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A scoping review of economic evaluations of post-traumatic stress disorder patients' intervention

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ABSTRACT

Intervention programmes for patients with post-traumatic stress disorder (PTSD) have been extensively evaluated economically, and the related implementation costs are presumably high. This study reviewed the cost-effectiveness of PTSD intervention programmes and associated health benefits. The literature search was carried out between June and July 2023. The PRISMA guidelines for scoping review protocols were strictly followed. A literature search was conducted on the National Health Service (NHS) Economic Evaluation Database, PubMed, PsycInfo, and EconLit, this search yielded 16 studies. This review revealed that trauma-focused cognitive-behavioural therapy (+selective serotonin re-uptake inhibitor) (TF+CBT+SSRIs); prolonged exposure therapy; MDMA-assisted therapy (MDMA-AT); stepped care, screen and treatment; and the transmural trauma care model were cost-effective for PTSD treatment. The cost-effectiveness of intervention programmes that lasted 10 to 31 years was greater. In general, long-term intervention programmes have been associated with health benefits. It is also important to note that telemedicine, cognitive-behavioural therapy, biopsychosocial therapy, and individual therapeutic interventions are capital-intensive and inefficient. When disbursing funding for PTSD treatment around the world, the world health organisation (WHO) should keep in mind these identified interventions and the countries where they have been found to be cost-effective.

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1. INTRODUCTION

Post-traumatic stress disorder (PTSD) is a chronic, severe, and incapacitating psychiatric condition that results from individuals' exposure to a traumatic event, which leads to several adverse psychological effects; these can include an increased high probability of co-occurrence with other related mental health problems, accelerated life expectancy, and early death [1], [2]. The psychological disorder of PTSD is characterised by avoidance, mood switches and cognition, and hyperarousal; all these symptoms persist for some time, some for weeks after encountering a traumatic incident [3], [4].

Research has identified causative factors that can be attributed to PTSD development: a pre-existing history of substance abuse and family history of mental disorder; traumatic exposure; the intensity of exposure; as well as post-traumatic conditions like social assistance [5], [6]. People can develop PTSD due to inherited mental disorders and direct exposure to threatening circumstances like sexual abuse and terrorism as well as consistent drug abuse. As a health issue, PSTD has been documented among conflict-affected populations such as insurgency, communal armed conflicts, and wars leading to poverty, unemployment, and changes in social

dynamics [7]. Posttraumatic stress disorder is estimated to develop in 6% of the world population and 15.4% of high-risk persons exposed to trauma [7] and is associated with later-life physical disability, inefficiency, suicidal thoughts, and mortality [8]–[11]. Researchers and psychologists have developed several interventions and therapies to assist individuals in recovering from the negative impacts of PTSD. Some of these psychological interventions identified in the PTSD literature include exposure, cognitive-behavioral and restructuring therapies, and other interventions like adaptive, biopsychosocial, and telemedicine-based interventions [12]–[15]. The PTSD literature shows that these intervention programmes are effective in the treatment of PTSD among the general population on different aspects of trauma encounters, such as war, sexual assault, and accidents among others [16].

Some of these intervention therapies and intervention programmes have been subjected to economic evaluation using the guidelines and protocol outlined by Wilson [17] to assess the cost and outcome of interventions and the rational choice amid various interventions. The economic evaluation of interventions takes into account the costs and consequences associated with alternative approaches by measuring, evaluating, and comparing the associated costs and benefits [18], [19]. Economic evaluation has several approaches for evaluating intervention studies such as: i) cost-effectiveness ratio using incremental cost-effectiveness ratio (ICER) to measure several outcomes of the intervention in naturally occurring units [20]; ii) cost-utility, which is the fraction of cost-effectiveness in which the utility of the intervention is measured using quality-adjusted life year (QALY) [21]; iii) cost-benefit analysis is estimated in monetary terms which allows a direct comparison of study objectives of different interventions [22]; and iv) cost-minimization analysis which takes into account the actual cost of alternative intervention options [23], [24].

