

Supplementary Table 1. Articles Excluded During Full-Text Screening

First Author(s)	Year	Title	DOI/URL	Reason for Exclusion
Abozayed	2022	Online Multicomponent Program for Mental Health Promotion of Medical Students: An Intervention Study	10.3889/OAMJMS.2022.9174	Wrong Age
AreskougSandberg	2024	A 10-week school-based mindfulness intervention and symptoms of depression and anxiety among school children and adolescents: A controlled study.	10.1007/s12310-023-09620-y	Wrong Intervention Format
Bacio	2020	Facilitating Change in Drinking Cognitions and Behaviors Among Three Immigrant Generations of Latinx Youth Through a School-Based Intervention: Findings From a Multi-Site Clinical Trial.	10.3389/fpsy.2020.574487	Wrong Intervention Format
Badesha	2023	Mental health mobile application self-help for adolescents exhibiting psychological distress: A single case experimental design.	10.1111/papt.12436	Mental health Diagnosis
Barral	2022	A Pilot Intervention to Reduce Adolescent Sexual and Mental Health Disparities by Increasing Access to Telemedicine and Mobile Care (AccessKCTeen)	10.1016/j.jadohealth.2022.01.136	No Mental Health Outcomes
Bei	2011	Development & feasibility trial of a mindfulness-based multi-component in-school group sleep intervention for poor sleep & anxiety symptoms in adolescent girls	10.1111/j.1479-8425.2011.00518.x	Wrong Article Type
Bisal	2022	Feasibility of a secondary school-based mental health intervention: Reprezents' On The Level	s13034-022-00534-2.pdf	No Mental Health Outcomes

Carriere	2024	Winner for Life: A three-year study of student-athletes' life skills development in a training programme for coaches and teachers.	10.1016/j.psychsport.2023.102573	Wrong Intervention Format
Chen	2023	Creating youth engaging platform for early mental health intervention: Preliminary findings from LevelMind@JC project in Hong Kong	10.1111/eip.13408	Wrong Article Type
Coughlin	2009	A controlled clinical evaluation of the parents plus children's programme: a video-based programme for parents of children aged 6 to 11 with behavioural and developmental problems.	10.1177/1359104509339081	Wrong Intervention Format
CraigRushing	2021	Efficacy of an mHealth Intervention (BRAVE) to Promote Mental Wellness for American Indian and Alaska Native Teenagers and Young Adults: Randomized Controlled Trial.	10.2196/26158	Wrong Age
deJong	2023	The efficacy of a self-help parenting program for parents of children with externalizing behavior: a randomized controlled trial.	10.1007/s00787-022-02028-0	Mental Health Diagnosis
Dickter	2019	Impact of an online depression prevention intervention on suicide risk factors for adolescents and young adults.	10.21037/mhealth.2019.04.01	Mental Health Diagnosis
Dietvorst	2021	A serious game smart phone application (Grow it!) that promotes wellbeing and resilience in Dutch adolescents during the COVID -19 pandemic	10.1111/bdi.13097	Wrong Article Type
Foskolos	2023	Brief parenting seminars for preventing child behavioral and emotional difficulties: A pilot randomized controlled trial.	10.1007/s10826-023-02653-6	Wrong Intervention Format

Grummitt	2025	Efficacy of a school-based, universal prevention programme for depression and anxiety in adolescents (OurFutures Mental Health): a two-arm cluster-randomised controlled trial.	10.1016/j.eclinm.2025.103672	Mental Health Diagnosis
Guertler	2025	App-Based Coaching to Prevent Addictive Behaviors in Vocational School Students: A Cluster Randomized Trial.	10.1016/j.jadohealth.2024.11.010	Wrong Age
Haggerty	2023	Two-Year Risk Behavior Outcomes from Connecting, a Prevention Program for Caregivers and Youth in Foster Care.	10.1007/s11121-022-01390-4	Wrong Article Type
Haggerty	2023	Family, Mental Health, and Placement Outcomes of a Low-cost Preventive Intervention for Youth in Foster Care.	10.1016/j.childyouth.2023.106973	No Mental Health Outcomes
HariPrakash	2025	Development and validation of android mobile application in the management of mental health	10.1016/j.cegh.2024.101894	Wrong Intervention Format
Haug	2023	Predictors of Youth Accessibility for a Mobile Phone-Based Life Skills Training Program for Addiction Prevention.	10.3390/ijerph20146379	Wrong Intervention Format
He	2025	AI-Driven Multimodal Preventive System for Adolescent Mental Health: A Randomized Controlled Trial	10.1016/j.amepre.2025.107924	Mental Health Diagnosis
Hennefield	2024	Early Emotion Development Intervention Improves Mental Health Outcomes in Low-Income, High-Risk Community Children.	10.1007/s10578-023-01639-1	Mental Health Diagnosis
Hill	2023	Open trial of a brief, web-assisted behavioural intervention to reduce thwarted belongingness and suicidal ideation among adolescents: The Supporting Grieving Teens intervention.	10.1002/capr.12582	Mental Health Diagnosis

Huen	2016	Evaluation of a Digital Game-Based Learning Program for Enhancing Youth Mental Health: A Structural Equation Modeling of the Program Effectiveness	10.2196/mental.5656	Incompatible data format; author contact unsuccessful
Ji	2023	Effectiveness of an integrated motivational cognitive-behavioral group intervention for adolescents with gaming disorder: a randomized controlled trial	10.1111/add.16292	Wrong Intervention Format
Jolley	2023	A cluster randomised, 16-week, parallel-group multicentre trial to compare the effectiveness of a digital school-based cognitive behavioural resilience/wellbeing-building intervention targeting emotional and behavioural problems in vulnerable Year 4 prima	10.1186/s13063-023-07267-3	Wrong Article Type
Jones	2024	Technology-enhanced program for child disruptive behavior disorders: development and pilot randomized control trial.	10.1080/15374416.2013.822308	Mental Health Diagnosis
Kierfeld	2013	Effectiveness of telephone-assisted parent-administered behavioural family intervention for preschool children with externalizing problem behaviour: a randomized controlled trial.	10.1007/s00787-013-0397-7	Mental Health Diagnosis
Kirchner	2022	Effects of “It Gets Better” Suicide Prevention Videos on Youth Identifying as Lesbian, Gay, Bisexual, Transgender, Queer, or Other Sexual or Gender Minorities: A Randomized Controlled Trial.	10.1089/lgbt.2021.0383	Wrong Age
KleinVelderman	2006	Preventing preschool externalizing behavior problems through video-feedback intervention in infancy.	10.1002/imhj.20104	Wrong Intervention Format

Lehner	2026	Effectiveness of the school-based internet intervention StresSOS for the prevention of mental health problems in young people: a randomized controlled trial as part of the ProHEAD consortium	10.1111/jcpp.70145	Wrong Intervention Format
LeverTaylor	2014	The effectiveness of self-help mindfulness-based cognitive therapy in a student sample: a randomised controlled trial.	10.1016/j.brat.2014.09.007	Wrong Age
Loades	2025	Investigating Project Care UK, a Web-Based Self-Help Single-Session Intervention for Youth Mental Health: Program Evaluation.	10.2196/72077	Mental Health Diagnosis
Lockwood	2022	Effectiveness, User Engagement and Experience, and Safety of a Mobile App (Lumi Nova) Delivering Exposure-Based Cognitive Behavioral Therapy Strategies to Manage Anxiety in Children via Immersive Gaming Technology: Preliminary Evaluation Study.	10.2196/29008	Mental Health Diagnosis
Lohaus	2009	Stress prevention in adolescence: Effects of a training program with an accompanying internet platform.	10.1026/0943-8149.17.1.13	Wrong Article Type
Lu	2026	Digital Parent-Child Intervention on Children's Exercise Behavior and Psychological Development-A Randomized Controlled Trial Based on Family Perspective.	10.3390/bs16020282	Wrong Intervention Format
MacIsaac	2021	Adverse Childhood Experiences and Building Resilience With the JoyPop App: Evaluation Study.	10.2196/25087	Wrong Age
Miller-Chagnon	2024	The benefits of mindfulness training for momentary mindfulness and emotion	10.1037/ccp0000910	Wrong Intervention Format

		regulation: A randomized controlled trial for adolescents exposed to chronic stressors.		
Munir	2026	Immediate Effects and Experiences of a Digital Single-Session Behavioural Activation Based Intervention for Adolescents: A Single Arm Pre-post Programme Evaluation of Project ABC in the UK	10.1177/13591045261433857	Mental Health Diagnosis
O'Dean	2025	Adolescent behavioural intentions: Secondary outcomes from a cluster randomized controlled trial of the Health4Life school-based lifestyle modification intervention.	10.17269/s41997-024-00955-w	No Mental Health Outcomes
O'Kearney	2006	Effects of a cognitive-behavioural internet program on depression, vulnerability to depression and stigma in adolescent males: a school-based controlled trial.	10.1080/16506070500303456	Mental Health Diagnosis
Pisani	2018	Mobile Phone Intervention to Reduce Youth Suicide in Rural Communities: Field Test.	10.2196/10425	Wrong Article Type
Poppelaars	2016	A randomized controlled trial comparing two cognitive-behavioral programs for adolescent girls with subclinical depression: A school-based program (Op Volle Kracht) and a computerized program (SPARX).	10.1016/j.brat.2016.03.005	Mental Health Diagnosis
RivaCrugnola	2021	Video-feedback attachment based intervention aimed at adolescent and young mothers: Effectiveness on infant-mother interaction and maternal mind-mindedness.	10.1080/03004430.2019.1652172	Wrong Intervention Format

Sanchez	2017	Improving Children's Mental Health with a Digital Social Skills Development Game: A Randomized Controlled Efficacy Trial of Adventures aboard the S.S. GRIN.	10.1089/g4h.2015.0108	Mental Health Diagnosis
Saulsberry	2013	Chicago Urban Resiliency Building (CURB): An internet-based depression-prevention intervention for urban African-American and Latino adolescents.	10.1007/s10826-012-9627-8	Wrong Article Type
Schoneveld	2018	Preventing Childhood Anxiety Disorders: Is an Applied Game as Effective as a Cognitive Behavioral Therapy-Based Program?.	10.1007/s11121-017-0843-8	Wrong Article Type
Sim	2022	The Role of Parent Engagement in a Web-Based Preventive Parenting Intervention for Child Mental Health in Predicting Parenting, Parent and Child Outcomes.	10.3390/ijerph19042191	Wrong Article Type
Soares	2022	The effects of engagement with an online depression prevention program for adolescents on suicide risk factors.	10.1007/s41347-022-00249-3	Mental Health Diagnosis
Spence	2019	Social support as a predictor of treatment adherence and response in an open-access, self-help, internet-delivered cognitive behavior therapy program for child and adolescent anxiety.	10.1016/j.invent.2019.100268	Mental Health Diagnosis
Stewart	2020	Feasibility and effectiveness of a telehealth service delivery model for treating childhood posttraumatic stress: A community-based, open pilot trial of trauma-focused cognitive-behavioral therapy	10.1037/int0000225	Mental Health Diagnosis

St-Pierre	2017	Evaluation of a school-based gambling prevention program for adolescents: Efficacy of using the theory of planned behaviour.	10.4309/jgi.2017.36.6	Wrong Intervention Format
Thorsen	2018	Using High-Risk Adolescents' Voices to Develop a Comprehensible Cognitive Behavioral Therapy-Based Text-Message Program.	10.1080/08964289.2016.1223597	Mental Health Diagnosis
Willems	2024	Mental health app boost my mood (BMM) as preventive early intervention for adolescents with (sub)clinical depressive symptoms.	10.1186/s12889-024-19666-5	Mental Health Diagnosis
Williamson	2019	A Web-Based Self-Help Psychosocial Intervention for Adolescents Distressed by Appearance-Affecting Conditions and Injuries (Young Persons' Face IT): Feasibility Study for a Parallel Randomized Controlled Trial.	10.2196/14776	Mental Health Diagnosis
Wols	2018	In-Game Play Behaviours during an Applied Video Game for Anxiety Prevention Predict Successful Intervention Outcomes	10.1007/s10862-018-9684-4	No Mental Health Outcomes
Zhang	2023	A randomized control trial establishing the effectiveness of using interactive television-based art, music, and poetry therapies for treating the post-traumatic stress disorder of children exposed to traumatic events.	10.1016/j.psychres.2023.115582	Wrong Intervention Format

Supplementary Table 1 lists full-text articles excluded at the eligibility stage, with reasons for exclusion (e.g., wrong article type or mental health diagnosis).

Supplementary Table 2. Study Characteristics of Universal DMHIs for Children and Youth

Ref.	Country	Total Sample	Comparators	Study Design	Study Quality	Hybrid Study Setting	Intervention Description	Study Focus	Reporting of Outcome	Measurement Scales of Outcomes Selected
Baharuddin, 2025	Malaysia	226	Repeated-measures design	RCT	low	School	The REAL™ is a 12-session school-based social-emotional learning (SEL) intervention integrating virtual reality (VR) components, culturally adapted for Malaysian early adolescents. Delivered by trained developmental psychologists over 4 weeks, it covers four chapters: Understanding Emotions, Managing Emotions, Regulating Emotions, and Emotion Awareness. Three of the four chapters incorporate a VR component (MVR-REAL™) featuring culturally contextualized scenarios in which participants practice emotional recognition, cognitive reappraisal, and self-regulation skills. Non-VR sessions include structured games, role-plays, and reflective exercises.	To improve emotional regulation skills and reduce depression and anxiety among early adolescents.	Self-report	Difficulties in Emotion Regulation Scale (DERS-18); Beck Depression Inventory (BDI); Beck Anxiety Inventory (BAI)
Benzi, 2023	Italy	24	Repeated-measures design	Non-RCT	low	N/A	The eCONNECT Parent Group is a 10-session online attachment-based intervention aimed at strengthening parenting skills and improving parent-adolescent relationships. Delivered via video conferencing, it focuses on improving parental sensitivity, reflective functioning, and emotion regulation through guided discussions, role-plays, and reflective exercises.	The reduce attachment insecurity and improve parent-adolescent interactions.	Caregiver-report	Ontario Child Health Study Emotional Behavioural Scales

