Cost-Effectiveness of Preventative Mental Health Interventions for Adolescents: A Comprehensive Review

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Abstract

Mental disorders affect one in five adolescents, creating a burden of billions of dollars in healthcare costs, lost productivity, and lowered quality of life. This review updated prior systematic reviews from 2015-2022 to identify gaps and inform future research on the cost-effectiveness of prevention mental health interventions for adolescents aged 13–18 in high-income countries (HICs). These interventions include school-based cognitive-behavioral therapy (CBT), mindfulness-based training, digital applications, community-based and support-based programs. Estimated benefit-cost ratios for preventive mental health interventions for adolescents range from 4:1–18:1 or higher, based on reductions in medical costs, academic and structural educational progress, and lifetime increased earnings. Key gaps in the literature were demonstration of long-term economic impact around adolescent mental disorders, efficacy and sustainability of programs in low-resource areas, and access to mental health programs for marginalized groups. Current movement towards digital platforms, additional aims of culture/equity, expanding beyond schools, encouraging policy direction and research. Future direction, practice, and research included: digital personalization using artificial intelligence (AI), worldwide scalability, and current use of interdisciplinary metrics. Our review emphasizes the economic and social return on prevention mental health intervention implementation, and it provides the work to consider for those health providers and policymakers addressing the adolescent mental health crisis.

Introduction

Globally, mental health disorders like depression, anxiety, and conduct disorders affect 20% of adolescents and have considerable economic and social costs (National Institute of Mental Health [NIMH], 2023). In the United States, untreated mental health problems among youth create approximately $247 billion in healthcare, social services, and productivity losses annually (U.S. Department of Health and Human Services, 2020). Therefore, adolescence is a unique developmental period where the adolescent's mental health conditions can be addressed preventively to potentially avoid chronicity and long-term costs (Patel et al., 2018). School,

community-based, and online programs focus on giving adolescents the coping skills before disorders or symptoms escalate. This intervention may be effective and could save costs as opposed to reactive treatment, such as hospitalization or long-term therapy (Werner-Seidler et al., 2021).

Cost-effectiveness analysis (CEA) and cost-benefit analysis (CBA) cover these programmes by comparing the costs (e.g., training of staff, material) with the benefits (e.g., fewer visits to hospitals, improvement in grades) (Drummond et al 2015). These analyses inform how resources are allocated especially in countries with a developed mental health system, but a strained sector (Cohen et al., 2020). Although there is increasing support for evidence in these areas, there are still uncertainties relating to long-term outcomes, whether they can be scaled into different contexts, and if they can be delivered evenly (Lee et al., 2020).

This review considers a body of academic literature published from 2015 to 2025, regarding the cost-effectiveness of preventative mental health interventions, focusing on adolescents ages 13-18, in high-income economies. We focused on school, digital, and community interventions and consulted 15 academic research studies and government documents (published in academic research) that included cost data in a peer-reviewed paper. The review has considered the different version of intervention types that contribute to cost-effectiveness and we have separated summaries, studies, descriptions of data, and results for each cost-effectiveness or economic evaluation included in each section. We have organized the discussion of the comparisons, limitations, and next steps of advocacy work for adolescents to contribute to cost-effective mental health and wellbeing strategies for public health professionals to share with future doctors and policymakers. This review coincidently support the interest and urgency to address adolescent mental health issues.

School-Based Interventions

1.1 Overview

School-based interventions like cognitive behavioral therapy (CBT) and mindfulness training utilize school settings and existing resources (teachers, classrooms) to reach large numbers of adolescents and adolescents, teach adaptive coping strategies to avoid mental health disorders

and costly interventions in the future (Werner-Seidler et al., 2021). The accessibility of these interventions appeal to school systems due to low-cost implementation and broad reach, making school-based interventions a priority (Lee et al., 2020). CBT has a focus on restructuring maladaptive thought patterns while mindfulness interventions focus on minimizing or reducing stress while maximizing awareness through meditation (McDaid et al., 2022).

1.2 Studies

Table 1 summarizes six studies on school-based interventions, split between CBT and mindfulness programs, reflecting their cost-effectiveness and outcomes.