All these economic evaluation approaches are designed to establish the efficacy, efficiency, cost-affordability, and utilization of these intervention programmes for PTSD patients' treatments. Researchers such as [18], [19] reported that economic evaluation reveals the costs associated with an intervention along with its effectiveness, efficiency, and affordability in the treatment of PTSD symptoms. An economic evaluation of intervention studies has been conducted on therapeutic treatment of PTSD patients [15], [25], [26]. Previous reviews conducted by von der Warth *et al.* [27] on economic evaluation and cost analysis of PTSD identified key literature reviews [13], [28], [29]. However, von der Warth *et al.* [27] focused more on the cost analyses of PTSD treatments while little was done on the cost-effectiveness of the PTSD intervention program. The latest study reviewed in von der Warth *et al.* [27] was published in 2019. Recently, numerous studies have been published on the economic evaluation of intervention programmes for PTSD patients, which have demonstrated their feasibility concerning cost-effectiveness and QALYs. Due to this recent upsurge in articles published, there is a need for an updated review of the economic evaluation of intervention studies on PTSD patients.

Using a scoping review approach, we aimed to unveil the latest data on the cost-effectiveness of these intervention programmes and their associated health benefits. Hence, this review is significant especially in this current global economic crisis where many countries are experiencing budget deficits for concurrent expenditure. We strongly believe that the findings of this study will guide therapists, clinicians, psychologists, and policymakers because it will help them make a rational choice in adopting an intervention programme for PTSD that is affordable and effective and has robust health benefits. It is expected that the findings will assist in the allocation of limited resources that will be directed towards treating the adverse effects of PTSD. We believe that our research findings will fill the knowledge gap in the literature and provide insight into the most affordable, cost-effective, and robust intervention program for PTSD patients. Review questions

– Are all PTSD intervention programmes cost-effective?

– What are the health benefits associated with these PTSD intervention programmes?

Post-traumatic Stress Disorder (PTSD) intervention programmes are associated with capital-intensive treatments. This study revealed some intervention programmes that are cost-efficient and have robust health benefits for treating PTSD patients across the globe. Similarly, other cost-ineffective intervention programmes were also highlighted. For effective treatment of PTSD, future researchers, therapists, and the World Health Organisation should adopt these cost-effective interventions.

2. METHOD

A rigorous preliminary search for a scoping review was conducted on the economic evaluation of interventions for PTSD patients in several online databases such as PsycInfo, NHS Economic Evaluation, ScienceDirect, National Library of Medicine, and PubMed from June to July 2023. There was no existing review of this type in the literature. In conducting this study, we followed the guidelines for preferred reporting items for systematic reviews and meta-analyses (PRISMA) and Joanna Briggs Institute (JBI) mythological framework [30], [31].

2.1. Literature search

A scoping review was conducted on online databases such as the NHS Economic Evaluation Database, PubMed, PsycInfo, EconLit, Health Management Database, and Scopus. We formulated sensitive search syntax with the assistance of digital librarians. We used the following search syntax: "Economic evaluation of PTSD intervention program", "cost-effectiveness analysis of intervention program", "economic evaluation of PTSD intervention", cost analysis of PTSD intervention," and "cost-benefit analysis of PTSD intervention program". Moreover, we screened the reference list of the identified articles for additional studies. Articles were not restricted by date of publication.

2.2. Eligibility of studies

Screening of articles was conducted independently by two authors (Dwarika Veronica (DV) and Amos Nnaemeka Amedu (AN)). Peer reviewed articles were analyzed. Based on the research questions that guided the study, only intervention studies focused on PTSD were considered for inclusion. Articles discussing management costs, service costs, and utilization were excluded from the study. Therefore, only articles that discussed the cost of intervention which included either cost-effectiveness, cost-benefit, or cost-utility analysis were included. A book of abstracts that contained all the necessary data was included. Only articles published in the English language were eligible and articles published in foreign languages were excluded. All participants were included, as there was no age restriction. Studies published below 2015 were excluded from the study.

2.3. Data extraction

The rationale for data extraction was formulated by the two authors (DV) and (AN). Data were extracted by one of the reviewers (AN) and revised by a second reviewer (DV). Consensus was used to resolve ambiguous data points. A summary of the data collected included the first author's name, intervention type, country, sample size, primary outcome, and the findings. The findings of the study were further categorized into cost of intervention per patient, incremental cost-effectiveness ratio (ICER), amount of QALY, and QALY gained. Costs measured in other foreign currencies were converted to USD using the publication date.