Bohr, 2023	Canada	48	Wait-list control	RCT	low	N/A	SPARX is a digital serious game designed to teach cognitive behavioural therapy (CBT) strategies to Inuit youth (ages 13-18) in Nunavut, Canada. The intervention was primarily self-led, with support from community facilitators. Through a fantasy-based environment, participants engaged in interactive challenges that helped them develop emotional regulation skills, resilience, and adaptive coping strategies.	To reduce hopelessness and depressive symptoms while improving resilience and cognitive coping strategies.	Self-report	Center for Epidemiological Studies Depression Scale Revised (CESD-R); The Highly Sensitive Child Scale (HSC)
Calcar, 2009	Australia	1,477	Wait-list control	RCT	high	School	MoodGYM is a free, interactive, internet-based cognitive-behavioral therapy (CBT) program designed to improve mental health literacy and resilience. It consists of five sequential modules incorporating information, animated demonstrations, quizzes, and exercises. Delivered over five weeks in a classroom setting, each module was presented weekly during a designated class period, with access restricted to prevent students from skipping ahead or altering responses.	The improve students' understanding of mental health concepts and develop coping strategies through structured online learning.	Self-report	Revised Children's Manifest Anxiety Scale (RCMAS)
Calcar, 2016	Australia	1,767	Wait-list control and e-GAD health service condition (teacher-supported intervention)	three-arm cluster stratified RCT	low	School	The e-GAD school intervention is a school-based, online cognitive-behavioral therapy (CBT) program. Participants completed six self-guided online modules covering psychoeducation, cognitive restructuring, problem-solving, and relaxation techniques. The program included interactive exercises and quizzes to reinforce learning, and students were encouraged to practice skills between sessions.	To reduce generalized anxiety symptoms in adolescents.	Self-report	General Anxiety Disorder-7

Cheng, 2024	China	264	Wait-list control	RCT	high	N/A	The Digital Netizen Alliance (D.N.A.) program is a multicomponent positive psychology intervention. The program is structured around the P-A-G-E framework, which focuses on developing four key psychological skills: Psychological resilience, active coping, growth mindset, and emotion regulation. Delivered over four weeks, the intervention includes animated psychoeducational clips, mini-games for knowledge reinforcement, and gamified elements like badges and trophies. Students also participated in a collaborative pledge activity with their parents to encourage a balanced digital lifestyle. The intervention was designed to be self-paced and accessible from home via digital devices, with facilitators available for support and progress monitoring.	To prevent gaming disorder (GD) and enhance mental wellness among Chinese primary school students.	Self-report	Emotion Regulation Questionnaire for Children and Adolescents
Chillemi, 2020	Australia	54	Repeated-measures design	Non-RCT	low	School	The Increasing Resilience to Cyberbullying (IRCB) program is a classroom-based online intervention aimed at improving adolescents' coping skills for cyberbullying. It focuses on three core strategies: self-compassion, cognitive behavioral therapy (CBT)-based reframing of negative thoughts, and recognizing the value of seeking professional mental health support. The program was designed to be completed individually within a single 60-minute classroom session and included psychoeducation,	To increase students' ability to manage cyberbullying experiences by increasing self-kindness, reducing negative thought patterns, and promoting help-seeking behaviours.	Self-report	General Help-Seeking Questionnaire (GHSQ); Attitudes Toward Seeking Professional Psychological Help Scale (ATSPPH-S); Measure participants' use of strategies to cope with cyberbullying

							guiding examples, vignettes, and open-ended questions.			
DeGarmo, 2019	United States	426	Wait-list control	RCT	high	N/A	The Fathering Through Change (FTC) intervention is a self-led, online parenting program for divorced or separated fathers of children aged 4-12 years. The 10-module program covers communication, discipline, emotion regulation, problem-solving, and conflict resolution, using video lessons, interactive exercises, and instructional materials. Fathers received automated reminders to encourage participation.	To reduce coercive parenting, improve father-child relationships, and support child adjustment by improving parenting skills, emotional regulation, and conflict resolution strategies.	Caregiver-report	Strengths and Difficulties Questionnaire (SDQ); Prosocial Behaviour
DeSmet, 2018	Belgium	216	Control condition	RCT	high	School	The Friendly ATTAC game is a digital intervention designed to promote positive bystander behaviour in adolescent cyberbullying situations. Set within a narrative-driven gaming environment, players assume the role of a time-traveling character from the future who must navigate a school setting and make decisions on how to respond to cyberbullying on social media. Playing the game took less than 30 min to play.	To improve bystander intervention skills, increase confidence in responding to cyberbullying, and reduce passive or reinforcing behaviours in online bullying situations.	Self-report	KIDSCREEN
Estrada, 2024	United States	30	Control condition	RCT	low	University offices and later via web conferen	Familias con Orgullo (FcO) is a family-based intervention among Latinx sexual minority youth (SMY) aged 13-17 and their parents. In the 14-session program	To prevent drug use, sexual risk behaviours, and depressive	Self-report	Center for Epidemiological Studies Depression Scale (CES-D)

						cing due to Covid-19	adolescents participated in group sessions focusing on coping with discrimination, emotion regulation, goal setting, and sexual health education. They also attended family sessions with their parents to work on communication, mental health, and conflict resolution. Parents attended group sessions to learn affirmative support strategies, parenting skills, and culturally relevant discussions on familismo and machismo. They also participated in family sessions to practice communication and strengthen family bonds.	symptoms among Latinx sexual minority youth (SMY).		
Fridrici, 2007	Germany	267	Wait-list control	RCT	low	School	The intervention is a school-based stress management program delivered to 7 th and 8 th grade students. Psychologists led a core module introducing fundamental stress management concepts, with three optional modules focusing on cognitive strategies, social support, and relaxation/time management, allowing participants to tailor their learning. Additionally, an e-learning component (SNAKE) was available to some students, providing interactive exercises and summaries to reinforce session content.	To reduce stress levels.	Self-report	SSKJ3-8
Gefter, 2024	United States	179	Remote; hybrid; and in-person conditions	Non-RCT	low	School	The Stanford Youth Diabetes Coaches Program (SYDCP) an 8-week school-based health promotion intervention aimed at adolescents (9 th and 12 th graders) from low-income communities. A “train the trainer” program in which health care professionals and	To promote health knowledge, psychosocial assets (self-esteem, self-efficacy and problem-	Self-report	Rosenberg Scale for Self-Esteem; CHKS; validated ability to manage stress questionnaire developed by authors

							trainees teach healthy high school students to coach family members with chronic health conditions, enhancing their health knowledge, psychosocial skills (self-esteem, self-efficacy, and problem-solving), and health behaviours like nutrition, physical activity, and stress management. It was delivered in remote and hybrid formats to accommodate different learning environments.	solving) and health behaviours (physical activity, nutrition and stress reduction).		
Goodman, 2014	United States	60	Repeated-measures design	Non-RCT (quasi-experimental study)	high	School	Ninth and twelfth-grade girls participated in either an oral storytelling group (OST), where they shared personal stories about stressors in a facilitated group setting, or a digital storytelling group (DST), where they created and recorded personal narratives using computers, adding images and music. The intervention lasted six one-hour sessions over two months and was conducted in a high school setting. The focus was on emotional expression, peer support, and self-reflection, with some DST participants opting to keep their stories private.	To reduce stress in adolescent females through storytelling activities.	Self-report	Adolescent Stress Questionnaire (ASQ)
Hadley, 2019	United States	85	Comparative intervention group	RCT	high	School	The study tested an emotion regulation intervention delivered in two formats: Emotion Regulation + Immersive Virtual Reality Environments (ER + IVRE) - Participants practiced emotion regulation skills in realistic virtual scenarios (e.g., a party, condom purchasing, sexual negotiation, and HIV/STD testing). Emotion Regulation + Role-Play (ER + RP)	To improve emotion regulation (ER) skills in adolescents.	Self-report	Affect Dysregulation Scale

							- Participants practiced the same skills through traditional role-plays with facilitators and peers. Both interventions were group-based, delivered in four weekly 2-hour sessions, including didactic lessons, games, and skill-building exercises. The sessions focused on recognizing emotions, managing emotional triggers, and improving decision-making in risk situations.			
Hassen, 2022	Ethiopia	153	Control condition	Non-RCT (quasi-experimental design)	low	N/A	The mental health literacy program, a social media-based intervention. Using a quasi-experimental design, the study compared an intervention group, which received mental health education via Facebook and Telegram, to a control group that received unrelated educational content. Participants in the intervention group received summarized texts, figures, and case vignettes on mental health literacy, posted every 72 hours over six weeks. Topics covered mental health disorders, risk factors, self-help strategies, and help-seeking behaviours.	To improve adolescents' understanding of mental health issues.	Self-report	Mental Health Literacy Questionnaire
Høgstad, 2025	Norway	399	Wait-list control	RCT	low	N/A	Opp is a universal mental health-promoting mobile application developed collaboratively with Norwegian adolescents and a reference group of researchers, social workers, health nurses and psychologists. It consists of two modules: (1) a psychoeducation module covering information about mental health, emotions, and where and how to seek mental health support; and (2) a resource module	To promote mental health and well-being and prevent mental health problems among adolescents.	Self-report	Strengths and Difficulties Questionnaire Total Difficulties Scale (SDQ); WHO-5 Well-Being Index; General Self-Efficacy Scale (GSE); Self-Liking and Competence

							containing exercises and techniques for coping with challenging thoughts, feelings and stress, including breathing techniques, sleep advice, relaxation exercises, and a CBT-based “thought clearing” exercise aimed at recognizing and challenging negative thoughts. The app also includes a personalized “My page” where users can set personal goals, track exercise completion, and monitor mood development over time via a graph. The intervention group had access to the app for approximately 11 weeks with one reminder prompt at one week.			Scale; single-item sleep measure; single-item help-seeking measure
Huag, 2021	Switzerland	1473	Control condition	RCT	high	School	The SmartCoach program, a mobile phone-based life-skills intervention. It began with a brief classroom session for program introduction and app registration. Participants received 2-3 personalized text messages per week for 22 weeks, including quizzes, self-reflection tasks, and goal-setting exercises on stress management, self-control, and peer resistance. Automated personalized feedback guided skill application, with optional interactive challenges like self-monitoring stress and screen time.	To prevent substance use prevention in adolescents and foster life skills.	Self-report	Well-Being (WHO-5 Well-Being Index); Brief Interpersonal Competence Questionnaire (ICQ-10)
Huang, 2024	Uganda	218	Control condition	Non-RCT	low	Community (faith-based organization)	The Pediatric-Behavioral Health Digital Tool (P-BHDT) is a digital parenting intervention based on an electronic Screening, Brief Intervention, and Referral to Treatment (e-SBIRT) preventive care model. It was designed to be implemented by trained	To promote positive parenting practices and children’s social-emotional wellbeing in	Parent-report and CHW-report	Parenting Strategies Questionnaire (PSQ); Mindfulness in Parenting Questionnaire (MIPQ);

							Community Health Workers (CHWs) to facilitate caregivers' access to preventive mental health services for children aged 3-8 years. The tool was developed using Qualtrics software in an offline-capable format (Single Session Intervention). CHWs from intervention FBOs received 3 days of additional training beyond the baseline 1-day training shared with all CHWs, and also received 4 group-coaching sessions from Ugandan mental health experts during the first 2 months of implementation. Parents followed a 4-step procedure lasting 1-2 hours: (1) standardized digital screening of children's behavioural health and family risks; (2) review of a personalized tailored report generated by the toolkit highlighting family strengths and areas for improvement; (3) review of child mental health literacy materials based on screening results; and (4) for high-risk families, referral to external professional resources or FBO parenting groups. The P-BHDT content was co-designed with local experts and iteratively adapted based on feedback from parents, caregivers, CHWs, and experts through focus groups and design workshops.	low-resource community settings.		Patient Health Questionnaire-4 (PHQ-4); Social Competence Scale – Emotion Regulation subscale; Conflicted Parent-Child Relationship Scale; Acceptability, Appropriateness, and Usefulness Scales (Weiner et al.)
Kazemi, 2022	Iran	102	Control condition	RCT	high	School	A cognitive-behavioural educational program among female students aged 10-13 in Khomeini Shahr, Iran. Participants in the	To improve social skills.	Self-report	Matson Evaluation of Social Skills with

							intervention group completed five weekly one-hour online sessions via the Shaad virtual learning platform. A trained instructor led the sessions, using storytelling and role-playing to help students recognize emotions, improve communication, and practice appropriate social behaviours. Each session focused on emotional awareness, managing impulsive behaviours, and practicing assertive communication. Students also completed home assignments, such as role-playing exercises, which they recorded and shared with their group.			Youngsters (MESSY)
Ko, 2023	South Korea	60	Control condition	RCT	high	School	Koala DMT (Digital Mental Training) intervention is a brief, app-based program. It consists of ten sessions delivered over two weeks, with each session lasting approximately 7 minutes. The intervention focuses on lazy breathing exercises guided by animations through the Koala mobile app. Sessions were conducted in groups of 15 students during school lunch breaks, using tablet personal computers. The goal is to enhance mindfulness and emotional control in a school-based setting	To improve emotional regulation and reduce stress in adolescents.	Self-report	State-trait anxiety inventory-X (STAI-X); Korean-mindful attention awareness scale (K-MAAS)
Lang, 2009	United States	55	Wait-list control	RCT	low	Community (computer labs within four affordable	Computeen is a preventive computer and psychosocial skills development program designed for middle school students from a predominantly African American, low-income urban community. Participants attended structured	The improve technical computer skills and prevent maladaptive behaviours.	Both (Self-report – emotional; Caregiver-report – behavioural)	Rosenberg self-esteem scale; Child Behaviour Checklist

						e housing communi- ties)	group sessions where they engaged in computer-based learning activities, working individually on tasks related to word processing, internet use, and multimedia projects. Alongside the technical training, facilitators led psychosocial skill-building exercises, including group discussions and activities focused on decision-making, self-confidence, and social skills.			
Lappalainen, 2021	Finland	243	Three groups: iACT+face-to-face support; iACT with online-only support; control group	RCT	high	School	The Youth COMPASS intervention was delivered in two formats: Virtual: Participants completed 10 weekly online modules (15-30 min each) on self-awareness, emotional regulation, and personal growth via a web-based platform. They received weekly asynchronous motivational feedback from coaches on WhatsApp, including reflective questions and encouragement. Hybrid: Participants completed the same 10 online modules but also had two in-person coaching sessions for personalized support. They received weekly WhatsApp feedback to reinforce engagement and self-reflection.	To prevent mental health problems in adolescents and promote adolescent well-being.	Self-report	Depression Scale (DEPS) and the Avoidance and Fusion Questionnaire for Youth (AFQ-Y) Depression Scale (DEPS) and the Avoidance and Fusion Questionnaire for Youth (AFQ-Y)
Lillevoll, 2014	Norway	707	Three groups: MoodGYM with tailored e-mail reminders; MoodGYM with standardized reminders; and MoodGYM with no reminders - or	RCT	low	N/A	MoodGYM, a self-directed internet-based cognitive behavioural therapy (iCBT) program designed to prevent and reduce depressive symptoms in adolescents. Participants were assigned to one of three intervention groups:	To reduce depressive symptoms and promote self-esteem and self-efficacy.	Self-report	Center for Epidemiological Studies Depression Scale (CES-D)

			a waitlist control group				MoodGYM with tailored e-mail reminders (personalized based on depression risk, self-esteem, and self-efficacy). MoodGYM with standardized weekly e-mail reminders (general prompts about module completion). MoodGYM with no reminders (access to the program but no follow-up). There was also a waitlist control group. The intervention included five modules, each taking 30–45 minutes, covering topics like cognitive restructuring, emotional regulation, and behavioural activation.			
Liu, 2024	China	59	Wait-list control	RCT	low	N/A	The OKmind intervention is a 6-week, online mindfulness program for Chinese children aged 4-7 years, designed to improve attention and emotion regulation through a culturally adapted curriculum. Children attended six weekly 30-minute group sessions via the Tencent Meeting platform, led by trained facilitators. Sessions included mindfulness exercises, such as breathing techniques for focus and calmness, body scanning for physical awareness, and emotion regulation practices to manage anger and sadness. They also participated in creative expression activities, like drawing and storytelling, to reinforce mindfulness concepts.	To improve emotion and attention regulation.	Self-report	Anger dysregulated expression; Flanker reaction time
Manicavasagar, 2014	Australia	235	Control condition	RCT	low	N/A	The Bite Back program is a self-guided, web-based intervention grounded in positive psychology.	To improve mental well-being in	Self-report	Depression, Anxiety, and Stress Scale-

