also separately by age (child trials: 5–10 years; adolescent trials: 11–18 years) and by length of follow-up (short: post-≤12 months; long: >12 months), for each mental health problem outcome. In the absence of a

commonly adopted age categorization across past relevant systematic reviews,^{24,40-50,54-56} the division of trials into child and adolescent groups was based on the World Health Organization (WHO) definition of adolescence as the second decade of life,²¹ and allocation was based on overall mean of sample at baseline. Subgroup analysis by gender was planned³⁵; however, too few studies provided data for differential intervention effect by gender that were amenable to meta-analysis. Additional post hoc exploratory subgroup analyses were conducted to explore differential intervention effect by therapeutic basis (cognitive-behavioral therapy [CBT]–based versus non-CBT-based). Trials were categorized as CBT-based if authors of included studies explicitly identified therapeutic basis as CBT or cognitive restructuring.⁵⁷ All other approaches were grouped as non-CBT.

Meta-analyses were performed using a random-effects model in Review Manager version 5.3,⁵⁸ and used a significance level of .05. Because of variation in measurement tools across trials, effect measures were calculated as standardized mean difference. For CRCTs, effective sample sizes were calculated for each outcome by dividing the total sample size by the design effect. Intraclass correlation coefficients ranged from 0.01 to 0.25. For studies with multiple control or intervention arms, provided that each treatment condition met the review inclusion criteria, composite treatment effects were calculated (weighted mean, by sample size), along with pooled standard deviation.⁵⁹ Heterogeneity was assessed via visual inspection of the forest plots and consideration of the I^2 statistic (I^2 of 75%–100% indicating considerable heterogeneity).⁶⁰

Assessment of Risk of Bias. Risk of bias for each study was assessed independently by 2 reviewers using the online program Covidence⁵¹ and following the Cochrane Handbook for Systematic Reviews of Interventions guidelines.⁶⁰ Disagreements were resolved through consensus.

Assessment of Reporting Bias and Confidence in Cumulative Evidence. For the main outcomes of the review, reporting bias was assessed via visual inspection of funnel plots, and the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) approach⁶¹⁻⁶³ was used to assess confidence in cumulative evidence.

