



# Cost-Utility of Attachment-Based Compassion Therapy (ABCT) and Mindfulness-Based Stress Reduction (MBSR) in the Management of Depressive, Anxious, and Adjustment Disorders in Mental Health Settings: Economic Evaluation Alongside a Randomized Controlled Trial

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## Abstract

**Objectives** The main objective of this paper was to examine the cost-utility of attachment-based compassion therapy (ABCT) compared to Mindfulness-Based Stress Reduction (MBSR) and treatment-as-usual (TAU) on patients with depressive and/or anxious disorder, or adjustment disorder with depressive and/or anxious symptomatology in terms of effects on quality-adjusted life years (QALYs) as well as healthcare costs from a public healthcare system perspective.

**Method** A 6-month randomized controlled trial was conducted. Ninety Spanish patients with mental disorders (depressive, anxious, or adjustment disorders) received 8 weekly group sessions of TAU + ABCT, TAU + MBSR, or TAU alone. Data collection took place at pre- and 6-month follow-up. Cost-utility of the two treatment groups (ABCT vs MBSR vs TAU) was compared by examining treatment outcomes in terms of QALYs (obtained with the EQ-5D-3L) and healthcare costs (data about service use obtained with the Client Service Receipt Inventory).

**Results** Both MBSR and ABCT were more efficient than TAU alone, although the results did not reach statistical significance. Compared to ABCT, MBSR produced an increase both in terms of costs (€53.69, 95% CI [− 571.27 to 513.14]) and effects (0.004 QALYs, 95% CI [− 0.031 to 0.049]); ICUR = €13,422.50/QALY). Both interventions significantly reduced the number of visits to general practice compared to TAU.

**Conclusions** This study has contributed to the evidence base of mindfulness- and compassion-based programs and provided promising information about the cost-utility of MBSR for patients with emotional disorders. However, the small sample size and short follow-up period limit the generalizability of the findings.

**Preregistration** Clinicaltrials.gov; NCT03425487.

**Keywords** Mindfulness-Based Stress Reduction · Attachment-based compassion therapy · Cost-utility · Economic evaluation

Depressive and anxiety disorders are two of the most common mental disorders worldwide and are responsible for

substantial economic and social cost (Ferrari et al., 2022). Adjustment disorder, a stress-response syndrome, shares commonalities with depression and anxiety disorders and is also commonly diagnosed in clinical settings (Morgan et al., 2021; Zelviene & Kazlauskas, 2018). These disorders impact the individual quality of life and significantly increase health expenditure (i.e., direct costs), which together with the indirect costs (e.g., sick leave) results in high economic burden on society (Haller et al., 2014; Kan et al., 2021; Yang et al., 2021). For instance, the economic

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burden of adults with major depressive disorder in the USA in 2018 was US\$326.2 billion (Greenberg et al., 2021). In fact, it has risen significantly over time (Greenberg et al., 2003, 2015): US\$83.1 billion in 2000; US\$173.2 billion in 2005; and US\$236.6 billion in 2010.

Psychological therapy and/or pharmacotherapy are the recommended treatments for depressive, anxiety, and adjustment disorders (Bandelow et al., 2015; Cuijpers et al., 2013, 2020; O'Donnell et al., 2018). The challenge of national healthcare systems is to achieve a significant spread of psychotherapy provision, on which cost-utility studies are essential to determine the most efficient psychological treatments and reduce economic burden (Castelnuovo et al., 2016). Among the evidence-supported psychotherapies, cognitive behavioral therapy (CBT) gathers the highest scientific recognition, mainly due to the considerable number of studies supporting it (David et al., 2018). However, mindfulness-based programs (MBPs) have achieved a quite similar magnitude of scientific literature to CBT in barely four decades (Goldberg et al., 2022).

Concretely, the Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1982) program is the prototype from which most of MBPs have evolved (Creswell, 2017). It was originally introduced for chronic pain treatment, though it has also shown effectiveness for treating depression, anxiety, and stress in people with other somatic health problems (e.g., musculoskeletal pain), mental health problems (e.g., mood and anxiety disorders, stress related problems), and general population, especially in mental health settings (Creswell, 2017; de Vibe et al., 2012). Mindfulness training within MBSR mainly relies on meditative practices that improve processes related to attention regulation (e.g., body awareness practices; Dahl et al., 2015). In contrast, other meditation-based interventions focus on a different type of meditative practices, i.e., compassion and loving kindness meditations (Brito-Pons et al., 2018; Kirby, 2017).