							Participants independently engage with: Interactive modules featuring exercises, reflection prompts, and quizzes. Educational content on positive psychology principles. Optional participation in online forums for peer discussions and resource sharing.	adolescents and young adults by fostering skills such as gratitude, mindfulness, and optimism.		Short-Form (DASS-21)
McRury, 2010	United States	51	Control condition	RCT	low	Community hospital	The calming intervention, a 30-minute instructional videotape, was designed to support parents of infants by demonstrating swaddling, side positioning, shushing, jiggling, and sucking techniques. Initially viewed in a hospital setting, the videotape was intended for independent, at-home use to help reduce infant crying and enhance parent-infant interactions. In addition to the videotape, parents received telephone check-ins to provide support, address questions, and reinforce the calming techniques.	To reduce infant crying.	Caregiver-report	Baby's Day Diary
Mesurado, 2019	Argentina	51	Repeated-measures design	Non-RCT	low	University	The Hero Program, a self-administered online intervention, in adolescents aged 12-16. Participants completed seven online sessions (one per week) using a web-based platform, where they engaged with interactive exercises, videos, and gamified activities. The program featured a virtual guide ("Sensei"), who guided participants through tasks such as recognizing emotions in images, writing gratitude letters, practicing forgiveness through reflective exercises, and learning about helping behaviours.	To promote prosocial behaviour.	Self-report	Kindness and Generosity subscale from the Values in Action Inventory of Strengths

Mesurado, 2022	Argentina	756	Wait-list control	RCT	low	School	The Hero intervention is a school-based program for adolescents aged 12-15. Delivered in school computer rooms with health professionals present, the program included interactive online modules, scenario-based exercises, and self-reflection activities. Participants watched videos, engaged in decision-making tasks, and tracked their emotional growth, while health professionals provided guidance and support.	To promote prosocial behaviour.	Self-report	Prosocial behaviour towards strangers; Perspective taking
Morawska, 2006	Australia	110	Repeated-measured design	Non-RCT	low	N/A	A self-administered behavioural family intervention (BFI) designed for parents of toddlers, delivered through a telephone-assisted self-directed model within Parentline, a telephone counselling service. Parents received structured educational materials, including Every Parent's Self-Help Workbook, tip sheets on toddler behaviours, and the video Every Parent's Survival Guide. Over ten weeks, they completed workbook tasks and practiced parenting strategies, focusing on promoting social competence in children and managing difficult behaviours. Each week, parents participated in telephone consultations with trained counselors who encouraged self-regulation and independent problem-solving.	To promote children's social competence and strategies for dealing with difficult behaviour.	Caregiver-report	Eyberg Child Behavior Inventory
Nagamitsu, 2022	Japan	217	Three groups: Well-Care Visit (WCV) group; WCV + Smartphone CBT	RCT	high	Hospital out-patient clinic	The study tested two adolescent health promotion interventions: A Well-Care Visit (WCV) and a smartphone-based cognitive behavioural therapy (CBT) app.	To promote mental well-being and reduce	Self-report	Depression Self-Rating Scale for Children (DSRS-C); Adolescent Health Promotion

			app group + control condition group				The WCV group received in-person health checkups, structured counseling using the HEEADSSS framework, and educational materials on mental and physical health. The WCV + CBT app group received the same intervention plus access to a two-week CBT app, which provided psychoeducation and self-monitoring exercises to track thoughts, emotions, and behaviours. A nonintervention group received no immediate treatment but was later offered the intervention.	depressive symptoms.		Short Form (AHP-SF)
Neal-Barnett, 2019	United States	72	Repeated-measures design	Non-RCT	low	School	The Build Your Own Theme Song (BYOTS) app, designed to help Black and biracial adolescent girls manage anxiety and negative thinking through musical cognitive restructuring. 72 7 th and 8 th grade girls participated in Sisters United Now (SUN), an eight-session, culturally relevant anxiety intervention. As part of the program, participants were introduced to negative and positive thought cycles and learned how music could help interrupt negative thoughts. Each girl selected a favourite song and rewrote its lyrics using positive affirmations derived from a vision statement and a positive word bank. They then recorded their personalized theme song in the BYOTS app. They were reminded to use the app three times daily and encouraged to use it whenever they experienced negative thoughts.	To reduce negative thoughts.	Self-report	Multidimensional Anxiety Scale for Children 2 (MASC-2); pre post in-app survey on negative thought reduction validated by prior work

Nelson, 2002	United States	492	Repeated-measures design	Non-RCT	low	School	The Family Management Program is a comprehensive school-based program in seven elementary schools over two years. The program included school-wide behavioural support, one-to-one reading tutoring, conflict resolution training, and a video-based family management program. Students participated in school-wide behavioural interventions, one-to-one reading tutoring for those at risk, and conflict resolution training through the “Talk It Out” program. Those with significant behavioural challenges received individualized intervention plans. Teachers led school-wide discipline and conflict resolution training, while graduate student tutors provided one-to-one reading support. Graduate students in social work assisted with conflict resolution, and a family intervention specialist guided parents through a video-based training program with phone consultations.	To prevent problem behaviours and improve student learning.	Teacher-reported (social behaviour); School-recorded disciplinary and academic data	Behavioral and Emotional Rating Scale (BERS)
Ohashi, 2024	Japan	44	Repeated-measures design (single-arm feasibility study)	Non-RCT	low	N/A	The Journey of the Brave intervention is an e-learning, CBT-based anxiety-prevention program for children aged 10-12. Delivered via a website, it includes eight stages covering emotional regulation, cognitive restructuring, and relaxation techniques. Participants watched videos, completed workbook exercises, and took quizzes. Gamification elements, such as earning points and unlocking characters,	To prevent anxiety in children and improve emotion regulation skills.	Self-report (SCAS); there is a SCAS-Parent version but did not use it.	Spence Children’s Anxiety Scale Child Version (SCAS-S)

							encouraged engagement. Parents monitored progress and completed surveys. The study assessed feasibility through participation rates, satisfaction, and changes in anxiety and emotional regulation skills.			
Ohashi, 2025	Japan	180	Repeated-measures design (single-arm study)	Non-RCT	low	School	The Journey of the Brave e-learning version is a universal CBT-based anxiety prevention program adapted for delivery within school settings during regular classroom hours. Unlike the home-based virtual version above, the program was accessed by students on individual school devices under the supervision of trained homeroom teachers, who provided in-class support without directly delivering the program content. The program comprises eight learning stages and a summary stage completed across nine class hours, with homework assigned between stages. Core content includes psychoeducation about anxiety, relaxation skills, gradual exposure via “anxiety stairs,” cognitive restructuring, and assertion skills. Students progressed at their own pace through video-based instruction and online check tests, with a gamified reward system providing points and unlocking new items and characters upon task completion.	To prevent anxiety and promote anxiety-related knowledge and skills among elementary school children.	Self-report	Spence Children’s Anxiety Scale (SCAS)
Pavarini, 2023	United Kingdom	100	Wait-list control	RCT	low	N/A	The Uplift Peer Support Training intervention is a virtual program designed to train individuals in peer support skills. The program consisted of 5 weekly live sessions	To promote adolescents’ emotional	Self-report	Strengths and Difficulties Questionnaire - Emotional

							conducted via Zoom, each lasting approximately 2 hours. Participants learned and practiced peer support techniques through interactive modules, breakout room activities, and small group discussions. Independent tasks, including skill practice and reflection exercises, were assigned between sessions and supported through WhatsApp communication.	support skills, mental health and agency.		Symptoms Subscale (SDQ-E)
Perry, 2017	Australia	540	Control condition (lifeSTYLE program)	RCT	high	School	The SPARX-R intervention is a cognitive behavioral therapy (CBT) program designed to prevent depression in final-year secondary school students. Delivered in a fantasy role-playing game format, the program guided participants through seven interactive modules, each lasting 20–30 minutes, where they learned and practiced CBT-based skills such as cognitive restructuring, emotion regulation, problem-solving, and behavioral activation. Additionally, students were given a paper notebook to record reflections and key takeaways from each module.	To reduce depressive symptoms.	Self-report	Major Depression Inventory; Depression Stigma Scale
Peuters, 2024	Belgium	279	Control condition; (2 intervention conditions – remote and in-school)	Non-RCT (two-arm cluster-controlled trial)	low	School	The #LIFEGOALS intervention is a mobile health program designed for adolescents aged 12-15. The program focuses on increasing physical activity, reducing sedentary time, improving sleep, and encouraging regular breakfast consumption. It is delivered through a self-guided mobile app that incorporates behaviour change techniques, gamification, and self-regulation tools. In the virtual	To improve mental well-being and promote healthy lifestyle behaviours.	Self-report	Moods & Emotions, and Self-Perception (KIDSCREEN-52); Psychological Well-being and Social Support & Peers (KIDSCREEN-27)

							format, participants engaged with the #LIFEGOALS app independently. The app provided self-regulation tools such as goal-setting, action planning, and self-monitoring using a Fitbit. Motivational reminders and weekly narrative health videos reinforced key health behaviours. A chatbot offered automated support by sending encouraging messages and guiding participants through challenges and goal-tracking. In the hybrid format, participants used the #LIFEGOALS app with additional in-person support at school. Researchers helped install the app and provided guidance on using the Fitbit for self-monitoring. Facilitators introduced the intervention and provided motivation through classroom banners with encouraging messages. However, participants retained autonomy in how they engaged with the app and were responsible for tracking their own progress.			
Pisani, 2024	United States	223	Control condition (information-only text messages)	RCT	low	School	The Text4Strength intervention is an automated text messaging program designed to help high school students manage their mental health and reinforce the Sources of Strength suicide prevention program. The intervention was delivered over nine weeks, with participants receiving one to two text messages per week focused on coping strategies, emotional regulation,	To reduce suicidal behaviour and improve mental health skills.	Self-report	Emotional regulation; help-seeking from adults at school

							and help-seeking behaviours. Participants: Read and engaged with personalized text messages based on their interests, such as favourite TV shows and music. Responded to interactive messages, which triggered follow-up texts reinforcing coping techniques and emotional support strategies. Accessed help resources by texting specific keywords, such as “helpinfo,” when needed.			
Schoneveld, 2016	The Netherlands	136	Control video fam condition (Max and the Magic Marker)	RCT	high	School	The MindLight intervention is a neurofeedback-based video game. The program consisted of 5 one-hour sessions, where children played the game at school after school hours under supervision. The game uses immersive virtual environments, attention-shifting exercises, and relaxation techniques to teach children how to manage anxiety. Gameplay was fully independent, but sessions were supervised.	To reduce anxiety in children.	Self-report (SCAS); there is a SCAS-Parent version but did not use it.	Spence Children’s Anxiety Scale (SCAS)
Sim, 2020	Australia	355 parents and 342 children	Control condition (educational factsheets)	RCT	high	N/A	The Parenting Resilient Kids (PaRK) program is a self-guided online intervention designed. It included up to 12 interactive modules, tailored to parents’ baseline assessments, covering parenting techniques, behaviour management, resilience, and coping strategies. Parents completed modules at their own pace, engaging with educational content, interactive activities, quizzes, and goal-setting exercises. To support participation, research personnel conducted brief weekly check-in	To help parents reduce anxiety and depression risk in their children.	Self-report (SCAS); there is a SCAS-Parent version but did not use it.	Revised Children's Anxiety and Depression Scale (RCADS-25); KIDSCREEN-27

							calls for technical assistance, without providing therapeutic advice or individualized parenting guidance.			
Skeen, 2023	Tanzania and Zambia	494 (caregiver-child dyads)	Wait-list condition	RCT	low	N/A	The Sharing Stories parenting intervention is a six-week digital parenting program delivered remotely via WhatsApp groups to caregivers in Tanzania and Zambia. The intervention included two key components: Promoting shared reading to encourage parent-child interaction and improving caregiver mental health by addressing negative thought patterns and stress management. Caregivers participated in weekly facilitated group discussions where they received digital picture books and guidance on how to engage their children in interactive storytelling.	To promote child's emotional and social skills; improve responsive parenting behaviours; and caregiver mental health.	Caregiver-report	Strengths and Difficulties Questionnaire (SDQ); subscales for prosocial behavior, emotional symptoms, hyperactivity, conduct problems, and peer problems.
Sousa, 2020	Portugal	353	Control condition	Non-RCT (quasi-experimental)	low	School	The TeenPower intervention is a six-month program for adolescents aged 12-16 years. It combined a self-directed mobile health (mHealth) component with structured school-based psychoeducational sessions. Adolescents used the TeenPower mobile app to access interactive content on nutrition, physical activity, stress management, and healthy habits, allowing them to track behaviours, set goals, and receive personalized feedback.	To promote lifestyle behaviours in adolescents (e.g., stress management).	Self-report	Adolescent Lifestyle Profile (ALP) - Stress Management; and Interpersonal Relations
Subotic-Kerry, 2023	Australia	438	Repeated-measures design	Non-RCT (quasi-experimental)	low	N/A	Bite Back Mental Fitness Challenge is a web-based positive psychology program targeting adolescents aged 13-16. It aims to promote mental well-being by focusing on five key	To improve help-seeking intentions and reduce anxiety	Self-report	Generalized Anxiety Disorder Scale (GAD-2 and GAD-7); General Help-