RESULTS

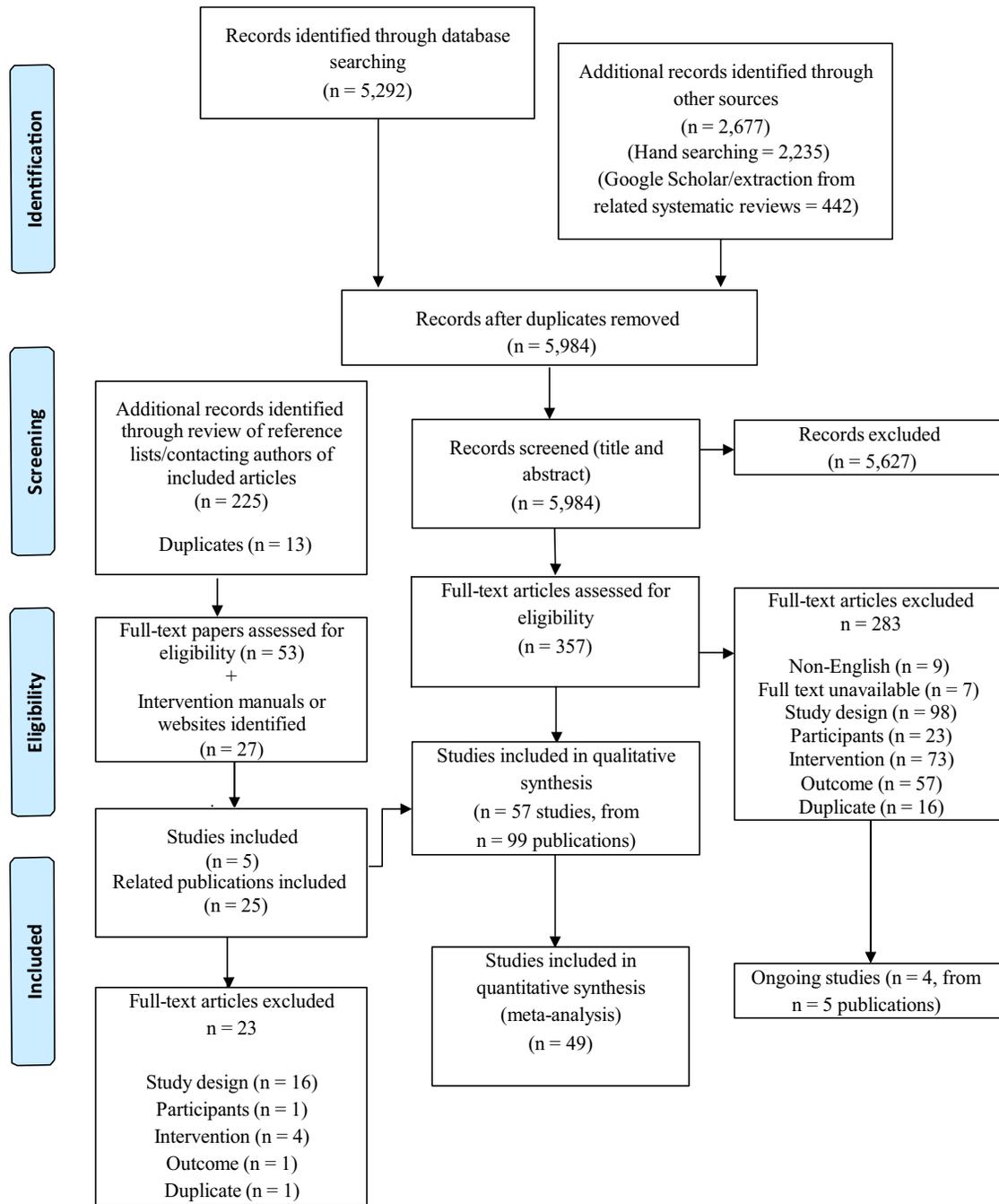
The review process resulted in the inclusion of 57 trials described across 99 publications (Figure 1). Four ongoing trials from 5 publications⁶⁴⁻⁶⁸ were identified.

Included Studies

The 57 included studies comprised 12 RCTs and 45 CRCTs, with 41,521 participants across study arms at longest follow-up (for characteristics of included studies, see Table S1, available online). Included studies were conducted across 16 countries, with the largest number conducted in Australia ($n = 18$), followed by the United States ($n = 14$). All trials were school-based and included universal components only.

In all, 41 trials reported a measure of depressive symptoms (9 child, 32 adolescent); 27 measured anxiety symptoms (11 child, 16 adolescent); 8 measured hyperactivity (6 child, 2 adolescent); 7 measured conduct problems (4 child, 3 adolescent); 7 measured internalizing problems (2 child, 5 adolescent); 8 measured externalizing problems (4 child, 4 adolescent); and 8 measured general psychological distress

FIGURE 1 Study flow diagram.



(4 child, 4 adolescent). Of 57 included studies, 19 were classified as child (participants aged 5–10 years at baseline), and 38 as adolescent (participants aged 11–18 years at baseline). Overall, 39 trials had a follow-up of immediate-post to 12 months postintervention (short-term), with 18 trials reporting a follow-up period of 13 to 72 months (long-term). By outcome, the length of follow-up ranged from immediate postintervention to 54 months for trials reporting

depressive symptoms, 54 months for anxiety symptoms, 24 months for hyperactivity, 72 months for internalizing problems, and 24 months for externalizing problems.