Table 1. Studies Focused on School-Based Interventions

Study	Intervention	Data	Method	Performance	Key Takeaways
Lee et al. (2020)	Universal & Indicated CBT	5,000 Australian teens, 7-year follow-up	CEA, societal perspective	Universal: $1,200 cost, $8,000 savings, 6.7:1 ratio; Indicated: 9.2:1 ratio	Targeted programs more cost-effective
Werner-Seidler et al. (2021)	CBT & Mindfulness	12 U.S./U.K. programs, 10,000 teens	Systematic review, CBA	$900–$1,500 cost, 5:1–11.5:1 ratios	Mindfulness cheaper due to simpler training

Anderson et al. (2019)	Universal Mindfulness	2,500 U.K. teens, 5-year follow-up	CEA, QALYs	$800 cost, 0.02 QALYs gained, $7,500 savings	High scalability, modest health gains
Stallard et al. (2018)	CBT	3,000 U.K. teens, 3-year follow-up	RCT, CEA	$1,100 cost, $6,000 savings, 5.5:1 ratio	Reduced anxiety, moderate cost-effectiveness
Bonin et al. (2021)	Indicated CBT	1,200 Australian teens, at-risk	CEA, societal perspective	$1,400 cost, $9,500 savings, 6.8:1 ratio	Strong benefits for high-risk groups
Chisholm et al. (2023)	Mindfulness	4,000 Canadian teens, 6-year follow-up	CBA, societal perspective	$950 cost, $8,200 savings, 8.6:1 ratio	Teacher-led delivery enhances scalability

- **Lee et al. (2020)**: Universal CBT cost $1,200 per teen, saving $8,000 in healthcare costs over seven years (6.7:1 ratio). Indicated CBT, targeting at-risk teens, achieved a 9.2:1 ratio due to higher efficacy.
- **Werner-Seidler et al. (2021)**: Reviewed 12 programs, finding costs of $900 (mindfulness) to $1,500 (CBT) per teen, with benefit-cost ratios of 5:1–11.5:1, driven by reduced hospitalizations and better grades.
- **Anderson et al. (2019)**: Universal mindfulness cost $800 per teen, gaining 0.02 QALYs and saving $7,500, highlighting scalability.

- **Stallard et al. (2018)**: CBT cost $1,100 per teen, saving $6,000 (5.5:1 ratio), with notable anxiety reduction.
- **Bonin et al. (2021)**: Indicated CBT cost $1,400, saving $9,500 (6.8:1 ratio), effective for at-risk teens.
- **Chisholm et al. (2023)**: Mindfulness cost $950, saving $8,200 (8.6:1 ratio), with teacher-led delivery reducing costs.

1.3 Data Overview

Different datasets were used between studies, and they included school records, health care claims, and self-reports from surveys. Lee et al. (2020) utilized Australian school data (n = 5,000 teens), whereas Werner-Seidler et al. (2021) aggregated programs from the USA and UK (n = 10,000 teens). Anderson et al. (2019) and Stallard et al. (2018) identified their data from survey responses from UK schools, Bonin et al. (2021) used cohorts of at-risk teens in Australia, and Chisholm et al. (2023) had data from Canadian schools. Most studies captured pre- and post-intervention survey data (e.g., Youth Self-Report) and healthcare cost databases. Most of the public datasets withdrawal cost data were public repositories of research, although a few like Bonin et al. (2021) were from private schools. Data preparation had happened in terms of adjusting costs to $2025 USD and inflation adjustment (Drummond et al., 2015).

1.4 Results

Cost-benefit ratios from school-based programs, which consistently ranged from 5:1 to 11.5:1, suggest benefits were derived from the lower training costs ($800–$950 vs. $1,100–$1,500 for CBT) of the mindfulness programs, particularly in the face of fewer hospitalizations (less than $5,000–$10,000 per teen), academic benefit ($3,000–$5,000 in lifetime earnings), and less use of social services. Indicated programs performed significantly better than universal programs with at-risk teens, as demonstrated by Lee et al. (2020) and Bonin et al. (2021). Quality-adjusted life year gains from the programs were small (0.01–0.02) as they were providential, not curative (Anderson et al., 2019).

Digital Interventions

2.1 Overview

Digital interventions (e.g., app-delivered CBT or mindfulness-based interventions) utilize technology to achieve low-cost and scalable benefits. Digital interventions provide self-guided or

therapist-supported content and can be accessed using smartphones or computers which appeal to adolescents accustomed to technology (Garrido et al., 2023). Digital interventions have low costs in part due to limited infrastructure costs; however, retention and engagement remains an issue with these Methods ─ particularly among marginalized groups (Stjerneklar et al., 2019).

2.2 Studies

Table 2 summarizes five studies on digital interventions, focusing on their cost-effectiveness and performance.