							domains of positive psychology: gratitude, mindfulness, connections, character strengths, and meaning and purpose. The program comprised 7 self-directed modules designed to be completed over six weeks. Each module included activities such as animations, reflective questionnaires, and exercises to foster resilience. The Bite Back website offered additional resources on topics like optimism, healthy lifestyles, and positive relationships, as well as links to external mental health support services.	and depressive symptoms.		Seeking Questionnaire (GHSQ)
Sun, 2022	China	390	Wait-list control	RCT	high	School	The smartphone app encouraged participants to engage in Sharing, Mind, and Enjoyment (SME) behaviours through daily and special tasks, such as expressing gratitude, spending time with family, and completing activities together. Participants earned digital tokens for completing tasks, which could be used to decorate a virtual “dream house” or play mini-games. An introductory workshop, led by a social worker, introduced students to the app and key mental health concepts.	To promote mental well-being and increase awareness of anxious symptoms among adolescents.	Self-report	Sharing, Mind, and Enjoyment (SMEa) Behaviours; Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS); Personal and Family Health and Happiness (validated in Hong Kong Chinese populations)
Tian, 2025	China	160	Repeated-measures design	RCT	low	N/A	The dMBI-EP (digital mindfulness-based intervention for expectant parents) is a 6-week couples-based mindfulness program delivered via a WeChat mini-program titled “Mindfulness Brightens Pregnant Couples’ Moods.” The program draws on mindfulness-based stress reduction and mindfulness-based	To reduce psychological distress (depression, anxiety, perceived stress) in expectant couples during	Self-report	Edinburgh Postpartum Depression Scale (EPDS); GAD-7; Perceived Stress Scale (PSS-10); Chalder Fatigue Scale; Athens Insomnia Scale

							childbirth and parenting content, adapted for Chinese couples through the use of Mandarin language, culturally appropriate animations, and couple-focused scenarios. Each of the six weekly modules includes a 12-20 minute animated thematic video and six days of audio-guided formal and informal home mindfulness practice. Module content covers prenatal psychological stress in couples, emotion awareness, mindful fetal interaction, mindful stretching and physical exercises, and integrating mindfulness into shared daily life. Two group coaching sessions were held via WeChat video conference at weeks two and six. The program explicitly incorporated partner-focused content emphasizing couple consensus, empathy, and collaboration throughout, with both partners expected to study and practice together using a shared linked account.	pregnancy and improve infant neuropsychological development outcomes.		(AIS); Perceived Partner Responsiveness Scale; Early Infancy Temperament Questionnaire; Ages and Stages Questionnaire-Third Edition (ASQ-3)
Waters, 2019	Australia	303	Two intervention conditions: PST and CBI; and a Control condition	RCT	high	School	The intervention compares two classroom-based programs for reducing anxiety in children aged 7-11 years: Positive Search Training (PST): A computer-assisted program that trained children to focus attention on positive stimuli while ignoring negative stimuli. It involved searching for “good” (e.g., happy children) or “calm” (e.g., serene objects) images in arrays of distracting negative images. PST consisted of 8 sessions, each lasting	Reducing anxiety.	Self-report – (SCAC-C); Parent-report (Tbias)	Spence Children’s Anxiety Scale (SCAS); Attention Bias (Visual Probe Task)

							30 minutes, conducted twice weekly over 4 weeks. Cognitive Behavioural Intervention (CBI): A therapist-led program based on cognitive-behavioural principles. It included psychoeducation about anxiety, relaxation training, positive self-talk, social skills, and graded exposure exercises. Like PST, it was delivered over 8 sessions lasting 30 minutes each, conducted twice weekly for 4 weeks. The PST sessions were self-directed on school laptops, while the CBI was facilitated by trained clinical psychologists and did not involve digital tools.			
Waters, 2023	Australia	66	Repeated-measures design	Non-RCT	low	N/A	The intervention is part of the RISE Rugby League Development Program. It includes three core steps: Participants completed online measures of mental health and well-being. Parents received individualized feedback via telephone, including support and referral options if needed. Group-based workshops were delivered via teleconference during rugby training sessions, focusing on topics such as healthy habits, mindfulness, grit, gratitude, and social connection. The intervention spanned the rugby season, with four 30-40 minute workshops and ongoing independent access to psychoeducational resources.	To promote adolescent mental health and well-being.	Self-report	Revised Children's Anxiety and Depression Scale (RCADS-25); Strengths and Difficulties Questionnaire (SDQ); Academic Grit Scale; Prosocial Behaviours Subscale
Waters, 2024	Australia	671	Repeated-measures design; Three intervention conditions: In-	Non-RCT (quasi-	low	Rugby league clubhouses	The Life-Fit Learning System within the RISE Rugby League Development Program was delivered across three groups,	To promote adolescent mental health	Self-report	Revised Children's Anxiety and Depression Scale

			person + remote real-time delivery; In-person + remote pre-recorded delivery; fully remote delivery	experimental)			combining in-person and remote methods: (a) In-Person + Remote Real-Time: Participants attended four hybrid workshops (30–40 min each), alternating between in-person sessions led by local well-being officers and live remote video sessions conducted by Life-Fit psychologists. They also completed self-assessments and accessed psychoeducational Tip Sheets. Parents received mental health feedback via email or phone. (b) In-Person + Remote Prerecorded: In-person workshops were led by well-being officers, while remote content was delivered via pre-recorded videos by Life-Fit psychologists. Participants engaged in four mixed-format workshops, supplemented with assessments and psychoeducational resources. Parents received feedback and referrals remotely. (c) Remote Only: All workshops were delivered remotely, either live via Microsoft Teams or through pre-recorded videos. Participants completed four remote sessions, self-assessments, and accessed additional resources. Parents received remote feedback and referral support.	and well-being.		(RCADS-25); Strengths and Difficulties Questionnaire (SDQ)
Werner-Seidler, 2025	Australia	6,388	Control condition	Cluster RCT	low	N/A	SPARX is a gamified, self-directed digital cognitive-behavioural programme originally developed as a web-based treatment for adolescent depression and adapted into a prevention programme delivered via smartphone app. It	Universal prevention of adolescent depression (primary); secondary focus on	Self-report	Patient Health Questionnaire – Adolescent Version (PHQ-A); Spence Child Anxiety Scale – Short Form

							consists of seven 20-minute modules in a fantasy game format covering emotion identification, emotion regulation, behavioural activation, challenging unhelpful thoughts, and problem-solving. Participants (Year 8 students aged 13-14 years) were encouraged to complete one to two modules per week over 6 weeks without human guidance. Schools were required to schedule a minimum of 4×20-minute in-class sessions for the first four modules, with remaining modules to be completed in students' own time. The control group had no access to any programme during the intervention period.	anxiety, psychological distress, and insomnia		(CAS-8); Distress Questionnaire-5 (DQ5); Insomnia Severity Index (ISI)
Whittaker, 2017	New Zealand	855	Control condition (placebo condition)	RCT	high	Schools	The MEMO CBT intervention is a mobile phone-based program delivered over nine weeks through daily multimedia messages. Participants received two messages per day outside of school hours. These messages contained links to videos or text-based content. They watched short videos (less than 30 seconds) featuring teen actors, cartoons, and celebrities, which demonstrated cognitive-behavioural therapy (CBT) strategies such as managing negative thoughts, problem-solving, and emotional regulation. Participants engaged independently with the content by clicking on links to view materials and reflect on the messages. After completing the program, they had continued access to a mobile	To prevent depression in adolescents.	Self-report	Reynold's Adolescent Depression Scale-Second Edition (RADS-2)

							website that summarized key messages and provided additional mental health resources.			
Wolchik, 2022	United States	240	Wait-list control	RCT	high	N/A	The New Beginnings Program (eNBP), a parenting intervention, was designed to support divorced and separated parents. Adapted from the in-person New Beginnings Program (NBP), it consisted of 10 self-paced modules completed over approximately five hours. Participants engaged with interactive exercises, instructional videos, and automated reminders to learn and apply parenting strategies. The program focused on strengthening parent-child relationships, improving discipline, and reducing children's exposure to parental conflict. Parents were expected to complete home practice assignments and received automated email and text reminders to reinforce learning.	To reduce interparental conflict, improve parenting quality, and improve children's post-divorce adjustment.	Both; but used only self-report	Brief Problem Monitor (BPM); Strengths and Difficulties Questionnaire (SDQ)
Wong, 2014	Australia	976	Two intervention conditions: anxiety prevention program; depression prevention program; and usual health classes control condition	RCT	low	School	The ThisWayUp Schools Depression and Anxiety Prevention Program is an internet-delivered, school-based cognitive-behavioural therapy (CBT) intervention. It consisted of 6 anxiety-focused lessons and 7 depression-focused lessons, each lasting 40 minutes and delivered over 6-7 weeks. Students accessed the program via a secure online platform and completed self-directed lessons that incorporated interactive elements to demonstrate CBT techniques. The intervention was implemented in schools during regular health classes, with teachers	To prevent anxiety and depression in adolescents.	Self-report	Generalized Anxiety Disorder Scale (GAD-7); Patient Health Questionnaire - Short Form (PHQ-5)

							supervising the process and reinforcing learning through class discussions and worksheets.			
Wong, 2020	China	67 parent-child pairs (134 participants in total)	Repeated-measures design	Non-RCT	low	N/A	The Family Move app-based intervention is an 8-week program designed to encourage physical activity and improve parent-child engagement through a mobile app. The program includes guided exercises for parents and children to perform together, along with features such as points, leaderboards, and rewards to promote consistent engagement. Regular prompts were provided to encourage app usage and physical activity.	To promote the health and well-being of both children and parents through parent-child exercises.	Caregiver-report	Strengths and Difficulties Questionnaire (SDQ); subscales for prosocial behaviour, emotional symptoms, hyperactivity, conduct problems, and peer problems.
Zagni, 2024	United States	813	Control condition	RCT	low	School	PeerLearning.net is a web-supported cooperative learning program. Delivered over 10 weekly lessons, each lasting 30 minutes. Facilitated by teachers using structured lesson plans, templates, and tools provided by the PeerLearning.net platform. Students participated in cooperative learning activities, engaging in group tasks and individual exercises to reinforce skills.	To improve mental health and well-being among students.	Self-reported and teacher-reported (only used self-report)	Strengths and Difficulties Questionnaire (SDQ); Peer Relations Scale
Zhang, 2023	China	160	Control condition	RCT	low	N/A	A digital Guided Self-Help Mindfulness-Based Intervention (GSH-MBI) was delivered via the WeChat mini program to support pregnant women in reducing stress and improving mindfulness, with effects on infant well-being at 6-weeks and 6-months. The program consisted of 8 sessions, each lasting 10–15 minutes, with video lessons and audio-guided practices focused	To prevent maternal psychological distress and support infant neuropsychological development.	Caregiver-report	Ages and Stages Questionnaire (ASQ-3); Early Infancy Temperament Questionnaire (EITQ)

							on mindfulness techniques, such as breathing exercises, body scans, and self-compassion. Participants accessed the program independently and at their convenience through the WeChat mini program. At 6 weeks postpartum, measures assessed the potential benefits for infants, including temperament and developmental behaviours.			
Zheng, 2021	China	954	Control condition	RCT	low	N/A	The REAP intervention is a peer-to-peer live-streaming digital program. Participants in the intervention group received health education on the importance of physical activity and the 20-20-20 eye relaxation rule. They used the REAP app to upload videos and photos of their physical activities and relaxation exercises. During scheduled recess breaks, they engaged in self-led exercises by following pre-recorded workout videos. They followed the government-recommended break schedule, which included four 15-minute recesses per day. To encourage engagement, participants also received SMS reminders prompting them to exercise and practice relaxation techniques.	To promote physical activity and reduce anxiety and eye strain among grade 7 homeschooled children during COVID-19.	Self-report	Spence Children's Anxiety Scale Child Version (SCAS-S)
Zulkefly, 2024	Malaysia	24 mothers of adolescents	Control condition	RCT	high	N/A	The Digital-Assisted Parenting Intervention (DaPI) consisted of 8 weekly sessions, each taking 30-40 minutes to complete. Delivered through a study-specific website, the program provided videos, infographics, comic strips, and interactive exercises to help parents improve communication, emotional	To promote positive parenting practices and adolescent mental health.	Caregiver-report	CAPES (Child Adjustment and Parent Efficacy Scale); Behavioural Problems; Emotional Maladjustment Subscale

							support, and parenting self-efficacy. Participants received WhatsApp and email reminders to reinforce engagement.			
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Supplementary Table 2. (updated reprint). Reprinted from:

Di Pierdomenico, K. et al. Universal digital mental health interventions for children and youth: A scoping review. *Front. Digit. Health* 7, 1665975; <https://doi.org/10.3389/fdgth.2025.1665975> (2025).

Supplementary Table 3. PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	2-5
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	5
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	6-8; 27
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	26
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Supplementary Table 4
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	28
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	26-31
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	28-29
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	28-29
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	9-10; 29-30
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	10-21
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	28-30

Section and Topic	Item #	Checklist item	Location where item is reported
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	28
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	29
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	30
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	30-31
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Supplementary Figures 18-21
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	30
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	30-31
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	6-7
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Supplementary Table 1
Study characteristics	17	Cite each included study and present its characteristics.	See Supplementary Table 2
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	9-10
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	10-21
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	10-21
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	10-21
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	10-21
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	31
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	9-10

Section and Topic	Item #	Checklist item	Location where item is reported
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	10-21
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	22-26
	23b	Discuss any limitations of the evidence included in the review.	24-25
	23c	Discuss any limitations of the review processes used.	24-25
	23d	Discuss implications of the results for practice, policy, and future research.	25
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	1; 26
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	1; 26
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	26
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	32
Competing interests	26	Declare any competing interests of review authors.	32
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	32

Supplementary Table 3 provides a completed PRISMA 2020 checklist indicating where each reporting item is addressed in the manuscript and supplementary materials.

Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71. This work is licensed under CC BY 4.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by/4.0/>

Supplementary Table 4. Representative Search Strategy

Ovid MEDLINE(R) and In-Process, In-Data-Review & Other Non-Indexed Citations <1946 to April 06, 2026>			
#	Searches	Results	Type
1	(Promot* or prevent* or benefit* or develop* or reduce or help* or effectiveness or project or universal or experiences or (skill* adj2 build*) or (teacher adj2 led) or (school adj2 based) or "school-based" or "after school").ti.	1972646	Advanced
2	(trials or trial or intervention or app evaluat* or application* or (app* adj2 mental health) or (app* adj2 restructuring) or program* or (mobile adj2 app)).ti.	1247124	Advanced
3	(mind or mindful* or psychosocial* or (mental adj2 (health or well-being or wellness or "well being"))) or (emotional* adj2 (health or well-being or wellbeing or wellness or "well being")) or resilien* or (cognit* adj2 (music or musical or skill or skills or ability or abilities)) or (life adj2 skill*) or behaviour* or behavior* or stress* or suicide or antecedents).ti.	996991	Advanced
4	(infan* or child* or adolescen* or youth* or student* or girl or girls or boy or boys or teen*).ti.	1630681	Advanced
5	1 and 2 and 3 [****Base clinical set no age groups****]	10577	Advanced
6	limit 5 to "all child (0 to 18 years)"	3271	Advanced
7	6 or (4 and 5) [****Final results version 1****]	4119	Advanced
Embase <1974 to 2026 April 03>			
#	Searches	Results	Type
1	(Promot* or prevent* or benefit* or develop* or reduce or help* or effectiveness or project or universal or experiences or (skill* adj2 build*) or (teacher adj2 led) or (school adj2 based) or "school-based" or "after school").ti.	2432057	Advanced
2	(trials or trial or intervention or app evaluat* or application* or (app* adj2 mental health) or (app* adj2 restructuring) or program* or (mobile adj2 app)).ti.	1696352	Advanced
3	(mind or mindful* or psychosocial* or (mental adj2 (health or well-being or wellness or "well being"))) or (emotional* adj2 (health or well-being or wellbeing or wellness or "well being"))	1144455	Advanced

	or resilien* or (cognit* adj2 (music or musical or skill or skills or ability or abilities)) or (life adj2 skill*) or behaviour* or behavior* or stress* or suicide or antecedents).ti.		
4	(infan* or child* or adolescen* or youth* or student* or girl or girls or boy or boys or teen*).ti.	1931159	Advanced
5	1 and 2 and 3 [****Base clinical set no age groups****]	13655	Advanced
6	limit 5 to (infant <to one year> or child <unspecified age> or preschool child <1 to 6 years> or school child <7 to 12 years> or adolescent <13 to 17 years>)	4191	Advanced
7	6 or (4 and 5) [****Final results version 1****]	4932	Advanced
APA PsycInfo <1806 to March 2026 Week 5>			
#	Searches	Results	Type
1	(Promot* or prevent* or benefit* or develop* or reduce or help* or effectiveness or project or universal or experiences or (skill* adj2 build*) or (teacher adj2 led) or (school adj2 based) or "school-based" or "after school").ti.	497783	Advanced
2	(trials or trial or intervention or app evaluat* or application* or (app* adj2 mental health) or (app* adj2 restructuring) or program* or (mobile adj2 app)).ti.	253016	Advanced
3	(mind or mindful* or psychosocial* or (mental adj2 (health or well-being or wellness or "well being"))) or (emotional* adj2 (health or well-being or wellbeing or wellness or "well being")) or resilien* or (cognit* adj2 (music or musical or skill or skills or ability or abilities)) or (life adj2 skill*) or behaviour* or behavior* or stress* or suicide or antecedents).ti.	629274	Advanced
4	(infan* or child* or adolescen* or youth* or student* or girl or girls or boy or boys or teen*).ti.	859451	Advanced
5	1 and 2 and 3 [****Base clinical set no age groups****]	8593	Advanced
6	limit 5 to (100 childhood <birth to age 12 yrs> or 200 adolescence <age 13 to 17 yrs>)	2943	Advanced
7	6 or (4 and 5) [****Final results version 1****]	3834	Advanced

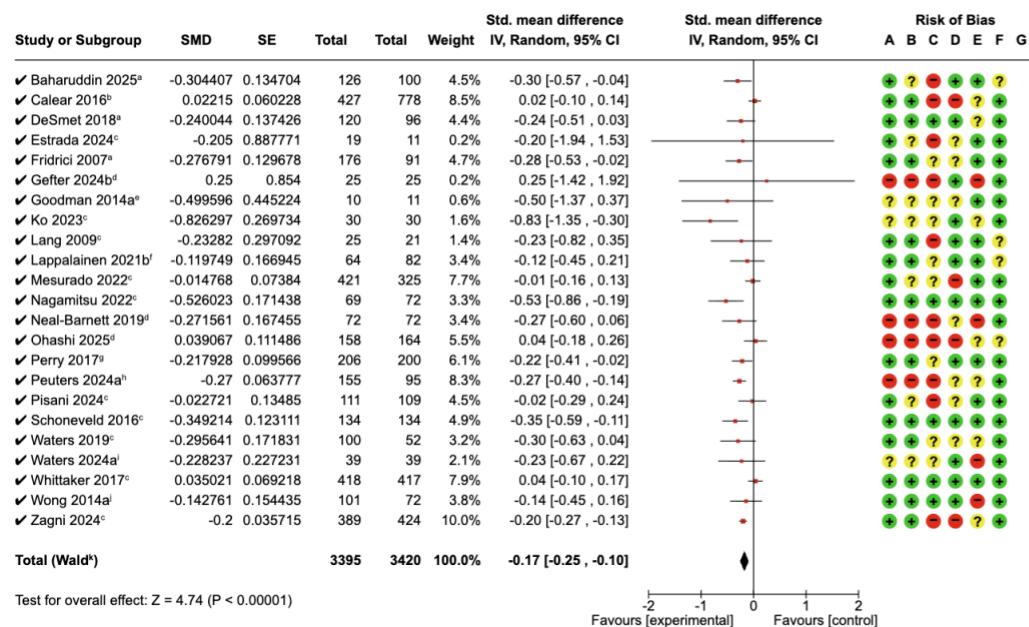
Supplementary Table 4 provides a representative search strategy used for the review, with database-specific syntax for Ovid MEDLINE, Embase, and APA PsycInfo

Supplementary Figures 1-16. 16 Forest Plots with Risk of Bias Summary

Shared explanation (covers Figures 1-16):

Supplementary Figures 1-16 present forest plots with integrated risk-of-bias summaries for each of the 16 meta-analyses, organized by psychological outcome domain (emotional, behavioural, social, cognitive), delivery format (hybrid, virtual), and assessment time period (immediate post-intervention, follow-up). For each contributing study, the figure displays the standardized mean difference (SMD), standard error (SE), total sample size in the experimental and control groups, percentage weight contributed to the pooled estimate, and a plotted point estimate with 95% confidence interval. The pooled (overall) effect is displayed as a black diamond, labeled “Total (Wald).” To the right of each forest plot, risk-of-bias judgments are shown for each study across seven domains, labeled A through G: (A) random sequence generation (selection bias), (B) allocation concealment (selection bias), (C) blinding of participants and personnel (performance bias), (D) blinding of outcome assessment (detection bias), (E) incomplete outcome data (attrition bias), (F) selective reporting (reporting bias), and (G) other bias. A green circle with a plus sign indicates low risk of bias, a red circle with a minus sign indicates high risk of bias, and a yellow circle with a question mark indicates unclear risk of bias. Superscript letters following each study name correspond to footnotes below the plot describing study design characteristics.

Supplementary Figure 1. Forest plot and risk-of-bias summary for emotional outcomes, hybrid delivery, immediate post-intervention (23 studies; SMD = -0.17, 95% CI -0.25 to -0.10).



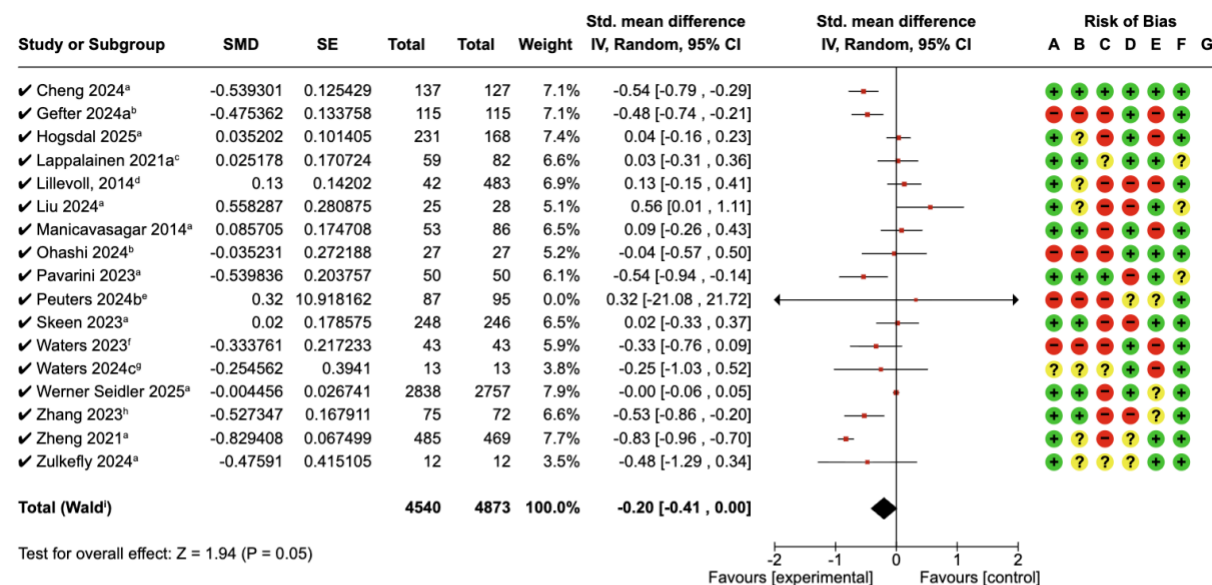
Footnotes

- ^aHybrid - Between - Randomized
- ^bHybrid - Between - Randomized (E-GAD Arm measured at posttest)
- ^cHybrid - Between - Randomized
- ^dHybrid - Within - Non-Randomized
- ^eHybrid (9th grade group sessions) - Within-Randomized; pretest (control) posttest (intervention)
- ^fHybrid (iACTface)- Between - Randomized
- ^gHybrid - Between - Randomized - Posttest
- ^hHybrid (In-School) - Between - quasi-Randomized
- ⁱHybrid - Within - Non-Randomized; In-person + remote real time.
- ^jHybrid (Depression Intervention) - Between - Randomized
- ^kCI calculated by Wald-type method.
- ^lTau² calculated by DerSimonian and Laird method.

Risk of bias legend

- (A) Random sequence generation (selection bias)
- (B) Allocation concealment (selection bias)
- (C) Blinding of participants and personnel (performance bias)
- (D) Blinding of outcome assessment (detection bias)
- (E) Incomplete outcome data (attrition bias)
- (F) Selective reporting (reporting bias)
- (G) Other bias

Supplementary Figure 2. Forest plot and risk-of-bias summary for emotional outcomes, virtual delivery, immediate post-intervention (17 studies; SMD = -0.20, 95% CI -0.41 to 0.00).



Footnotes

^aVirtual - Between - Randomized

^bVirtual - Within - Non-Randomized

^cVirtual (iACT) - Between - Randomized

^dVirtual - Between - Randomized - tailored e-mail reminder (but in end all measured) posttest

^eVirtual - Between - Quasi-Randomized

^fHybrid - Within - Non-Randomized

^gVirtual - Within - Non-Randomized; Remote Delivery only

^hHybrid - Between - Randomized

ⁱCI calculated by Wald-type method.

^jTau² calculated by DerSimonian and Laird method.

Risk of bias legend

(A) Random sequence generation (selection bias)

(B) Allocation concealment (selection bias)

(C) Blinding of participants and personnel (performance bias)

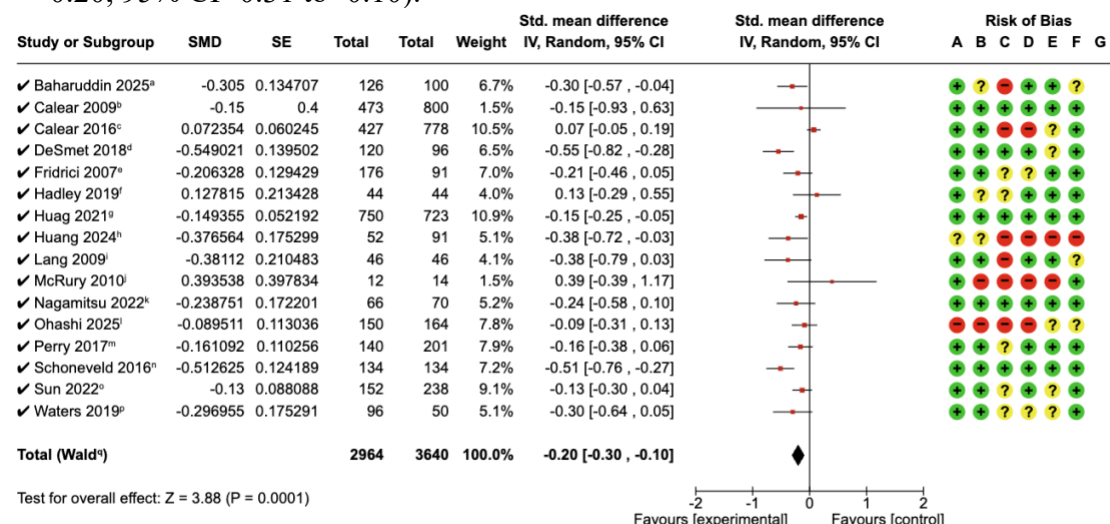
(D) Blinding of outcome assessment (detection bias)

(E) Incomplete outcome data (attrition bias)

(F) Selective reporting (reporting bias)

(G) Other bias

Supplementary Figure 3. Forest plot and risk-of-bias summary for emotional outcomes, hybrid delivery, follow-up (16 studies; SMD = -0.20, 95% CI -0.31 to -0.10).



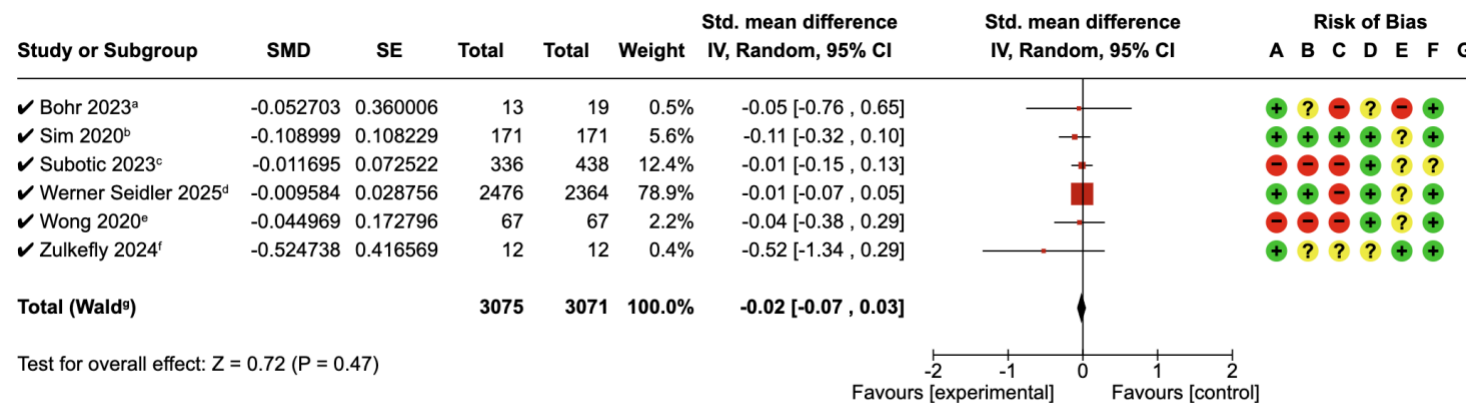
Footnotes

- ^aHybrid - Between - Randomized; Follow-up at 3-months (T2).
^bHybrid - Between - Randomized - posttest measured at 1-month
^cHybrid - Between - Randomized (E-GAD Arm) measured at 6-months posttest
^dHybrid - Between - Randomized; Posttest measured at 4-weeks (T2)
^eHybrid - Between - Randomized; Follow-up at 2-months.
^fHybrid - Between - Randomized; Posttest measured at 3-month follow-up from intervention
^gHybrid - Between - Randomized; Posttest measured at 6-months after intervention
^hHybrid - Within - Non-Randomized; Posttest (T2) measured at 5-6 months after intervention.
ⁱHybrid - Crossover-randomized from baseline to 3-month follow-up; since participants all received the intervention, we entered the total number of participants for both arms.
^jHybrid - Between - Randomized; Follow-up measured at 12-weeks.
^kHybrid - Between - Randomized; Follow-up at 4-months.
^lHybrid - Within - Non-Randomized - Follow-up at 2-3 months.
^mHybrid - Between - Randomized - 6-month follow-up
ⁿHybrid - Between - Randomized; pretest to 3-month follow-up.
^oHybrid - Between-Randomized; Follow-up at (T4) 3-months.
^pHybrid - Between - Randomized; Follow-up at 6-months.
^qCI calculated by Wald-type method.
^rTau² calculated by DerSimonian and Laird method.