Intervention Characteristics

A total of 28 trials (15 child; 13 adolescent) targeted 3 or more internal resilience protective factors only, and 29

trials (4 child; 25 adolescent) included content that targeted both 3 or more internal resilience protective factors and one or more external resilience protective factors (Table S1, available online). The most commonly targeted internal protective factors were cognitive competence ($n = 33$), problem solving/decision making ($n = 28$), cooperation and communication ($n = 23$), and coping skills ($n = 23$). The largest number of trials ($n = 31$) reported being based on CBT. However, many additional approaches were described, and included programs based on the following: positive psychology; social and emotional learning; social skills; life skills; coping skills; interpersonal and self-management skills; psychological well-being therapy; the affective-behavioral-cognitive-dynamic (ABCD) model; mindfulness; and mental health promotion. All interventions included a curriculum component that ranged from one lesson per week up to daily lessons ranging from 15 to 120 minutes in length (average: 65 minutes), for 5 to 32 weeks (average: 14 weeks), with 2 trials including additional capacity building or social climate components that were implemented for a period of up to 3 years. The largest number of interventions were implemented by teachers and school staff ($n = 24$), followed by clinicians and trained external facilitators ($n = 20$), teachers in combination with clinicians, or trained external facilitators ($n = 13$). Table S2 (available online) lists group intervention characteristics by each mental health outcome.

Risk of Bias in Included Studies

Assessment of risk of bias is shown in Figures S1 and S2, available online. Of the 57 studies, 44 (77.2%) were rated as high risk for bias overall. Almost all studies were rated as high risk of bias for performance (94.7%) and detection bias (96.5%) because of the nature of the interventions implemented, lack of blinding of key study personnel or participants, and common use of self-report outcome measures. Interrater agreement for risk of bias assessments was strong⁶⁹ at 0.71.

Quality Assessment of Included Studies

The quality of evidence (GRADE) for all mental health problem outcomes, except depressive symptoms, was downgraded to “moderate” because of methodological limitations; the quality of evidence for depressive symptoms was downgraded to “low” because of methodological limitations and high probability of publication bias based on visual inspection of the funnel plot.

Effect of Intervention

Of 57 included studies, 49 provided data amenable to meta-analysis (see Table S1, available online, for measurement tools and outcomes used in each included study). Data from 8 studies were not suitable for inclusion in meta-analysis, 6 because of incomplete data,^{38,70-74} and 2 because of reported dichotomous outcomes^{75,76} (not suitable for inclusion in meta-analysis with continuous outcomes). Of the trials

providing data amenable to meta-analyses, 42 compared an intervention group to a control group (results reported here), and 7 compared a resilience-focused intervention to an alternate resilience-focused intervention. For brevity, the meta-analysis results reported in the text pertain to studies that compared a resilience-focused intervention to a control. For an overview of all meta-analyses results, Table 1 provides a summary of effects.

All Trials (5–18 Years). Meta-analysis (5–18 years) was possible for all outcomes and indicated a significant overall intervention effect for 4 of 7 outcomes: depressive symptoms, internalizing problems, externalizing problems, and general psychological distress.

Effect of Intervention by Age

Child Trials (5–10 Years). For child trials, meta-analysis was possible for 6 of 7 outcomes, with results for internalizing problems reported narratively. Meta-analyses indicated a significant overall intervention effect for anxiety symptoms and general psychological distress. Two trials reported a measure of internalizing problems (with data from one trial incomplete), with one trial finding a significant main effect of intervention⁷⁷ and the other no effect.⁷²

Adolescent Trials (11–18 Years). For adolescent trials, meta-analysis was possible for 5 of 7 outcomes and indicated a significant overall intervention effect for internalizing problems only. One trial⁷⁸ reported the outcome of conduct problems and found no overall effect of intervention.

Effect of Intervention by Gender

Of 57 included trials, 23 studies reported difference in intervention effect by gender for the outcomes of depressive symptoms ($n = 18$), anxiety symptoms ($n = 10$), hyperactivity ($n = 1$), internalizing problems ($n = 1$), and/or general psychological distress ($n = 2$). However, only 3 trials provided data suitable for inclusion in gender subgroup analysis. Thus, gender subgroup analysis was not viable, and narrative synthesis was undertaken.