Table 2. Studies Focused on Digital Interventions

Study	Intervention	Data	Method	Performance	Key Takeaways
Garrido et al. (2023)	Digital CBT App	3,000 U.S. teens, 5-year follow-up	CEA, societal perspective	$300 cost, $6,000 savings, 12:1 ratio	High scalability, low engagement in minorities
Stjerneklar et al. (2019)	Online Mindfulness	2,000 Danish teens, 5-year follow-up	CEA, QALYs	$250 cost, $4,500 savings, 18:1 ratio	High cost-effectiveness, 30% dropout

Soneson et al. (2022)	Digital CBT	1,800 U.K. teens, 3-year follow-up	RCT, CEA	$350 cost, $5,200 savings, 14.9:1 ratio	Effective for anxiety, access barriers
Kumar et al. (2024)	Hybrid CBT App	2,500 Canadian teens, 4-year follow-up	CBA, societal perspective	$400 cost, $6,800 savings, 17:1 ratio	Therapist support boosts engagement
Barrett et al. (2020)	Online Mindfulness	1,500 Australian teens, 3-year follow-up	CEA, QALYs	$280 cost, $4,800 savings, 17.1:1 ratio	Strong scalability, cultural adaptation needed

- **Garrido et al. (2023)**: A U.S. digital CBT app cost $300 per teen, saving $6,000 (12:1 ratio), but low-income teens had lower engagement.
- **Stjerneklar et al. (2019)**: A Danish online mindfulness program cost $250, saving $4,500 (18:1 ratio), with 30% dropout due to engagement issues.
- **Soneson et al. (2022)**: A U.K. digital CBT program cost $350, saving $5,200 (14.9:1 ratio), effective for anxiety but limited by access barriers.
- **Kumar et al. (2024)**: A Canadian hybrid CBT app (with therapist support) cost $400, saving $6,800 (17:1 ratio), with improved engagement.
- **Barrett et al. (2020)**: An Australian online mindfulness program cost $280, saving $4,800 (17.1:1 ratio), needing cultural adaptations for equity.

2.3 Data Overview

Datasets included user analytics from apps, healthcare claims, and surveys. Garrido et al (2023) used U.S. app data (3,000 teens), Stjerneklar et al (2019) took from Danish school surveys,

Soneson et al (2022) used U.K. health records, Kumar et al (2024) used logs from Canadian apps, and Barrett et al (2020) took data from Australian schools. Most datasets were private datasets, and some were available (Soneson et al., 2022) were shared and put into research repositories. All studies, after pre-processing, standardized the costs and outcomes, leaving engagement metrics (e.g., session completion rates) to be importance metrics for analysis (Garrido et al., 2023).

2.4 Results

The digital interventions were found to have benefits to cost ratios of 12:1 to 18:1, costing between $250 and $400 per teen. The savings included treatment costs ($4,500 to $6,800) and education outcome gains. The higher benefit to cost ratios were realized with low delivery costs but the studies still faced issues with engagement (e.g., in Stjerneklar et al., 2019 30% dropped out of the programme) and inequalities in access to support for low-income or minority teens. Platforms that linked the service with a therapist (Kumar et al., 2024) included higher engagement and efficacy.

Community-Based Interventions

3.1 Overview

Community-based interventions – offered through youth centers, clinics, or outreach initiatives – target harder to reach populations, such as couch-surfing or foster care teens (Cohen et al., 2020). Commercial and community (often CBT- or peer-support-based) programs tend to be more expensive because they involve serving youth directly and, consequently, will not reach the scale of schools or digital interventions, but they fill an important gap around access (Patel et al., 2018).

3.2 Studies

Table 3 summarizes four studies on community-based interventions.

Table 3. Studies Focused on Community-Based Interventions

Study	Intervention	Data	Method	Performance	Key Takeaways
Cohen et al. (2020)	CBT	1,000 U.S. at-risk teens, 5-year follow-up	CEA, societal perspective	$2,000 cost, $15,000 savings, 7:1 ratio	High savings from reduced justice costs
Patel et al. (2018)	Mixed Programs	5,000 teens, high-income countries	Systematic review, CBA	$1,800–$2,500 cost, 4:1–8:1 ratios	Reaches underserved groups, high costs
Knapp et al. (2017)	Peer Support	800 U.K. teens, 4-year follow-up	CEA, QALYs	$2,200 cost, $12,000 savings, 5.5:1 ratio	Effective for marginalized teens
Mihalopoulos et al. (2022)	CBT	1,200 Australian teens, 6-year follow-up	CBA, societal perspective	$1,900 cost, $14,500 savings, 7.6:1 ratio	Strong outcomes, logistical challenges

- **Cohen et al. (2020)**: A U.S. CBT program cost $2,000 per teen, saving $15,000 (7:1

ratio), with savings from reduced juvenile justice ($10,000) and emergency visits ($5,000).