Risk of bias legend

- (A) Random sequence generation (selection bias)
 (B) Allocation concealment (selection bias)
 (C) Blinding of participants and personnel (performance bias)
 (D) Blinding of outcome assessment (detection bias)
 (E) Incomplete outcome data (attrition bias)
 (F) Selective reporting (reporting bias)
 (G) Other bias

Supplementary Figure 4. Forest plot and risk-of-bias summary for emotional outcomes, virtual delivery, follow-up (6 studies; SMD = -0.02, 95% CI -0.07 to 0.03).



Footnotes

^aVirtual - Between - Randomized; Postintervention at 7-weeks.

^bVirtual - Between - Randomized; Postintervention measured at 3-months.

^cVirtual - Within - Non-Randomized; Posttest measured at 1-2-months post intervention

^dVirtual - Between - Randomized; Follow-up at 6-months.

^eVirtual - Within - Non-Randomized; Posttest measured at 1-month.

^fVirtual - Between - Randomized; Follow-up at 1-month.

^gCI calculated by Wald-type method.

^hTau² calculated by DerSimonian and Laird method.

Risk of bias legend

(A) Random sequence generation (selection bias)

(B) Allocation concealment (selection bias)

(C) Blinding of participants and personnel (performance bias)

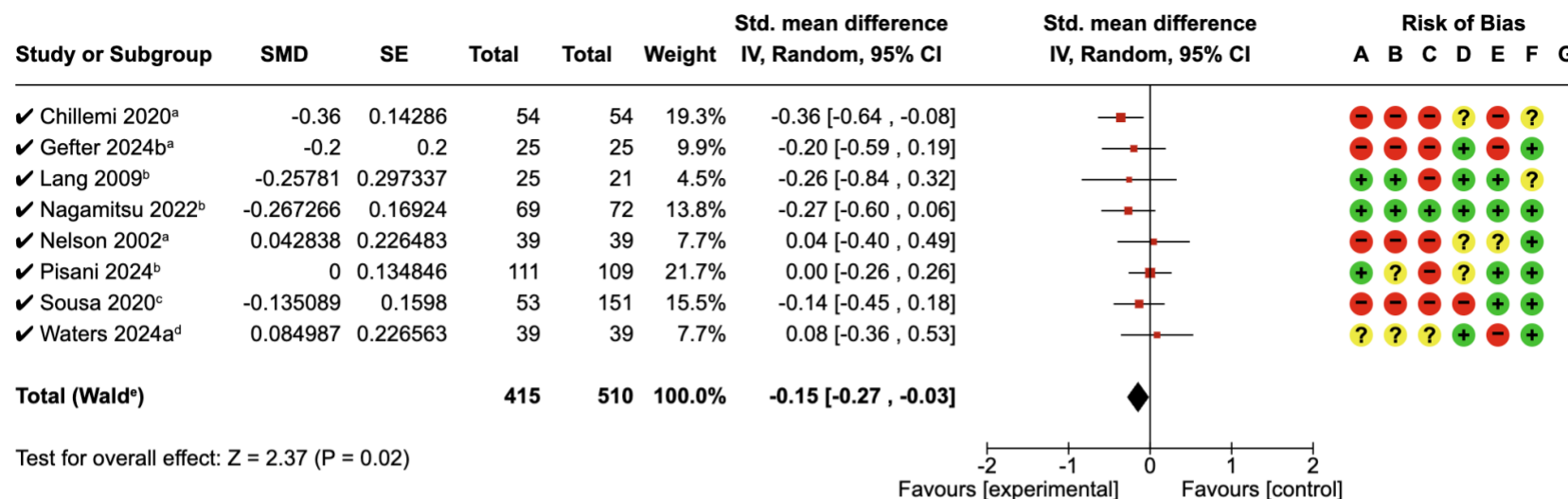
(D) Blinding of outcome assessment (detection bias)

(E) Incomplete outcome data (attrition bias)

(F) Selective reporting (reporting bias)

(G) Other bias

Supplementary Figure 5. Forest plot and risk-of-bias summary for behavioural outcomes, hybrid delivery, immediate post-intervention (8 studies; SMD = -0.15, 95% CI -0.27 to -0.03).



Footnotes

^aHybrid - Within - Non-Randomized

^bHybrid - Between - Randomized

^cHybrid - Between - Non-Randomized

^dHybrid - Within - Non-Randomized; In-person + remote real time.

^eCI calculated by Wald-type method.

^fTau² calculated by DerSimonian and Laird method.

Risk of bias legend

(A) Random sequence generation (selection bias)

(B) Allocation concealment (selection bias)

(C) Blinding of participants and personnel (performance bias)

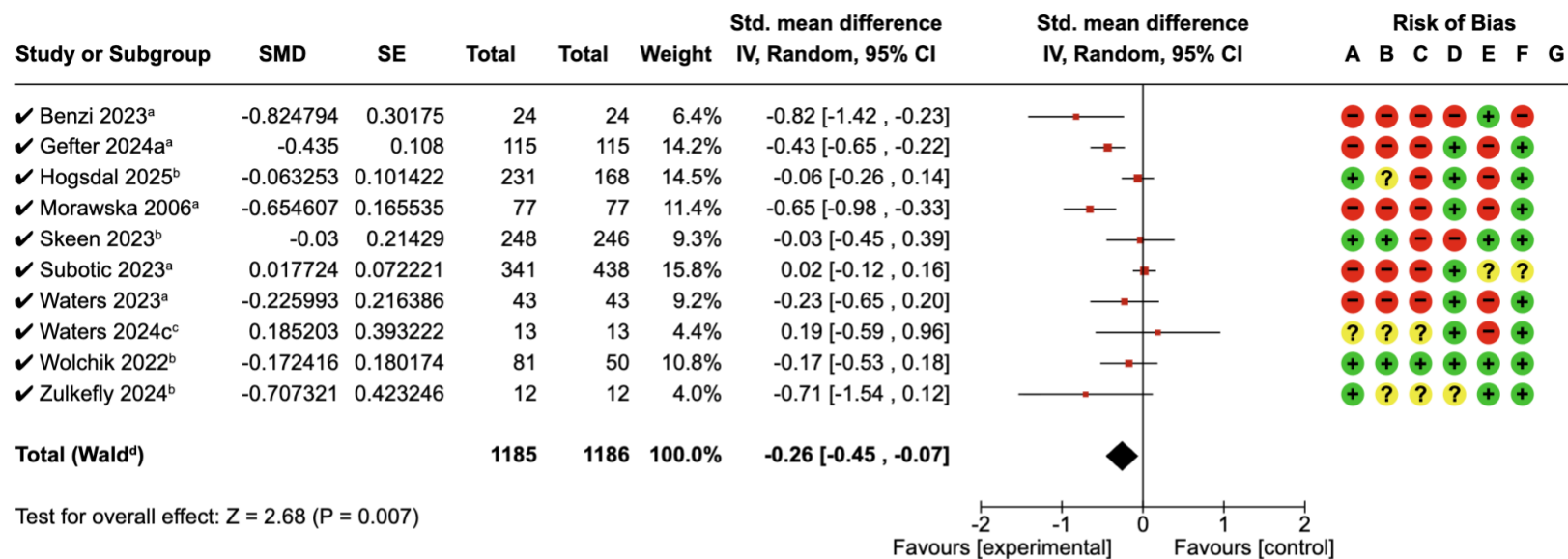
(D) Blinding of outcome assessment (detection bias)

(E) Incomplete outcome data (attrition bias)

(F) Selective reporting (reporting bias)

(G) Other bias

Supplementary Figure 6. Forest plot and risk-of-bias summary for behavioural outcomes, virtual delivery, immediate post-intervention (10 studies; SMD = -0.26, 95% CI -0.45 to -0.07).



Footnotes

^aVirtual - Within - Non-Randomized

^bVirtual - Between - Randomized

^cHybrid - Within - Non-Randomized; Remote delivery only.

^dCI calculated by Wald-type method.

^eTau² calculated by DerSimonian and Laird method.

Risk of bias legend

(A) Random sequence generation (selection bias)

(B) Allocation concealment (selection bias)

(C) Blinding of participants and personnel (performance bias)

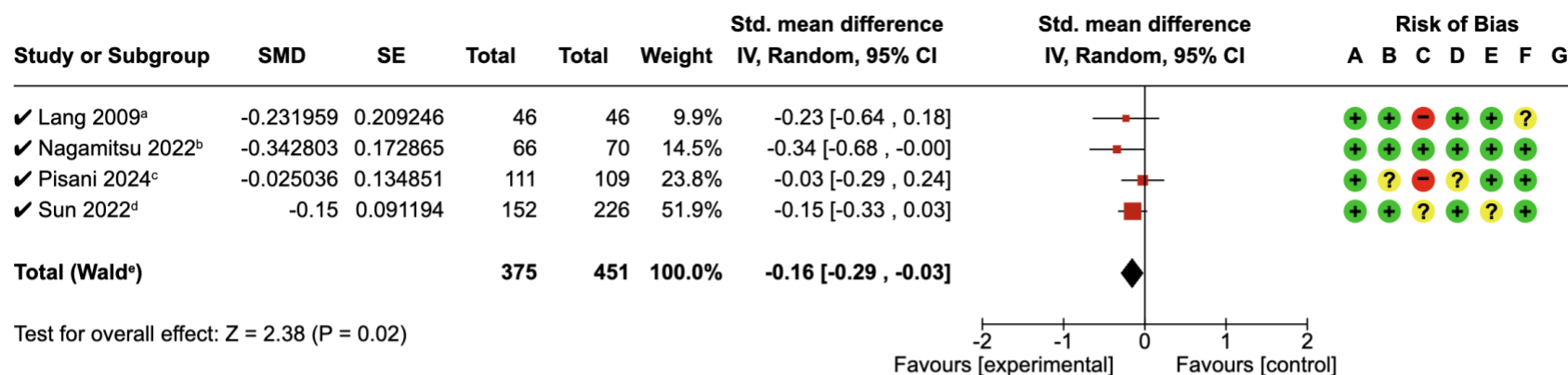
(D) Blinding of outcome assessment (detection bias)

(E) Incomplete outcome data (attrition bias)

(F) Selective reporting (reporting bias)

(G) Other bias

Supplementary Figure 7. Forest plot and risk-of-bias summary for behavioural outcomes, hybrid delivery, follow-up (4 studies; SMD = -0.16, 95% CI -0.29 to -0.03).



Footnotes

^aHybrid - Crossover-randomized from baseline to 3-month follow-up; since participants all received the intervention, we entered the total number of participants for both arms.

^bHybrid - Between - Randomized; Follow-up at 4-months.

^cHybrid - Between - Randomized - follow-up at 3-months.

^dHybrid - Between - Randomized; Follow-up measured at T4 - 3-months

^eCI calculated by Wald-type method.

^fTau² calculated by DerSimonian and Laird method.

Risk of bias legend

(A) Random sequence generation (selection bias)

(B) Allocation concealment (selection bias)

(C) Blinding of participants and personnel (performance bias)

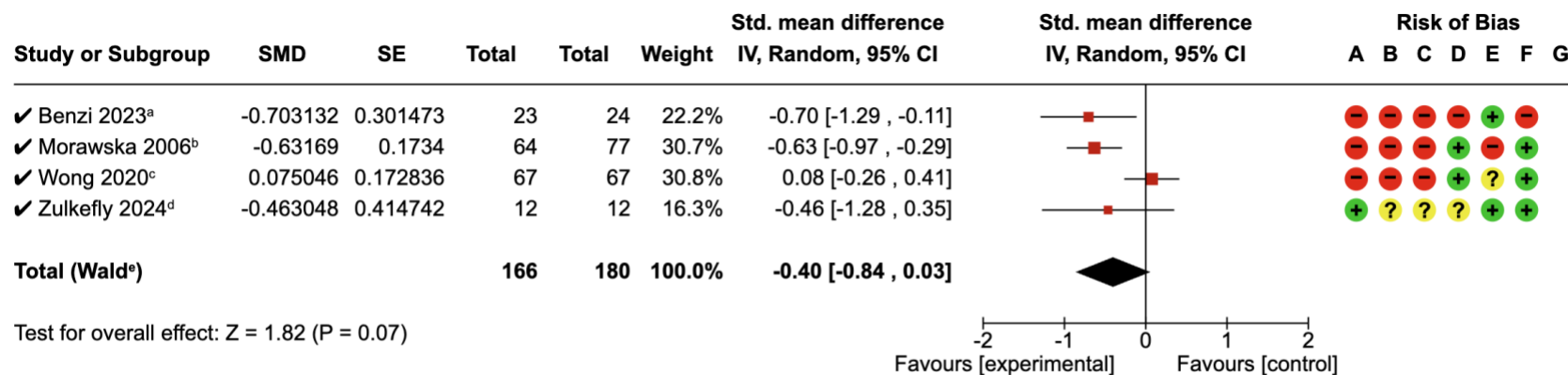
(D) Blinding of outcome assessment (detection bias)

(E) Incomplete outcome data (attrition bias)

(F) Selective reporting (reporting bias)

(G) Other bias

Supplementary Figure 8. Forest plot and risk-of-bias summary for behavioural outcomes, virtual delivery, follow-up (4 studies; SMD = -0.40, 95% CI -0.84 to 0.03).