Of the 18 trials that assessed the difference in intervention effect by gender for the outcome of depressive symptoms, 15 found no difference,⁷⁹⁻⁹³ and 3 indicated significant gender effects all of varying trends, with one trial finding a significant reduction in depressive symptoms for intervention group males but not for females,⁹⁴ one trial finding a significant reduction for intervention group females but not for males,⁷⁸ and the third trial finding significant reductions for intervention females and increased depressive symptoms in males.⁷¹ For the outcome of anxiety symptoms, 8 of 10 trials found no difference in intervention effect by gender,^{86,87,89,91,92,94-96} and the remaining 2 trials found a significant reduction in anxiety symptoms for intervention group females at posttest compared to males,^{81,97} with one trial assessing this again at 12-month follow-up but indicating that the significant difference was not sustained.⁸¹ One trial assessed difference in intervention effect by gender for

TABLE 1 Summary of Effects

Outcome	Intervention vs. Control				Intervention vs. Alternate Intervention			
	SMD (95% CI)	p	I ² (%)	n	SMD (95% CI)	p	I ² (%)	n
Overall intervention effect								
All trials								
Depressive symptoms	-0.08 (-0.14 to -0.01)	.02	56	30	0.07 (-0.09 to 0.23)	.42	29	6
Anxiety symptoms	-0.14 (-0.28 to 0.00)	.06	84	22	N/A			—
Hyperactivity	-0.07 (-0.18 to 0.05)	.24	0	5	N/A			—
Conduct problems	0.01 (-0.11 to 0.12)	.93	0	4	N/A			—
Internalizing problems	-0.21 (-0.36 to -0.06)	.005	0	4	N/A			—
Externalizing problems	-0.18 (-0.34 to -0.01)	.03	4	4	N/A			—
General psychological distress	-0.11 (-0.21 to -0.01)	.03	0	6	N/A			—
Intervention effect by age								
Child trials								
Depressive symptoms	-0.11 (-0.31 to 0.09)	.27	78	8	Narrative			1
Anxiety symptoms	-0.25 (-0.42 to -0.07)	.005	72	11	N/A			—
Hyperactivity	-0.07 (-0.18 to 0.05)	.24	0	5	N/A			—
Conduct problems	-0.02 (-0.15 to 0.10)	.73	0	3	N/A			—
Internalizing problems	Narrative			1	N/A			—
Externalizing problems	-0.16, (-0.45 to 0.13)	.29	41	2	N/A			—
General psychological distress	-0.13, (-0.24 to -0.02)	.02	0	4	N/A			—
Adolescent trials								
Depressive symptoms	-0.05 (-0.11 to 0.01)	.08	36	22	0.12 (-0.02 to 0.25)	.09	0	5
Anxiety symptoms	-0.02 (-0.24 to 0.20)	.87	88	11	0.08 (-0.08 to 0.24)	.35	0	4
Hyperactivity	N/A			—	Narrative			2
Conduct problems	Narrative			1	Narrative			2
Internalizing problems	-0.19 (-0.35 to -0.02)	.03	0	3	Narrative			1
Externalizing problems	-0.19 (-0.45 to 0.08)	.17	29	2	Narrative			1
General psychological distress	-0.04, (-0.26 to 0.18)	.72	0	2	Narrative			2
Intervention effect by length of follow-up								
Short-term follow-up								
Depressive symptoms	-0.13 (-0.22 to -0.05)	.002	63	22	-0.01 (-0.28 to 0.26)	.93	48	4
Anxiety symptoms	-0.18 (-0.33 to -0.02)	.03	86	19	0.02 (-0.19 to 0.23)	.86	0	3
Hyperactivity	-0.05 (-0.19 to 0.06)	.32	0	3	N/A			—
Conduct problems	0.01 (-0.11 to 0.12)	.93	0	4	N/A			—
Internalizing problems	-0.20 (-0.41 to 0.02)	.07	0	2	N/A			—
Externalizing problems	-0.18 (-0.42 to 0.06)	.14	18	2	N/A			—
General psychological distress	-0.12 (-0.24 to 0.01)	.06	0	5	Narrative			1
Long-term follow-up								
Depressive symptoms	0.04 (-0.03 to 0.10)	.25	0	8	0.13 (-0.04 to 0.31)	.14	0	2
Anxiety symptoms	0.07 (-0.13 to 0.27)	.51	0	3	Narrative			1
Hyperactivity	-0.09 (-0.36 to 0.18)	.52	0	2	N/A			—
Conduct problems	N/A			—	N/A			—
Internalizing problems	-0.22 (-0.42 to -0.02)	.03	0	2	Narrative			1
Externalizing problems	-0.17 (-0.49 to 0.15)	.31	47	2	Narrative			1
General psychological distress	Narrative			1	N/A			—
Exploratory post hoc subgroup analyses								
CBT-Based								
Non-CBT-Based								
Outcome	SMD (95% CI)	p	I ² (%)	n	SMD (95% CI)	p	I ² (%)	n
Exploratory post hoc subgroup analyses								
Depressive symptoms	-0.10 (-0.18 to -0.01)	.03	59	22	-0.03 (-0.12 to -0.07)	.58	44	8
Anxiety symptoms	-0.22 (-0.34 to -0.09)	.0009	70	16	0.09 (-0.34 to 0.51)	.68	92	6
Hyperactivity	N/A			0	N/A			5
Conduct problems	N/A			1	N/A			3