3. RESULTS

The search results produced 628 records (manual search=5; database=223); however, 16 articles met the criteria for inclusion in the scoping review ([14], [15], [23], [24], [32]–[44]. Among the excluded records, 8.28% of the identified records (52 articles) met all the criteria except that the intervention cost and QALY were not specified. Furthermore, 35.19% (221 articles) of the records were excluded because the articles dealt with only pharmaceutical and clinical costs of treating PTSD patients while 53.9% records (339 articles) constituted duplicates which were removed (Figure 1).

- Features of included studies

The earliest economic evaluation (EE) study selected was published in 2015 [41] and the most recent EE was published in 2023 [33]. In this review, nine studies were conducted in North America [14], [23], [24], [32], [34], [35], [39], [40], [42], six were conducted in Europe [15], [33], [36]–[38], [44], and one was conducted in Australia [41]. The selected studies sample size ranged from N=31 [15] (18) to N=2 642 713 [40].

Some of the studies dealt with psychological treatments such as TF-CBT vs TF-CBT + SSRIs [41]. TF-CBT vs standard care [42], cognitive behavioral therapy (CBT) vs brief intervention (BRF) [23] prolonged exposure therapy vs pharmacotherapy [13], prolonged exposure (PE) vs i-PE vs Skills Training in Affective and Interpersonal Regulation + Prolonged exposure (STAIR + PE), [32] and biopsychosocial intervention vs waiting list, [15]. Furthermore, other studies that focused on the intervention cares were stepped care vs usual care [39], smoking cessation vs standard care [39], telemedicine-based collaborative care vs education only [14], evidence-based telemedicine vs standard treatment; [35], telephone-based concussion management problem solving therapy vs education only [24], centrally assisted collaborative telecare vs optimized usual care [35], screen and treat intervention vs enhanced usual care [36] transmural trauma care model vs regular care [23] and MDMA-AT [34], [41].

3.1. Main outcome

The four major outcome variables of this study included cost per patient, QALYs, QALY gained and ICER. Based on the results of the selected literature, the cost-effectiveness of the intervention program per patient was reported in all studies except one [42]. QALYs gained due to intervention was also established in most of the studies, except in five [14], [23], [35], [37]. Furthermore, incremental QALYs gained due to intervention programmes were not reported in eight studies [32], [34], [35], [38], [42]. There was no mention of ICERs in these studies [13], [32], [35], [37], [42].

