



Nature-Based Interventions for Adolescent Mental Health



Robyn Campbell

Acknowledgment of Country

We hereby acknowledge the Wurundjeri Woi-wurrung and Bunurong/Boon Wurrung peoples of the Eastern Kulin Nation as the Traditional Owners of this land.

We pay our respect to their Elders, past and present, recognising their enduring, over 2,000-generation connection to the land, water, and community.



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Nature-Based Interventions for Adolescent Mental Health

It's Friday Afternoon.

Relax.

I get it.

Enjoy the session.

Downloads Available (later)

- Slide pack
- Summary Sheet (including References)
- Systematic Review and Meta-Analysis



Nature-Based Interventions for Adolescent Mental Health

Learning Outcomes

- Identify core theoretical foundations (e.g., Attention Restoration Theory, Biophilia Hypothesis) underpinning nature-based interventions for adolescent mental health.
- Experience and evaluate simple, practical nature-connected strategies that can be applied in educational or clinical practice to support mental health and wellbeing.
- Reflect on how nature-based approaches can be adapted and implemented across varied school and therapeutic contexts.



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Systematic Review and Meta-analysis (Quantitative Study)

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Systematic review and meta-analysis investigating nature-based interventions for adolescent mental health: Program characteristics and effectiveness

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ABSTRACT

Background: Rates of psychological distress among adolescents have increased globally, alongside a marked decline in time spent in natural environments. Nature-based interventions (NBIs), structured therapeutic programs involving direct engagement with real, physical natural settings, have emerged as a potentially low-cost and scalable approach to supporting adolescent mental health. However, the characteristics and effectiveness of group-based NBIs for this population have not been comprehensively synthesised.

Methods: A systematic review and meta-analysis was conducted in accordance with PRISMA 2020 guidelines on peer-reviewed studies published between 2015 and 2025 evaluating group NBIs for adolescents aged 11–19. Eligible designs included quasi-experimental trials with a comparison group and single-group pre-post studies reporting validated psychometric outcomes of mental health or psychological distress. Random-effects meta-analysis was undertaken where possible; when data were unsuitable for pooling, findings were synthesised using Synthesis Without Meta-analysis (SWiM). Program characteristics (e.g., duration, setting, facilitator expertise, and contents) were extracted and narratively synthesised.

Discussion: Twenty-five studies met inclusion criteria. Quasi-experimental designs assessing mental health out-

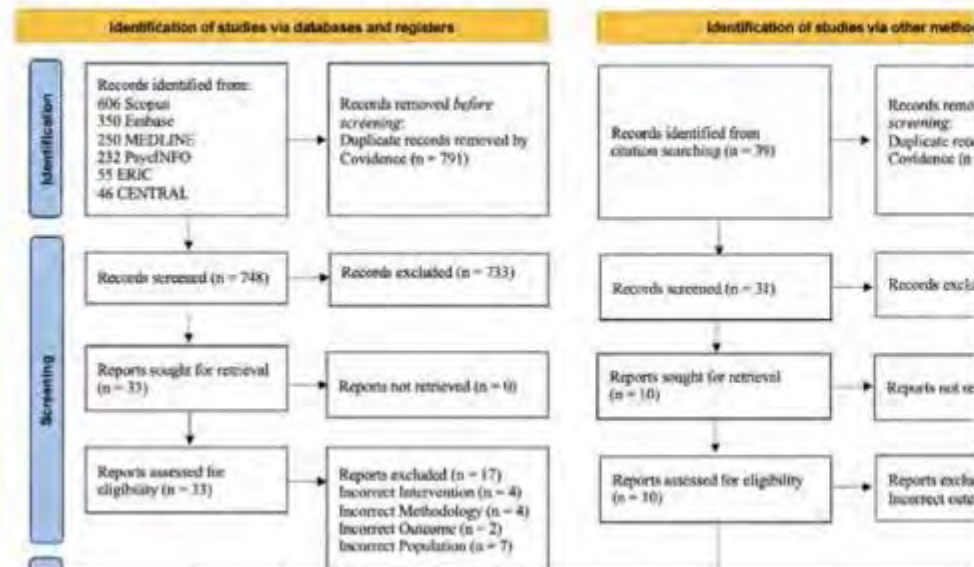


Table 2

Summary of included studies.