TABLE 1 Continued

Outcome	CBT-Based				Non-CBT-Based			
	SMD (95% CI)	<i>p</i>	<i>I</i> ² (%)	<i>n</i>	SMD (95% CI)	<i>p</i>	<i>I</i> ² (%)	<i>n</i>
Internalizing problems	N/A			3	N/A			1
Externalizing problems	N/A			3	N/A			1
General psychological distress	-0.13 (-0.26 to -0.00)	.05	9	3	-0.08 (-0.36 to 0.10)	.37	0	3

Note: Boldface type reflects significant overall effect of intervention; *n* is the number of trials that provided data amenable to each meta-analysis. Where table notes "N/A," no trials reported the outcome for the subgroup meta-analyses (see Results section), and where "narrative" is noted, see text for narrative review. CBT = cognitive-behavioral therapy; SMD = standardized mean difference.

the outcome of hyperactivity⁹⁰ and one trial for the outcome of total difficulties⁹⁸; both trials indicated no significant effect for such outcomes. For the outcome of internalizing problems, a single trial assessed difference in intervention effect by gender and indicated no significant difference.⁹⁹

Effect of Intervention by Length of Follow-Up

Short-Term Follow-Up. For short-term follow-up, meta-analysis was possible for all outcomes, and indicated a significant overall intervention effect for depressive symptoms and anxiety symptoms.

Long-Term Follow-Up. For long-term follow-up, meta-analysis was possible for 5 of 7 outcomes and indicated a significant overall effect of intervention at long-term follow-up for the outcome of internalizing problems only. One trial reported a long-term follow-up for the outcome of general psychological distress,⁹² indicating a significant intervention effect maintained at 18-month follow-up. No trials reported a long-term follow-up for the outcome of conduct problems.

Exploratory Subgroup Analyses

Additional post hoc subgroup analyses comparing CBT-based versus non-CBT-based resilience-focused interventions (Table 1) were possible for 3 of 7 outcomes. Results indicated a significant effect for CBT-based resilience-focused interventions for all 3 outcomes, namely, depressive symptoms, anxiety symptoms, and general psychological distress, with no significant effects for non-CBT-based, resilience-focused interventions.

Heterogeneity

Heterogeneity remained high in 3 meta-analyses: child trials subgroup analysis for the outcome of depressive symptoms ($I^2 = 78\%$), all trials analysis ($I^2 = 84\%$), and adolescent trials subgroup analysis ($I^2 = 88\%$) for the outcome of anxiety symptoms.