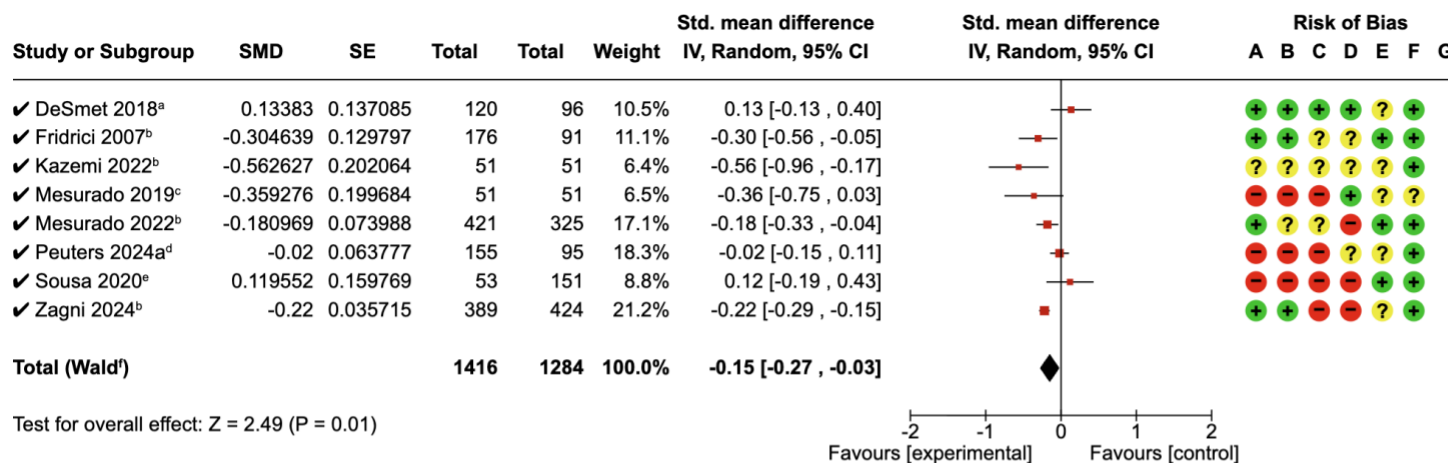
Footnotes

- ^aVirtual - Within - Non-Randomized; T0-T2 (baseline to 2-month follow-up)
^bVirtual - Within - Non-Randomized; pretest to follow-up measured at 3-months
^cVirtual - Within - Non-Randomized; Posttest measured at 1-month.
^dVirtual - Between - Randomized; Follow-up at 1-month.
^eCI calculated by Wald-type method.
^fTau² calculated by DerSimonian and Laird method.

Risk of bias legend

- (A) Random sequence generation (selection bias)
 (B) Allocation concealment (selection bias)
 (C) Blinding of participants and personnel (performance bias)
 (D) Blinding of outcome assessment (detection bias)
 (E) Incomplete outcome data (attrition bias)
 (F) Selective reporting (reporting bias)
 (G) Other bias

Supplementary Figure 9. Forest plot and risk-of-bias summary for social outcomes, hybrid delivery, immediate post-intervention (8 studies; SMD = -0.15, 95% CI -0.27 to -0.03).



Footnotes

^aHybrid - Between - Randomized

^bHybrid - Between - Randomized

^cHybrid - Within - Non-Randomized

^dHybrid (In-person) - Between - quasi-Randomized

^eHybrid - Between - Non-Randomized

^fCI calculated by Wald-type method.

^gTau² calculated by DerSimonian and Laird method.

Risk of bias legend

(A) Random sequence generation (selection bias)

(B) Allocation concealment (selection bias)

(C) Blinding of participants and personnel (performance bias)

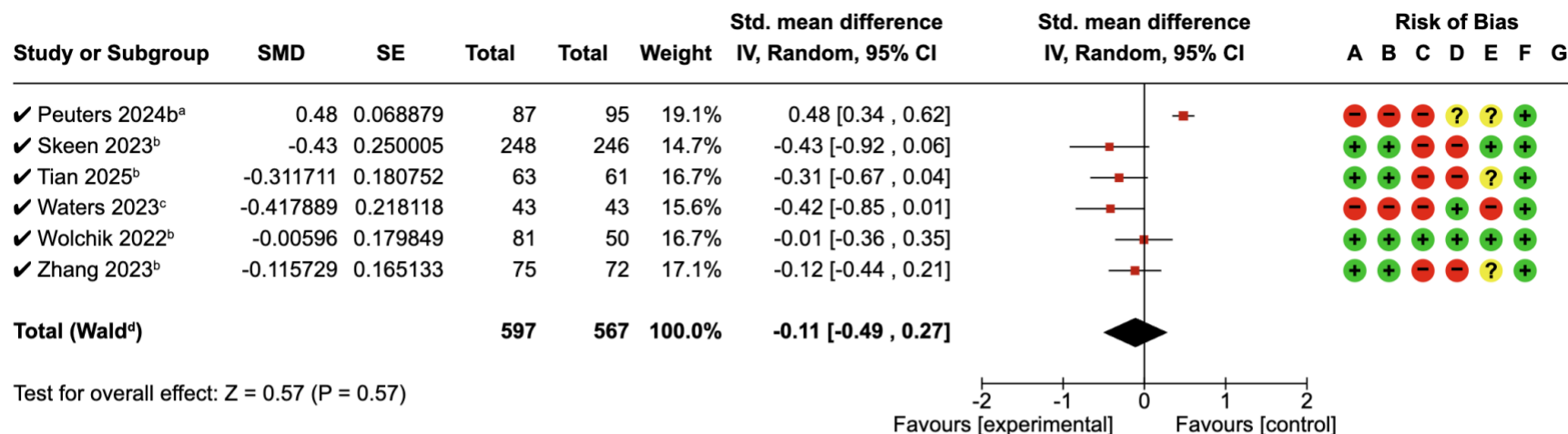
(D) Blinding of outcome assessment (detection bias)

(E) Incomplete outcome data (attrition bias)

(F) Selective reporting (reporting bias)

(G) Other bias

Supplementary Figure 10. Forest plot and risk-of-bias summary for social outcomes, virtual delivery, immediate post-intervention (6 studies; SMD = -0.11, 95% CI -0.49 to 0.27).



Footnotes

^aVirtual (Remote due to pandemic) - Between - quasi-Randomized

^bVirtual - Between - Randomized

^cVirtual - Within - Non-Randomized

^dCI calculated by Wald-type method.

^eTau² calculated by DerSimonian and Laird method.

Risk of bias legend

(A) Random sequence generation (selection bias)

(B) Allocation concealment (selection bias)

(C) Blinding of participants and personnel (performance bias)

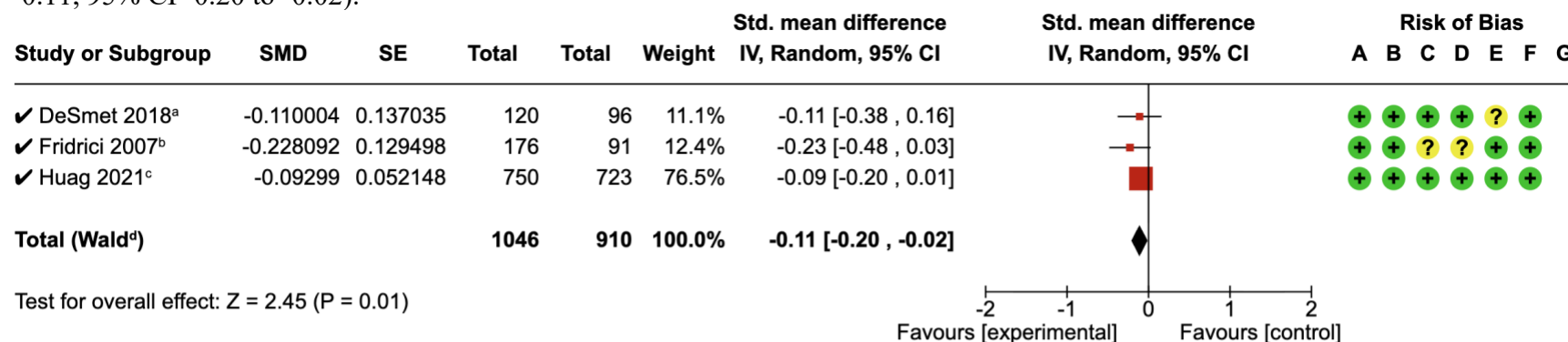
(D) Blinding of outcome assessment (detection bias)

(E) Incomplete outcome data (attrition bias)

(F) Selective reporting (reporting bias)

(G) Other bias

Supplementary Figure 11. Forest plot and risk-of-bias summary for social outcomes, hybrid delivery, follow-up (3 studies; SMD = -0.11, 95% CI -0.20 to -0.02).



Footnotes

^aHybrid - Between - Randomized; Posttest measured at 4-weeks (T2)

^bHybrid - Between - Randomized; Follow-up at 2-months.

^cHybrid - Between - Randomized; Posttest measured at 6-months.

^dCI calculated by Wald-type method.

^eTau² calculated by DerSimonian and Laird method.

Risk of bias legend

(A) Random sequence generation (selection bias)

(B) Allocation concealment (selection bias)

(C) Blinding of participants and personnel (performance bias)

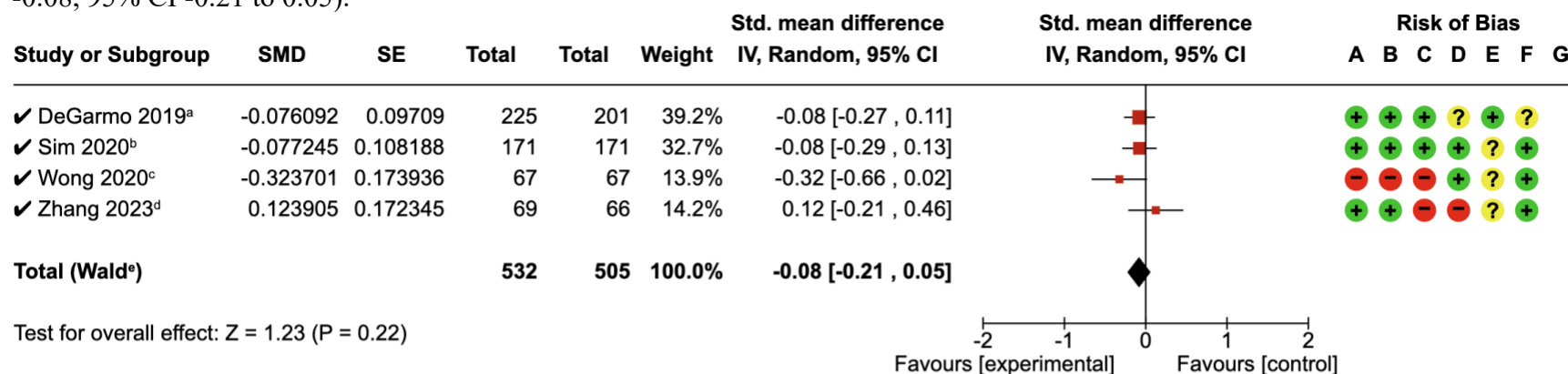
(D) Blinding of outcome assessment (detection bias)

(E) Incomplete outcome data (attrition bias)

(F) Selective reporting (reporting bias)

(G) Other bias

Supplementary Figure 12. Forest plot and risk-of-bias summary for social outcomes, virtual delivery, follow-up (4 studies; SMD = -0.08, 95% CI -0.21 to 0.05).



Footnotes

^aVirtual - Between - Randomized; Posttest measured at 12-weeks (Time 3) follow-up. Posttest (Time 2) at 7-weeks not provided.

^bVirtual - Between - Randomized; Posttest measured at 3-months.

^cVirtual - Within - Non-Randomized; Follow-up from baseline to 6-months.

^dVirtual - Between - Randomized; Follow-up at 6-months.

^eCI calculated by Wald-type method.

^fTau² calculated by DerSimonian and Laird method.

Risk of bias legend

(A) Random sequence generation (selection bias)

(B) Allocation concealment (selection bias)

(C) Blinding of participants and personnel (performance bias)

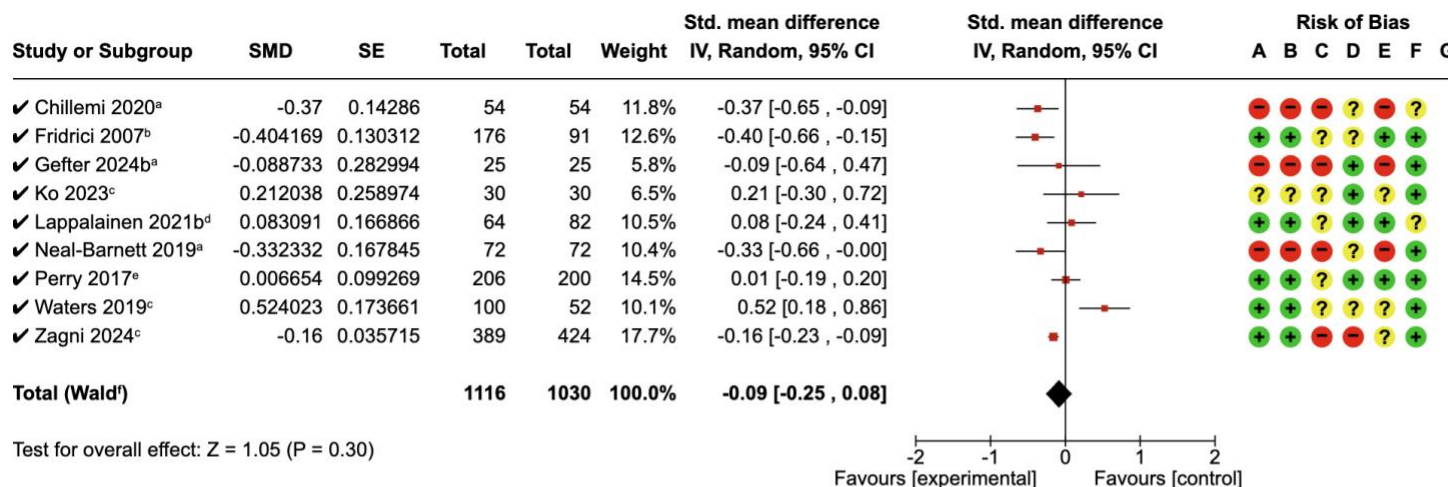
(D) Blinding of outcome assessment (detection bias)

(E) Incomplete outcome data (attrition bias)

(F) Selective reporting (reporting bias)

(G) Other bias

Supplementary Figure 13. Forest plot and risk-of-bias summary for cognitive outcomes, hybrid delivery, immediate post-intervention (9 studies; SMD = -0.09, 95% CI -0.25 to 0.08).