Author (Year)	Country	Participants			Intervention Type	Outcome Measure	Assessment Timepoint Analyzed	Ethical Conduct	Main Findings
		N Enrolled/ Analyzed	Age M (SD)	% Female					
Adams et al. (2020)	USA	95/85	15.0 (0.6)	52.6	Adventure (challenging)	CD-RISC-10	T1: Baseline T2: Post intervention	University Michigan IRB (HUM00208514)	Significant improvements in resilience after semester-long adventure education curriculum. Increased resilience (36 %).
Amis et al. (2009)	UK	622/622	16.5*	50.0	Outdoor adventure education (residential camp)	CD-RISC-10	T1: Arrival T2: Week 10	Sheffield Hallam	
Arbuckle and Hunter (2019)	Canada	F: 15/15 C: 23/23	14.5*	NR	Nature-based music/adventure camp	PANAS-C/ DASS	T1: Baseline T2: Post intervention		
Bentley et al. (2010)	UK/SA	130/117	14.5*	37.0	Wilderness expedition	RSES	T1: Baseline T2: Post intervention		
Brown et al. (2016)	Australia	36/36	14.6 (1.6)	58.3	Wilderness Adventure Therapy (WAT)	RQ/ROB-II	T1: Baseline T2: Post intervention		
Brown & Noll (2016)	Australia	36/36	14.0 (0.7)	30.0	Catalyst outdoor adventure program	GWB - PD	T1: Baseline T2: Post intervention		

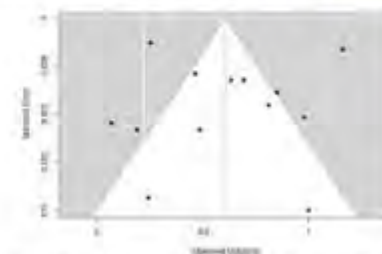
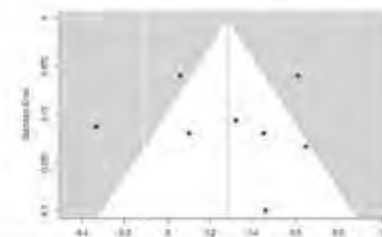


Fig. P2. Funnel Plot of Publication Bias - Pre-Post Studies Mental Health Outcomes

Table E1
GRADE Summary Findings Table

Evidence Set	No. of Studies	Study Design	Pooled Effect	Risk of Bias	Inconsistency	Indirectness	Imprecision	Publication Bias	Overall Certainty
Quasi-experimental mental health outcomes	7	Non-randomized with comparison group	0.82 [0.32-1.31]	Moderate-Serious	Very High ($I^2 = 91.72\%$)	Low	Low (adequate sample, CI)	Not detected (Forest p = .660)	Low
Pre-post mental health outcomes	13	Single-group before-after	0.60 [0.30-0.90]	Moderate-Serious	Very High ($I^2 = 91.72\%$)	Low	Low (adequate sample, CI)	Not detected (Forest p = .660)	Low
Pre-post psychological distress outcomes	8	Single-group before-after	0.28 [0.04-0.52]	Moderate-Serious	Very High ($I^2 = 91.72\%$)	Low	Low (adequate sample, CI)	Not detected (Forest p = .660)	Low
SWIM (Narrative synthesis)	4	Uncontrolled/partial individual-level data	-	Moderate-Serious	Very High ($I^2 = 91.72\%$)	Low	Low (adequate sample, CI)	Not detected (Forest p = .660)	Low

Note: Legend: ●●●●● High ●●●●○ Moderate outcome was rated across five domains: risk of bias, inconsistency, indirectness, imprecision, publication bias.

Bias due to confounding
Bias due to selection of participants
Bias in classification of interventions
Bias due to deviations from intended interventions
Bias due to missing data
Bias in measurement of outcomes
Bias in selection of the reported result
Overall risk of bias

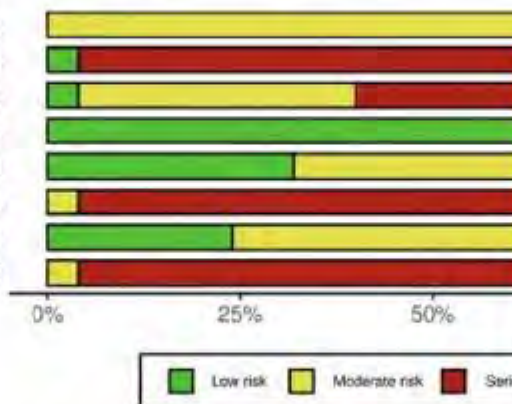


Fig. 2. ROBINS-I summary plot.