DISCUSSION

A comprehensive systematic review was conducted to quantitatively synthesize the body of evidence regarding the effect of universal, school-based interventions targeting resilience protective factors on a range of mental

health outcomes prevalent in children and adolescents aged 5 to 18 years. The review found the effectiveness of resilience-focused interventions to vary by mental health problem outcome, age group, and length of follow-up. When pooling all trials, such interventions were effective relative to a control for reducing 4 of 7 mental health problem outcomes, namely, depressive symptoms, internalizing and externalizing problems, and general psychological distress. For the outcome of anxiety symptoms, results of subgroup analysis by age indicating a significant effect of resilience-focused interventions for children but not for adolescents may suggest that the overall effect (all trials 5–18 years) was weakened by the inclusion of adolescent trials. For the outcomes of hyperactivity and conduct problems, it is possible that the ability to detect an intervention effect was limited by the inclusion of a minimal number of trials in such meta-analyses. As no previous systematic review has provided a quantitative synthesis of evidence of the effects of such interventions in children and adolescents, and in particular analyses on the range of mental health problem outcomes and subgroups included in the present review, the capacity to compare the present results to those of previous reviews is constrained.

Meta-analysis results for child trials indicated that resilience-focused interventions were effective relative to a control for reducing 2 of the 6 outcomes amenable to meta-analyses, namely, anxiety symptoms and general psychological distress. For adolescent trials, 5 outcomes were amenable to meta-analyses, with the analysis supporting the effectiveness of resilience-focused interventions in addressing adolescent internalizing problems. The identification of critical times for the implementation of resilience-focused interventions has the potential to improve effectiveness, to boost return on investment, and to positively affect prevention efforts and policy.¹⁰⁰ Results of the present review suggest some benefit of intervening both in childhood (5–10 years) and in adolescence (11–18 years), depending on the mental health outcome being targeted. Variation in effect by age and mental health outcome may potentially be due to differences in the relevance of particular protective factors across life stages¹⁰¹ and a need to tailor resilience-focused interventions to target protective factors that are developmentally appropriate at age of implementation.¹⁰² This

may suggest that if interventions that adopt a resilience approach are driven by strong logic models¹⁰¹ that ensure appropriateness of intervention content relative to the mental health problem and age of population being targeted, greater preventive effects may be possible. However, for the outcomes of depressive symptoms and externalizing problems, a significant overall effect (5–18 years) was found, although no effect was found by age group (child; adolescent). For these outcomes, there remains a need to elucidate the timeframe when implementation of resilience-focused interventions is most appropriate.

Despite gender differences being consistently identified in both the prevalence of mental health problems^{27–33} and in the type of resilience protective factors that children and adolescents use,^{16,18} only 40% of resilience-focused intervention trials identified in the present review (23 of 57 trials) examined differential effect of intervention by gender, with only 5% (3 of 57 trials) providing data amenable to meta-analysis. Consequently, subgroup analysis by gender could not be performed, and narrative synthesis largely indicated no differential effect by gender for the 5 outcomes able to be considered, namely, depressive symptoms, anxiety symptoms, hyperactivity, internalizing problems, and general psychological distress. This conclusion should be interpreted with caution, however, because of the minimal number of trials in this summary and the inability to quantitatively support such findings through meta-analysis. Uncertainty remains about whether strategies targeting particular gender-related protective factors should be included in resilience-focused interventions so as to achieve more optimal reduction in mental health problems for all students.¹⁸ Future trials of resilience-focused interventions could inform this issue by including analysis of differential effect of intervention by gender.