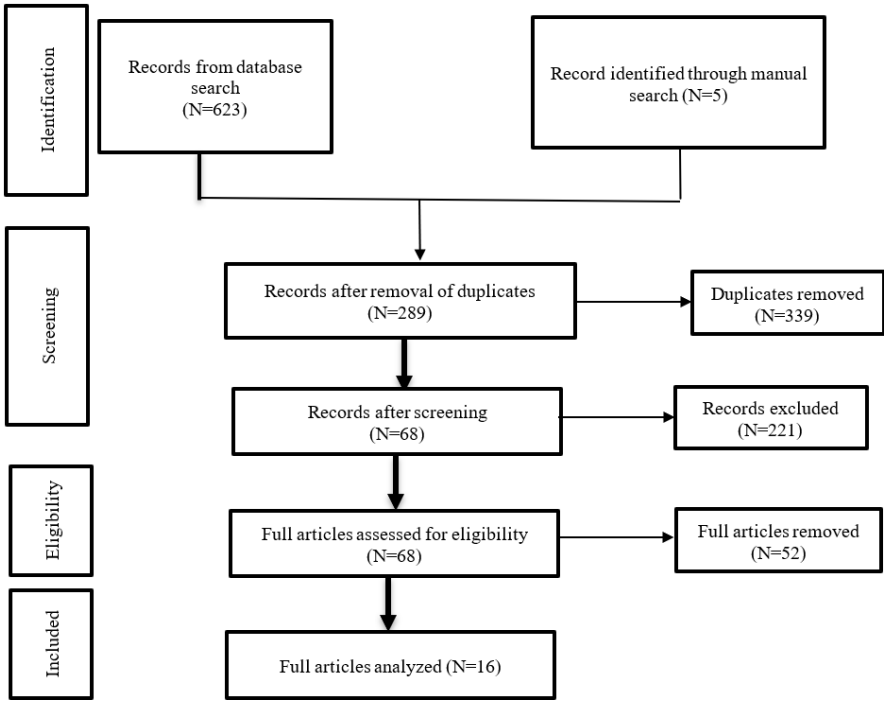

Figure 1. PRISMA flow chart

3.2. Findings

3.2.1. Economic cost-effectiveness of PTSD intervention programmes

This review explored the economic cost-effectiveness of intervention programmes for treating PTSD patients. We found strong evidence that some of these PTSD intervention programmes are cost-effective in treating patients with PTSD. To be more precise, we found that 19 PTSD studies on intervention programmes reported cost-effectiveness per patient. Among the literature that met our inclusion criteria, telemedicine rated the highest. There were four studies that evaluated the cost-effectiveness of telemedicine interventions for PTSD patients. Painter *et al.* [14] established that telemedicine was relatively expensive compared to the cost of enhanced usual care. Richardson *et al.* [24] revealed that telephonic education was more costly than education alone. In other words, education only is more economically cost-effective than telephone-based concussion management problem solving therapy (PST). This finding validated the report of Painter *et al.* [14] who revealed that telemedicine is relatively expensive compared to usual care because of the associated training costs and inherent capital-intensive nature of the intervention. Wong *et al.* [35] found that centralized assisted collaborative telecare (CACT) appeared to be cost-effective related to optimized usual care (OUC) even though CACT was associated with a high cost of implementation. This finding partially agreed with previous findings in terms of capital intensiveness associated with telemedicine, Painter *et al.* [14] and Richardson *et al.* [24] however, it revealed that CACT which is part of telemedicine is cost-effective. Wong *et al.* [35] reported that evidence-based telemedicine was cost-effective compared to standard care. Wong's finding supported the report of Wong *et al.* [35] which revealed that CACT is a cost-effective intervention. However, Wong's finding counters the findings of the previous researches [14], [24], [35] which reported that the telemedicine approach is not cost-effective due to the capital-intensive nature of the implementation.

Two studies explored the cost-effectiveness of MDMA-AT in treating PTSD patients. A study revealed that MDMA-AT was more cost-effective because it generated more net savings and averted premature death [32]. The MDMA-AT had a breakeven point at 3.8 years, meaning it was not economically cost-inefficient from 1 to 3.7 years. Furthermore, Avanceña *et al.* [34] found that at a cost-effectiveness threshold of $100,000 per QALY gained, the three MDMA-AT (25%, 50% and 75%) were cost-effective and cost saving compared to standard care. This finding aligned with Marseille *et al.* [32] who revealed that MDMAT-AT saves lives and enhances the health of patients with severe PTSD. When the effectiveness of PE, intensified PE (i-PE) and skills training in affective and interpersonal regulation (STAIR+PE) were compared, there was no significant difference due to the three treatment conditions [32]. However, since the individual patient's cost-effectiveness ratio was below the QALY threshold, the probability of each of these programmes being cost-effective was established at 32% for PE, 28% for i-PE and 40% for STAIR-PE respectively.

Furthermore, we identified two studies that explored the cost-effectiveness of CBT intervention in the treatment of individuals with PTSD. Slade *et al.* [23] found that CBT was not more cost-effective than BRF since costs associated with CBT were statistically non-significant compared with BRF intervention. Second, Shearer *et al.* [38] revealed that CBT was found to be at 69% probability of being cost-effective compared to usual care at the UK QALY decision threshold. Mihalopoulos *et al.* [41] found that TF-CBT was cost-effective for both children and adults compared to SSRIs at current prices. Hence, Mihalopoulos *et al.* [41] recommended that the full implementation guideline evaluated in the study would lead to the economic efficiency in the treatment of PTSD.

This review identified six other intervention studies that compared two intervention programmes or intervention programmes with usual care. Barnett *et al.* [39] found that even though the costs associated with smoking cessation was high, it was 86% likely to be cost-effective compared to usual care at a threshold of $100,000/QALY. Barnett *et al.* [39] revealed that stepped care is more cost-effective than usual care and within the reach of acceptability of being cost-effective for individuals with PTSD. Chang *et al.* [15] revealed that the implementation cost of biopsychosocial intervention was high and above the World Health Organization's (WHO) cost-effectiveness threshold. Screen and treat was found cost-effective at 88% compared to usual care among adult victims of terrorism [35]. Transmural trauma care model (TTCM) was found cost-effective when compared with regular care [37].