Footnotes

^aHybrid - Within - Non-Randomized

^bHybrid - Between - Randomized

^cHybrid - Between - Randomized

^dHybrid (iACTface) - Between - Randomized

^eHybrid - Between - Randomized - Posttest

^fCI calculated by Wald-type method.

^gTau² calculated by DerSimonian and Laird method.

Risk of bias legend

(A) Random sequence generation (selection bias)

(B) Allocation concealment (selection bias)

(C) Blinding of participants and personnel (performance bias)

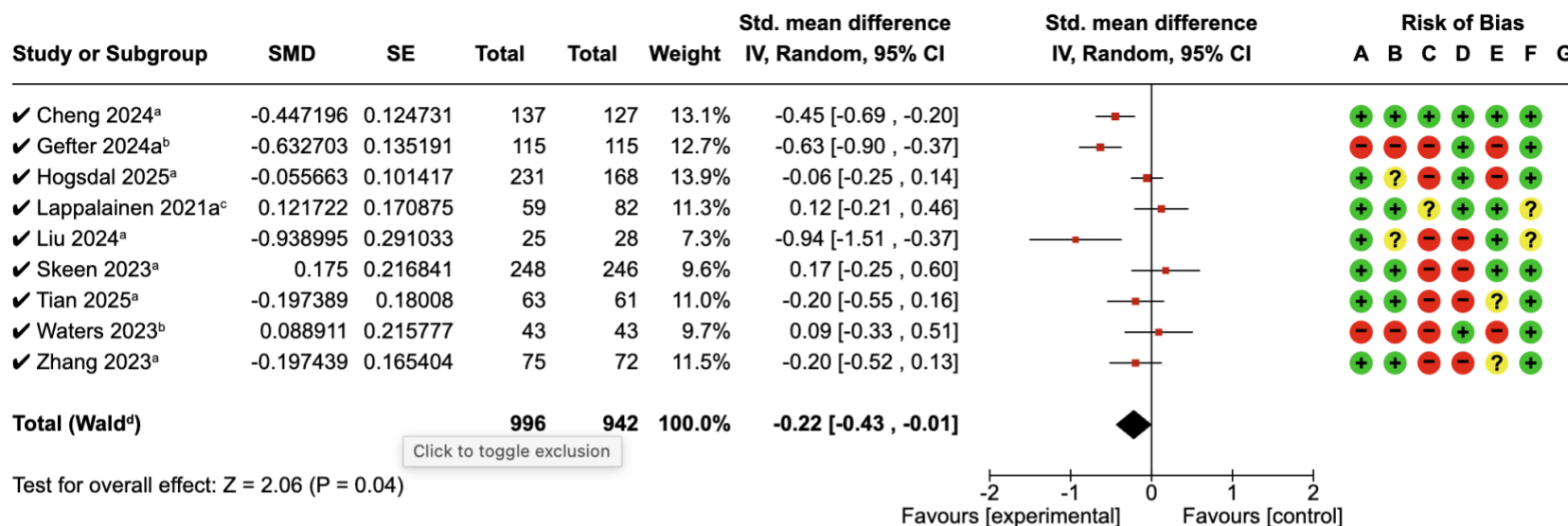
(D) Blinding of outcome assessment (detection bias)

(E) Incomplete outcome data (attrition bias)

(F) Selective reporting (reporting bias)

(G) Other bias

Supplementary Figure 14. Forest plot and risk-of-bias summary for cognitive outcomes, virtual delivery, immediate post-intervention (9 studies; SMD = -0.22, 95% CI -0.43 to -0.01).



Footnotes

^aVirtual - Between - Randomized

^bVirtual - Within - Non-Randomized

^cVirtual (iACT) - Between - Randomized

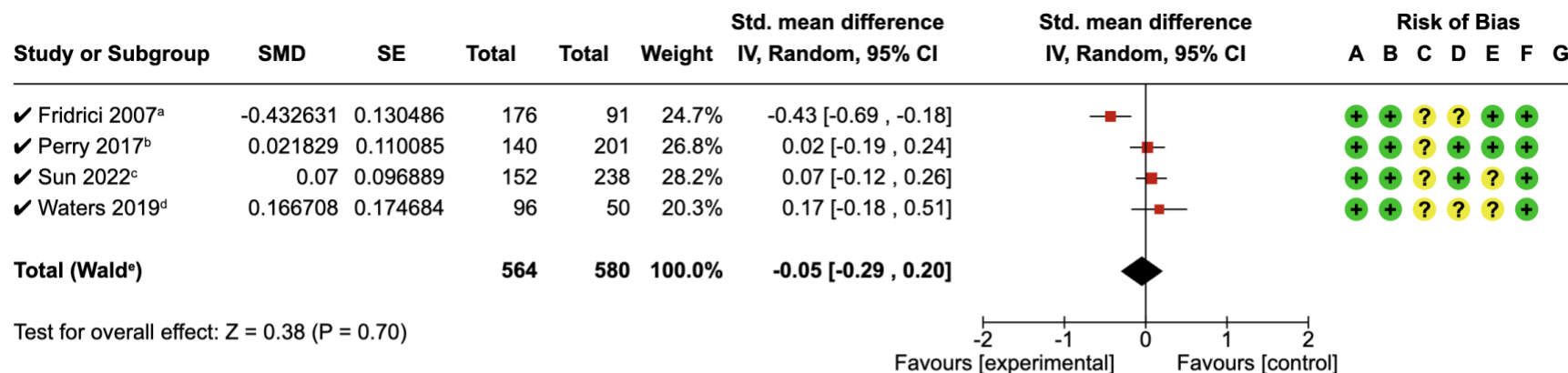
^dCI calculated by Wald-type method.

^eTau² calculated by DerSimonian and Laird method.

Risk of bias legend

- (A) Random sequence generation (selection bias)
- (B) Allocation concealment (selection bias)
- (C) Blinding of participants and personnel (performance bias)
- (D) Blinding of outcome assessment (detection bias)
- (E) Incomplete outcome data (attrition bias)
- (F) Selective reporting (reporting bias)
- (G) Other bias

Supplementary Figure 15. Forest plot and risk-of-bias summary for cognitive outcomes, hybrid delivery, follow-up (4 studies; SMD = -0.05, 95% CI -0.29 to 0.20).



Footnotes

^aHybrid - Between - Randomized; Follow-up at 2-months.

^bHybrid - Between - Randomized - 6-month follow-up

^cHybrid - Between - Randomized; Follow-up measured at T4, 3-months.

^dHybrid - Between - Randomized; Follow-up at 6-months.

^eCI calculated by Wald-type method.

^fTau² calculated by DerSimonian and Laird method.

Risk of bias legend

(A) Random sequence generation (selection bias)

(B) Allocation concealment (selection bias)

(C) Blinding of participants and personnel (performance bias)

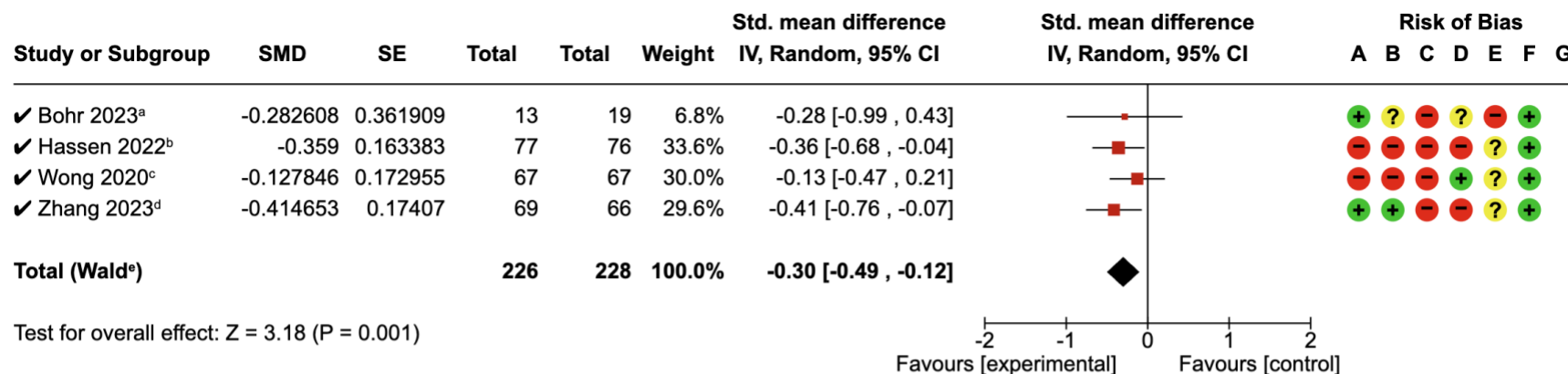
(D) Blinding of outcome assessment (detection bias)

(E) Incomplete outcome data (attrition bias)

(F) Selective reporting (reporting bias)

(G) Other bias

Supplementary Figure 16. Forest plot and risk-of-bias summary for cognitive outcomes, virtual delivery, follow-up (4 studies; SMD = -0.30, 95% CI -0.49 to -0.12).



Footnotes

^aVirtual - Between-Randomized; Posttest measured at 7 weeks.

^bVirtual - Between-Non-Randomized; Posttest measured at 7 weeks.

^cVirtual - Within - Non-Randomized; Posttest measured at 1-month.

^dVirtual - Between - Randomized; Follow-up at 6-months.

^eCI calculated by Wald-type method.

^fTau² calculated by DerSimonian and Laird method.

Risk of bias legend

(A) Random sequence generation (selection bias)

(B) Allocation concealment (selection bias)

(C) Blinding of participants and personnel (performance bias)

(D) Blinding of outcome assessment (detection bias)

(E) Incomplete outcome data (attrition bias)

(F) Selective reporting (reporting bias)

(G) Other bias

Supplementary Figures 17-20. Subgroup Analyses at the Immediate and Follow-Up Time-Periods

Shared explanation (covers Figures 17-20):

Supplementary Figures 17-20 present subgroup characteristics across each of the 16 pooled analyses, grouped under four delivery-format-by-time-period headers: hybrid immediate, virtual immediate, hybrid follow-up, and virtual follow-up. Within each grouping, rows correspond to the four outcome domains (emotional, behavioural, social, cognitive). Cells are shaded to indicate the subgroup finding: green shading indicates a statistically significant subgroup effect, with darker shades corresponding to progressively larger effect sizes (small, medium, or large); grey shading indicates no meaningful difference between subgroups, or a loss of statistical significance within that subgroup; and unshaded (white) cells indicate no available evidence for that subgroup. A cell containing the number “1” indicates that only one study contributed data to that subgroup estimate. An asterisk following an outcome domain label (e.g., “Emotional*”) indicates that the overall pooled effect for that outcome, delivery format, and time period was statistically significant in the primary meta-analysis (Tables 1-4).

Supplementary Figure 17. Study and participant characteristics by subgroup, including study design (randomized vs. non-randomized), study quality (good vs. poor), lived experience of marginalization (present vs. absent), and participant age range (0-4 years, 5-18 years, or mixed-age).

Cluster	RCT	Non-RCT	Good Quality	Poor Quality	Lived Marginalization	No Lived Marginalization	0-4 Age	5-18 Age	Mixed-Age
Hybrid Immediate									
Emotional*									
Behavioural*			1						
Social*									
Cognitive									
Virtual Immediate									
Emotional*									
Behavioural*									
Social			1		1				
Cognitive*									1
Hybrid Follow-Up									
Emotional*					1		1		
Behavioural*					1				
Social*									
Cognitive									
Virtual Follow-Up									
Emotional					1				
Behavioural	1		1				1		
Social		1					1		
Cognitive*					1		1		

Supplementary Figure 18. Intervention focus and format by subgroup, including intervention aim (preventing psychopathology, promoting positive mental health, or both), and delivery format (e.g., online program, website, virtual communication, app, video game, virtual reality).

Cluster	Preventing Psychopathology	Promoting Positive Mental Health	Both Preventing and Promoting	Online Program	Website	Virtual Communication	Website + Virtual Communication	app	Video Game	Virtual Reality
Hybrid Immediate										
Emotional*					1					
Behavioural*	1					1	1			
Social*			1				1		1	
Cognitive		1					1		1	
Virtual Immediate										
Emotional*	1				1	1				
Behavioural*	1				1		1			
Social	1		1			1	1	1		
Cognitive*	1					1				
Hybrid Follow-Up										
Emotional*			1				1			1
Behavioural*	1	1		1		1				
Social*			1				1	1	1	
Cognitive		1		1			1	1	1	
Virtual Follow-Up										
Emotional	1				1			1	1	
Behavioural	1					1		1		
Social		1						1		
Cognitive*	1		1	1		1		1	1	

Supplementary Figure 19. Intervention delivery and structure by subgroup, including facilitation type (self-led, facilitator-led, or both) and session structure (group-based, one-to-one, independent work, or combinations thereof).

Cluster	Self-Led	Facilitator-Led	Both-Led	Group-Based	One-to-One	Independent Work	Group-Based & Independent Work	One-to-One & Independent Work	Group-Based & One-to-One & Independent Work
Hybrid Immediate									
Emotional*		1			1			1	
Behavioural*								1	
Social*				1				1	
Cognitive								1	
Virtual Immediate									
Emotional*		1							
Behavioural*		1							
Social	1						1		1
Cognitive*		1				1		1	1
Hybrid Follow-Up									
Emotional*								1	
Behavioural*							1		1
Social*	1						1		
Cognitive							1		1
Virtual Follow-Up									
Emotional								1	
Behavioural	1	1				1	1		
Social									
Cognitive*	1						1		

Supplementary Figure 20. Facilitator type and engagement by subgroup, including facilitator role (registered mental health professional, non-registered mental health professional, child and youth worker or counselor, teacher, research personnel, not described, or mixed) and engagement context (e.g., teaching and counseling, non-involved resource).

Cluster	Registered Mental Health Professional	Non-Registered Mental Health Professional	Child & Youth Workers & Counselors	Registered Mental Health Professionals & Child & Youth Workers & Counselors	Teachers	Research Personnel	Not Described	Mixed	Teaching & Counseling	Non-Involved Resource
Hybrid Immediate										
Emotional*	1		1				1			
Behavioural*		1			1			1		1
Social*						1	1			
Cognitive		1	1							
Virtual Immediate										
Emotional*							1			
Behavioural*		1								
Social	1	1								1
Cognitive*	1	1		1			1			
Hybrid Follow-Up										
Emotional*				1						
Behavioural*	1	1								
Social*				1		1			1	1
Cognitive	1	1		1	1					
Virtual Follow-Up										
Emotional	1		1			1				1
Behavioural										
Social										
Cognitive*			1						1	