When examining intervention effect by length of follow-up, resilience-focused interventions were effective at short-term follow-up (≤ 12 months) for reducing depressive and anxiety symptoms. Although not directly comparable, the finding of a significant intervention effect for depressive symptoms at short-term follow-up is consistent with a previous meta-analysis examining the effect of multiple randomized controlled trials of the universal application of the PENN Resiliency Program (PRP) at 12-month follow-up,²⁴ and is inconsistent with the second of such meta-analyses, which found no evidence of effect for the outcomes of depressive and anxiety symptoms at immediate postintervention (no longer points of follow-up were examined in the second meta-analysis).²⁵ At long-term follow-up (> 12 months), a significant effect was found for 1 of the 5 outcomes amenable to meta-analysis, namely, internalizing problems. Although depressive and anxiety symptoms are commonly considered components of internalizing problems, no significant effect was found for such outcomes at long-term follow-up. Visual inspection of related forest plots indicated variation in the direction of intervention

effects as a possible reason for such results; there was greater variation in direction of intervention effects (results mixed in favor of intervention and control) for the outcomes of depressive and anxiety symptoms in comparison to the outcome of internalizing problems (results consistently in favor of intervention). As neither of the above-mentioned meta-analyses^{24,25} investigated intervention effect for length of follow-up greater than 12 months, such results cannot be compared to past research.

Lack of long-term follow-up in school-based intervention studies was evident. Achieving long-term implementation and collection of long-term follow-up data in school-based studies may be difficult for many reasons. These include already-high demand on time and resources within schools, high attrition in school-based studies,^{103,104} and, as with all research, the collection of data across long-term points of follow-up requiring the establishment of long-term relationships between schools and research teams and long-term funding. However, with the development of resilience protective factors identified as a time-intense process¹¹ and systematic review evidence indicating some intervention trials to have delayed preventive effects identifiable only at later follow-up points⁵⁰ and lack of long-term follow-up points consequently resulting in potential underestimation of preventive effects,⁵⁰ and with the potential to better determine the cost versus benefit of implementing resilience-focused interventions should more studies include long-term outcomes, sustaining resilience-focused preventive efforts in schools and assessing longer-term effects present a worthwhile future focus in this field.

Finally, exploratory subgroup analyses enabled investigation of the impact of therapeutic basis on intervention effect. Consistent with and extending on the findings of a recent systematic review of depression prevention programs for children and adolescents by Hetrick *et al.*,⁵⁷ the present exploratory analyses found variation in intervention effect by therapeutic approach, indicating benefits of resilience-focused interventions based on CBT principles for depressive symptoms⁵⁷ and additionally for anxiety symptoms and general psychological distress. However, there remains the potential to further investigate what intervention qualities achieve the greatest positive effect per mental health problem outcome. In particular, the identification of common protective factors targeted, particularly when greater intervention effects are demonstrated, and relatedly the identification of what type and number of protective factors result in the greatest preventive effect for each mental health problem outcome, may help reduce variability in the field and aid in building more effective resilience-focused prevention interventions in the future.¹¹

Strengths of the present review included coverage of a broad range of mental health outcomes, the pooling of study effects in the meta-analysis for each outcome, the examination of difference in intervention effect for children and adolescents, for short- and long-term follow-up, and the addition of exploratory subgroup analysis to examine

differences in intervention effect by therapeutic approach. Together, the findings suggest promise for using resilience-focused interventions for short-term reductions in depressive and anxiety symptoms, particularly if a CBT-based approach is used.

A limitation of the present review was an insufficient number of trials in some subgroups, thus precluding completion of all meta-analyses for subgroups specified a priori.³⁵ In addition, the number of trials reporting adequate data for meta-analyses varied by outcome and subgroup. Research suggests that the inclusion of 4 or fewer studies in random effects meta-analysis may result in imprecise estimations of between-study variance.¹⁰⁵ Therefore, results in the present review of meta-analyses based on minimal numbers of trials, such as for the outcomes of conduct problems, internalizing problems, and externalizing problems, should be interpreted with caution. Moreover, the risk of bias of included studies was rated high overall due to 2 key methodological limitations, namely, lack of blinding of key study personnel or participants, and common use of self-report outcome measures. Because of the nature of universal, school-based intervention trials, such study qualities may not easily be modified to reduce bias. However, it may be possible to improve the accuracy of reporting of mental health problems in such trials through multi-informant data collection.^{34,99,106} Using the GRADE approach, the overall quality of evidence was moderate for all mental health problem outcomes except depressive symptoms, which was downgraded to low. These ratings were a result of methodological limitations of included trials, such as lack of blinding of participants and outcome assessment, and incomplete outcome data, in addition to potential publication bias in the case of the outcome of depressive symptoms. This suggests that the true effect may vary to the intervention effects reported in the review.