3.2.2. Health benefit associated with the PTSD intervention program

The extent these intervention programmes produced QALY varied across 15 studies. Studies with a longer period of intervention yielded more amount of QALYs [32], [34]. However, studies that lasted for a short period yielded lower QALYs per patient [24], [37]. Likewise, higher QALY gains were positively correlated with a longer period of intervention [32], [34]. ICER shows that interventions that produced higher QALY gains were dominant [32], [34] while lower QALY gains were associated with higher ICER [14], [23], [42]. The highest amount of QALY at a period of 30 years was MDMA-AT [32]. The amount of QALYs gained was not associated with the period of intervention rather it was associated with the effectiveness of the two intervention programmes compared. The two intervention programmes that produced similar QALYs were associated with lower QALY gained or zero QALY gained [35], [41], [42].

3.3. Discussion

This review aimed to reveal the most cost-effective intervention program for treatment of PTSD patients and found that TF-CBT was the most cost-effective. TF-CBT has been proven cost-effective both in isolation or combined with other intervention programmes such as TF+CBT+SSRIs [41]. This means that TF-CBT is more cost-effective when compared with other intervention programmes because it offsets the costs accrued from other medical care services. TF-CBT is also cost-effective in the treatment of both children and adults [42]. TF-CBT+SSRIs is among the list of first-line treatments recommended by international guidelines where it has been found to be highly effective for adults only [45]. Furthermore, PET was found cost-effective in treating PTSD patients [32]. This could be as a result of PE being less expensive in terms of implementation when compared to other intervention programmes. Also, it could be associated with PE's feature that gradually exposes patients to an event that caused the PTSD in a safe controlled environment with the intention of reducing patients' fear and anxiety.

Also, MDMA-AT was found to be cost-effective in the treatment of PTSD patients [32], [34]. The cost-effectiveness of MDMA-AT broke even after a period of 3.7 years of consistent implementation [32]. This could be as result of more net savings it generated after 3.7 years; costs associated with implementation remained constant despite an increase in QALY gained. This meant that MDMA-AT intervention was not cost-effective within 3.7 years of implementation, hence, it is suitable for intervention that would last for a minimum of five years. Three other intervention studies such as stepped care, screen and treat, and TTCM were all found cost-effective [35], [37], [39]. Cost-effectiveness of these intervention were evaluated based on the strength of the usual care which varies from country to country.

However, some interventions were found to be cost-ineffective compared to usual care or other intervention programmes. The literature showed that telemedicine intervention was popular among researchers, however, it was associated with a high cost of implementation and found to be cost-ineffective [14], [24], [35]. The high cost of implementation could be attributed to the facilities and personnel that were hired for the intervention. However, a recent study by Wong *et al.* [35] established that telemedicine is more cost-effective when using descriptive analysis instead of population-level cost-effectiveness analysis used by previous studies. Also, CBT and individualized therapy were capital-intensive and cost-ineffective. This was paramount when CBT and individualized therapy interventions were compared with other interventions [23]. In addition, the implementation cost of the biopsychosocial intervention was high and was equally higher than the WHO cost-effective threshold. This implies that the biopsychosocial intervention is not economically cost-effective. However, the costs of implementation of intervention studies vary from country to country due to standard of

living and wage variability. Some of the interventions that were found to be ineffective could have been effective if they were implemented in low-income countries.