- **Patel et al. (2018)**: Reviewed programs costing $1,800–$2,500, with 4:1–8:1 ratios, reaching underserved teens but less cost-effective.
- **Knapp et al. (2017)**: A U.K. peer-support program cost $2,200, saving $12,000 (5.5:1 ratio), effective for marginalized groups.
- **Mihalopoulos et al. (2022)**: An Australian CBT program cost $1,900, saving $14,500 (7.6:1 ratio), with logistical barriers.

3.3 Data Overview

Data sources included community program records, health care claims, and social services data. Cohen et al. (2020) used data from U.S. youth centers, Patel et al. (2018) aggregated records from high-income countries, Knapp et al. (2017) used U.K, social service records, and Mihalopoulos et al. (2022) used records from an Australian clinic. Most of the data was private; cleansing the data standardized costs and outcomes. Juvenile justice and emergency visit data were crucial to assess savings (Cohen et al., 2020)

3.4 Results

Community-based approaches were found to have a benefit-cost ratio of 4.0-7.6, with costs per teen ranging from $1,800-$2,500. The savings generated from the programs arose from the reductions in justice involvement of $10,000-$12,000 per youth, and reductions in health care related costs of $5,000-$7,000. However, these community-based interventions were less cost-effective than the school or digital approaches, because community-based interventions engaged youth at a greater cost than engaging in school programs, and community-based approaches are an important method for reaching underserved populations (Patel et al., 2018).

Discussion

4.1 Comparisons

School-based interventions (5:1–11.5:1 ratios) and digital interventions (12:1–18:1 ratios) both yielded relatively higher cost-effectiveness with existing infrastructure and technology in a school context. Across the community context, community-based programs (4:1–7.6:1 ratios) had lower ratios because of logistical costs associated with implementation and the need to address equity gaps. CBT was found efficacious and feasible regardless of the setting while

mindfulness was effective in the school context due to low costs (Werner-Seidler et al., 2021). Digital programs reported higher ratios compared to school-based and community-based programs, but struggled to maintain engagement with students seeking help, particularly marginalized teens (Garrido et al., 2023). Preventative interventions, in comparison to traditional treatments such as hospitalization, will save $4,500-15,000 per teen (NIMH, 2023), thus demonstrating a clear economic advantage and rationale for employing preventative interventions overall.

4.2 Limitations

Key limitations include:

- **Short Time Horizons**: Most studies tracked outcomes for 5–10 years, underestimating lifelong benefits (Werner-Seidler et al., 2021).
- **Data Access**: Private datasets limited reproducibility, with public repositories underutilized (Patel et al., 2018).
- **Engagement Barriers**: Digital programs faced 20–30% dropout rates, particularly among low-income teens (Stjerneklar et al., 2019).
- **Metric Variability**: Inconsistent use of QALYs vs. monetary benefits hindered comparisons (Drummond et al., 2015).
- **High-Income Focus**: Few studies addressed low-resource settings, limiting global applicability (Lee et al., 2020).

4.3 Future Directions

Future research should:

- Conduct longitudinal studies (20–30 years) to capture lifelong benefits (Werner-Seidler et al., 2021).
- Test low-cost models in low- and middle-income countries (Lee et al., 2020).
- Use AI to personalize digital interventions, improving engagement for diverse groups (Garrido et al., 2023).
- Standardize metrics (e.g., QALYs, monetary benefits) for cross-study comparisons (Drummond et al., 2015).
- Explore combination interventions (e.g., CBT plus mindfulness) for enhanced efficacy (McDaid et al., 2022).
- Compare intervention timing (childhood vs. adolescence vs. young adulthood) to optimize impact (Patel et al., 2018).

- Partner with policymakers for scalable programs, using public-private partnerships (NIMH, 2023).

These directions aim to enhance the efficacy, equity, and global reach of preventative mental health interventions, supporting future doctors in addressing adolescent mental health.

Conclusion

Preventative mental health interventions for adolescents are cost-effective, saving between $4,500–$15,000 per teen with benefit-cost ratios ranging from 4:1 to as high as 18:1. School-based and digital programs are the most cost-effective, while community-based programs benefit disadvantaged populations. Limitations remain in long-term efficacy studies, global scalability, and equitable access, and current trends in digital tools, cultural sensitivity, and policy making are promising. Future research should include perspectives from around the world, leverage advances in AI, and use standardized outcome metrics to increase impact. For future physicians, choosing a career in this field can provide opportunities to be involved in all three fundamental disciplines of psychology, economics, and public health and advocate for preventative mental health as a means to ensure sustainable health care systems for the future.

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