Furthermore, heterogeneity remained high for the outcomes of depressive symptoms and anxiety symptoms. For both outcomes, subgroup analyses by length of follow-up indicated a high degree of heterogeneity with short-term length of follow-up (depressive symptoms: $I^2 = 82%$; anxiety symptoms: $I^2 = 86%$) compared to long-term follow-up (depressive symptoms: $I^2 = 0%$; anxiety symptoms: $I^2 = 0%$). Inspection of related forest plots indicated that trials reporting short-term follow-up appeared to have greater variation in the direction of overall intervention effect than those reporting long-term follow-up. As such, the high degree of heterogeneity may be linked to variation in the direction of effect in studies of short-term compared to long-term follow-up. In addition, to further explore the source of such heterogeneity, subgroup analyses by size of study were conducted. For depressive symptoms, heterogeneity remained high for both small and large studies; there was no consistency in the direction of effect for small or large studies. In contrast, for anxiety symptoms, inspection of related forest plots indicated that large studies were more likely than small studies to demonstrate a significant effect of intervention, suggesting that the size of the study may be

a potential source of the high degree of heterogeneity for this outcome. Therefore, although the heterogeneous nature of interventions was anticipated a priori³⁵ and considered in the choice of the statistical methods used, conclusions of the present review should be considered in context of meta-analysis based at times on data from a minimal number of trials, including a diverse range of resilience-focused interventions (shown in Tables S1 and S2, available online) and with varying degrees of bias and study quality.

In addition, the present review examined the effect of only universal resilience-focused interventions. In a recent review by Werner-Seidler *et al.*, of 81 trials of school-based depression and anxiety prevention programs for young people, researchers found small effects for both universal and targeted interventions.¹⁰⁷ Werner-Seidler *et al.* note possible merit in implementing interventions targeting both levels of prevention in the school setting, and suggest potential for a stepped-care approach whereby universal interventions are first implemented, with targeted interventions later implemented to aid students with increased risk or levels of mental health problems.¹⁰⁷ Such findings may valuably inform future school-based interventions targeting child and adolescent mental health problems.

Finally, resilience-focused interventions are based on the premise that strengthening resilience protective factors is an effective mechanism for positively influencing mental health in children and adolescents. It was not possible to test this in the current review, as very few trials also provided a measure of levels of the resilience protective factors targeted within the interventions. The inclusion of measures of protective factors in future evaluation trials will help determine whether protective factors are being strengthened and whether this is the mechanism responsible for some positive results for resilience-focused interventions, and support the identification of specific protective factors that have the greatest impact on mental health problem outcomes.

In conclusion, the present review supports some positive effects of resilience-focused interventions in relation to mental health problems in young people; however, such effects varied by mental health problem, age group, and length of follow-up. Overall, findings suggest promise for using resilience-focused interventions for short-term reductions in depressive and anxiety symptoms, particularly through the use of CBT-based approaches. Given the broad application of universal, school-based, resilience-focused interventions internationally, further consideration of the benefit of their implementation for particular mental health problems and age groups, as well as the achievable length of sustainable positive impact of such interventions, appears to be warranted. In addition, the complex task of further elucidating what intervention qualities (such as number and type of protective factors) are required to achieve the greatest positive effect for each mental health problem outcome remains an important area for future research. ϵ

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Dr. Oldmeadow and Ms. Palazzi served as the statistical experts for this research.

J.D. led the review. J.D., J.Bo., E.C., M.F., L.W., R.H., and J.W. contributed to conception and design of the study, acquisition, analysis and interpretation of the data, drafting of the manuscript, critical revision of the manuscript and approved the version to be published. K.M., D.T., K.B., T.S., and J.Ba.

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Consent for publication was not applicable.

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