As a result of this study, it has been established that TF-CBT-SSRIs and PET are economically cost-effective for a short period of psychological interventions, whereas PE and MDMA-AT are cost-effective for a long period of psychological interventions. In general, some of these interventions that were found to be ineffective due to high cost of implementation may be the result of a short period of implementation. For instance, MDMA-AT was found ineffective for 3.7 years before breaking even and was found cost-effective for 26.3 years. herefore, whether an intervention is cost-ineffective or not depends on how it is designed to accomplish a short-term or long-term goal. Also, the cost-effectiveness of the intervention depends on how effective the usual care or standard care is at the time of intervention implementation. In a country where usual care is not generally effective, there is a high chance that any PTSD intervention would be cost-effective, but when usual care is cost-effective, it would be very rare to find intervention studies that are cost-effective, especially when compared with current practices. Furthermore, it is significant to emphasise that the benchmark for establishing the cost-effectiveness of some of these intervention programmes was based on comparing the current practice of cost-effectiveness to the effectiveness of intervention programmes or interventions vs. another intervention [14], [23], [42]. Therefore, if the cost-effectiveness ratio of some of these interventions were compared to the World Health Organisation's cost-effective threshold, some interventions would be found cost-effective.

The health benefits associated with these intervention programmes were measured in QALYs. Thus, the greater the number of QALYs associated with an intervention, the greater the amount of health benefit a patient gain from participating in the intervention. This review showed that QALYs varied across the intervention studies. As shown in Table 1, longer-term interventions were associated with a higher number of QALYs [34], [41]. This means that interventions that lasted longer had a higher number of QALYs, since an increase in the number of QALYs indicates the cost-effectiveness of the intervention. This review has revealed that QALYs gained were not correlated with a longer period of intervention because some studies established the cost-effectiveness of two intervention programmes. Hence, the QALY associated with the two programmes could be high, but the difference in the QALY gained could be very small. For instance, the QALY gained from the comparison of CACT and optimised usual care was small despite the higher QALY associated with each intervention [42]. This means that when two interventions produce the same number of QALYs, the QALYs gained will be zero since there is no significant difference in the QALYs associated with the interventions [40].

3.4. Gaps identified in the literature

Studies on cost-benefit analysis of intervention studies on PTSD patients are scarce. Only a few studies have been conducted using cost-benefit analysis, while others used cost-effectiveness analysis. Therefore, there was a need to investigate PTSD intervention studies using cost-benefit approaches. In addition, there are very few studies focusing on the children's population. Thus, the cost-effectiveness and health benefits of some of these intervention studies have not been established for children. Furthermore, this scoping review was conducted without regional limitations, however, there was no single study on the economic evaluation of intervention studies for PTSD patients from South American, African, and Asian countries, despite the frequency of traumatic events recorded on these continents. For instance, in China, a study revealed that the incidence of PTSD among COVID-19 patients was 20% among patients hospitalized, treated, and discharged [46]. Also, in Latin America, a study found that PTSD affected a quarter of Pisco's population and its impacts ranged from moderate to severe in comparison with other disasters in Latin America [47]. Also, sub-Saharan Africa has an 8% prevalence of PTSD in conflict-unexposed regions and 30% in conflict-exposed regions [48]. Thus, there is a need to conduct an economic evaluation of intervention studies on PTSD treatment on these continents.

3.5. Strengths and limitations

PTSD is a global psychological problem, and there is no current literature that reviews the cost-effectiveness of the economic evaluation of these intervention programmes and the associated health benefits in the treatment of PTSD patients. For the purpose of ensuring a quality report, we strictly followed the current guidelines for health economics reviews [17]. This study is the first of its kind to particularly review the cost-effectiveness and benefits associated with the economic evaluation of intervention studies for PTSD patients. First, this review has inherent shortcomings that are imbedded in a scoping review, like sensitive search terms, screening criteria, and assessment of eligibility; hence, some articles were excluded. Second, the reviewed articles were conducted in different countries; therefore, several criteria and benchmarks for establishing cost-effectiveness were used; therefore, the generalizability of these findings is limited. Third, some articles reported cost-effectiveness without reporting QALY associated with effectiveness, while few studies reported QALY associated with cost-effectiveness.