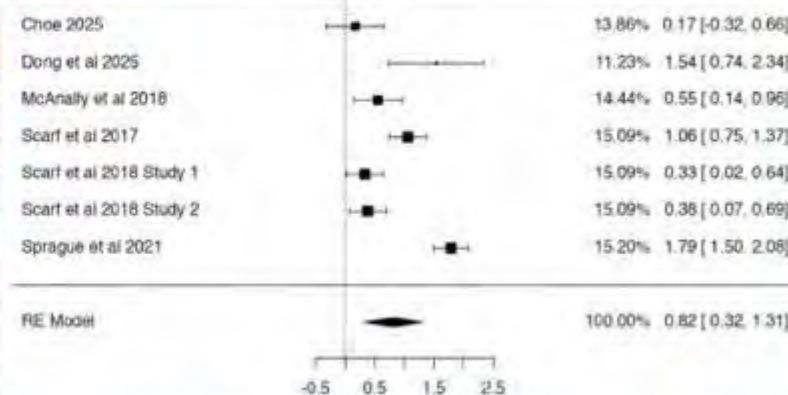


Fig. 4. Forest plot for mental health between group changes of rate randomized controlled trials.



Systematic Review & Meta-Analysis Findings: Effectiveness of Nature-Based Interventions (NBIs)

Highest-effect NBI structures

Characteristics / Observed Patterns

Associated Effect Sizes



Multi-day or residential format; high physical and emotional challenge; shared responsibility; **novelty**; cohort living; structured reflection; group identity emphasis.

Large to very large ($g \geq 1.00$)



Adventure-based challenges; camping or expeditions; teamwork and leadership; journaling or **reflective** activities; strong but shorter immersion.

Moderate ($g = 0.40-0.85$)



Facilitator characteristics associated with **higher effects**
Trained clinical staff, certified mindfulness / forest-bathing **instructors**, or highly specialised outdoor educators

Large effects



Facilitator characteristics associated with **moderate effects**
Outdoor educators and youth-development leaders integrating reflection and teamwork into challenges.

Moderate to large improvement

lower → higher



Most responsive outcomes: Resilience, self-esteem, wellbeing, social connectedness, belonging, self-efficacy



Mechanisms appearing to drive strongest effects



Dose-response patterns: Higher duration and immersion reported larger effect

Therapeutic intentionality: Large effects when CC integrated

lower → higher

Systematic Review of the Proposed Mechanisms of Change and RESTORE Framework (Qualitative Study)

- Across **diverse settings and program formats**, studies reported improvements in wellbeing, self-efficacy, resilience, emotion regulation, and social connectedness.
- **Findings suggest benefits emerge through interactions among environmental, relational, and experiential processes over time.**
- Natural environments serve to reduce cognitive and emotional load. Duration, structured challenge, skilled facilitation, guided reflection, and stable group processes that foster belonging and identity are other key features.
- These patterns were integrated into the RESTORE framework



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Systematic Review of the Proposed Mechanisms of Change and RESTORE Framework



RESTORE Framework: Practical Design Guidance

RESTORE Domain	What to Design For	Practical Suggestions (Evidence-Aligned)
 Restorative Contexts	 Natural settings that reduce everyday cognitive demands.	- Choose the most nature-rich, least chaotic setting available (parks, bush, beaches, lakes, school gardens).  Limit access to screens.
 Extended Exposure	 Sustained or repeated engagement with the same group	- Aim for multi-week groups (6–10 sessions)  - with a minimum of 3 sessions or ≥3–5 cumulative days. - Camps, extra curricular programs, school holiday programs.
 Soft Fascination	 Low-effort sensory engagement that restores attention	- Use co-regulation with nature, incorporate slow walking, observation, mindful movement, or sensory noticing. - Minimise cognitive load and avoid competition, time pressure, or public performance.
 Therapeutic Facilitation	 Skilled facilitation with structured reflection	- Use trained facilitators (clinical, youth mental health, or experiential learning). - Integrate clinical content (ACT/MBSR/CBT) across sessions. - Use experiential debriefing/reflection after challenges.
 Optimal Challenge	 Graduated, choice-based challenge with scaffolding	- Screen for relevant history, tailor developmentally calibrated challenges (navigation, teamwork, leadership/peer roles). - Frame challenge as learning-oriented, not toughness-oriented. - Always provide choice and alternative roles.
 Relational Density	 Stable groups, shared responsibility, interdependence	Keep groups small–moderate (≥6–12). - Use shared tasks, rotating roles, and gentle group identity practices. Continuity of peers and facilitators is critical.

RESTORE Framework for Nature-Based Interventions

Restorative Contexts



Natural settings reducing cognitive demands.

Practical Application:

Extended Exposure



Sustained, repeated group engagement.

Practical Application:

Soft Fascination



Low-effort sensory attention restoration.

Practical Application:

Therapeutic Facilitation



Skilled facilitation & reflection.

Practical Application:

Optimal Challenge



Graduated, choice-based challenges.

Practical Application:

Relational Density



Stable, interdependent groups.

Practical Application:



Nature-Based Interventions for Adolescent Mental Health



Thank you