Table 1. Characteristics of 16 articles reviewed for economic evaluations of post-traumatic stress disorder patients' intervention

First author and year	Intervention	Country	Sample size	Time horizon	Cost per patient	QALYs	QALY gained	ICER
[32]	-MDMA-AT	USA	1000	30	$234, 636	14.179	4.856	Dominant
	-Control				$367,553	9.322		
				10	$128,711	6.603	2.163	Dominant
					$175,269	4,440		
				3.8	$61,210	2,757	0.887	Dominant
					$61,210	1,870		
[32]	-PE condition	Netherlands	149	1	$7888	0.778		
	-i-PE				$7153	0.805		
	STAIR + PE				$7125	0.794		
[34]	- 25% MDMA-AT	USA	3,523,049	10	$41,725	2.787	0.944	Dominant
	-Standard care				$72,664	1.842	1.707	Dominant
	-50% MDMA-AT				$75,502	5.034	2.318	Dominant
	Standard Care				$131,136	3.328		
	-75% MDMA-AT				$102,468	6.836		
	Standard Care				$178,254	4.518		
[35]	-Evidence-based telemedicine	USA	447	3.3	$1,240			
	-Standard Treatment				$1,840			
[35]	-Screen and treat intervention	UK	1000	5 years	$3,278	3.804	0.131	$9,382.373
	-standard care				$2,048	3.674		
[37]	-Transmural trauma care model	Netherland	140	9 months	$186	0.54 - 0.58		
	-Regular care				$194			
[23]	-CBT for PTSD (CBT-P)	USA	201	1 year	$29,530			$36,893
	-Breathing, retraining and psychoeducation intervention				$25,539			$33,523 to $158,914
[24]	-Telephone-Based concussion management problem solving therapy	USA	356	1 year	$1,027	0.015		$996
	-Education only				$32	0.020		
[38]	-Cognitive therapy intervention	UK	50	3	$633	0.1979	.0156	
	-Usual Care				$682	0.1823		$2601.9
[14]	-Telemedicine-based Collaborative care.	USA	265	1	$11,512			$185,565
	- Enhanced usual care				$9,544			
[15]	-Biopsychosocial intervention	Kosovo	31	1.5	$1,571	0.097		
	-Waiting list				$312	0.097		$1,202.42
[39]	-Smoking cessation	USA	943	1.5	$1,286	0.0259		$32 257
	-Standard care				$551			
	-No treatment			31	$0	11.59	-	-
	-Non-directive				$2,123	12.61	1.02	$2081.57
	counselling				$2,095	12.86	1.28	$1650.16
	-TF-CBT				$2,269	12.92	1.34	$1706.61
	-TF-CBT+SSRIs							
[39]	--Stepped care (SC)	USA	2642713	2	$436	1.0		$3428.71
	- Usual care (UC)				$1,517	1.0		$6857.68
[41]	-TF-CBT for adult	Australia	67	5	$16,000	1.0		
	-TF-CBT for children				$8,000	1.0		
	-SSRIs as pharmacological intervention				$200	1.0		
[35]	-Centrally assisted collaborative telecare	USA	666	1	$2,743	0.61	0.02	$49,346
	- Optimized usual care				$989	0.59		
[42]	- TF-CBT	OSLO	156	2		1.528	0.046	
	-Standard care					1.574		

Note. MDMA-AT: MDMA-assisted therapy; PE: Prolonged exposure, i-PE: Intensified PE; CBT: Cognitive Behavioural Therapy; STAIR: Skills training in affective and interpersonal regulation; CBT-P: CBT for PTSD; TF-CBT: Trauma focused CBT; SSRIs: Selective serotonin re-uptake inhibitors; QALLY: Quality-adjusted life year; ICER: Incremental cost-effectiveness ratio.

4. CONCLUSION

This review revealed a significant level of global evidence with respect to the cost-effectiveness and health benefits of economic evaluation studies of intervention programmes for PTSD patients. This study found that TF+CBT+SSRIs, PET, MDMA-AT, stepped care, screen and treat, and TTCM were cost-effective in

PTSD treatment when compared to usual care or other interventions. However, the literature emphasised that SSRIs should primarily be used for adult patients with PTSD. Interventions with longer periods of experimentation were economically cost-effective compared to interventions that lasted for a shorter period. In addition, this review revealed that the health benefits of these interventions, as measured by QALY, were positively correlated with interventions of longer durations, and the QALY gained due to interventions was not associated with the length of the period. This result has substantial practical implications for therapists, clinicians, psychologists, and policymakers. Adoption of these cost-effective intervention programmes for PTSD treatment would be profitable because it would lead to high net savings and benefits to the patients as well as society, with short payback periods. However, adoption of these identified intervention programmes should be done with caution since the efficacy of some of these programmes has not been established in the children's population or on other continents such as South America, Asia, and Africa.

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