Recent meta-analyses have shown that compassion-based programs (CBPs) have promising effectiveness for treating depression, anxiety, and psychological distress (Ferrari et al., 2019; Kirby et al., 2017). An example is the Attachment-Based Compassion Therapy (ABCT; García-Campayo et al., 2016), an 8-week intervention grounded in attachment theory, Buddhist contemplative tradition, and previous CBPs (e.g., Compassion-Focused Therapy) and therapies (e.g., Acceptance and Commitment Therapy). It has shown effectiveness for increasing self-compassion in a non-randomized controlled trial with general population (Navarro-Gil et al., 2020) and reducing psychological impairment and inflammatory biomarkers in a randomized controlled trial with fibromyalgia patients (Montero-Marín et al., 2018; Montero-Marín et al., 2019a, 2019b). Lastly, ABCT has proved to be as efficacious as MBSR at reducing psychological distress

in patients with depressive, anxiety, or adjustment disorders from mental health settings (Collado-Navarro et al., 2021).

In contrast to the extensive evidence about the efficacy of mindfulness- and compassion-based programs, studies about the efficiency of these protocols are still scarce and no firm conclusions can be reached on this topic (de Vibe et al., 2012; Duarte et al., 2018). For instance, Knight et al. (2015) showed in a prospective study that 1730 patients who underwent the MBSR program significantly decreased the utilization of healthcare during the next year compared to matched cases. In addition, ABCT was more cost-effective than relaxation therapy in fibromyalgia patients for the Spanish healthcare system (D'Amico et al., 2020). However, further studies are needed to assess the efficiency of these programs, which would enable investing economical resources in the most cost-effective approach (de Vibe et al., 2012; Wilkinson et al., 2016).

The objective of this study was to examine the 6-month cost-utility of ABCT compared to MBSR and treatment as usual (TAU) in terms of gains in quality-adjusted life-years (QALYs) from a healthcare perspective in patients with depressive, anxiety, and/or adjustment disorders from mental health settings. Both ABCT and MBSR were expected to be more cost-effective added to TAU than TAU alone. No a priori hypothesis was established about the comparison among the active treatments.

## Method

### Participants

The initial screening for participants included 104 individuals, 90 of which met the selection criteria (a detailed description of these criteria is presented later within this section). In terms of sociodemographic and clinical characteristics of the participants, we could not observe any statistically significant difference across the three treatment arms at baseline (Table 1). This set of participants was randomly allocated to the three treatment groups: 30 receiving ABCT, 30 receiving MBSR, and 30 receiving TAU as standalone treatment. The attrition rate was reasonable since 23 participants (77%) from the ABCT arm, 21 participants (70%) from the MBSR arm, and 25 (83.3%) from the TAU arm completed the 6-month follow-up assessment, respectively. We did not observe any selective dropout.

In order to be admitted in the study, prospective participants had to meet the following criteria: (1) having an age range within the threshold 18–75 years old; (2) presenting a depressive and/or anxious disorder, or an adjustment disorder with depressive and/or anxious symptomatology (based on the DSM-5 criteria); (3) the depressive/anxious disorder should have a mild-to-moderate severity according

**Table 1** Baseline sociodemographic and clinical features of participants by study arm

Characteristics	TAU + ABCT ( <i>n</i> = 30)	TAU + MBSR ( <i>n</i> = 30)	TAU ( <i>n</i> = 30)	<i>p</i>
Gender, % female	27 (90)	25 (83.3)	26 (86.7)	0.93
Age (M, SD)	46.83 (10.84)	44.30 (12.50)	47.90 (10.9)	0.46
Marital status, % with partner	20 (66.7)	22 (73.3)	19 (63.4)	0.77
Dwelling, % own home	22 (73.3)	22 (73.3)	20 (66.7)	0.83
Educational level				0.41
No studies	2 (6.7)	1 (3.3)	0 (0.0)	
Primary	11 (36.7)	8 (26.7)	15 (50.0)	
Secondary	12 (40.0)	13 (43.3)	8 (26.7)	
University	5 (16.7)	8 (26.7)	7 (23.3)	
Work status				0.25
Housework	8 (26.6)	2 (6.7)	6 (20.0)	
Student	2 (6.7)	2 (6.7)	0 (0.0)	
Employed	11 (36.7)	14 (46.5)	10 (33.3)	
Sick leave	2 (6.7)	5 (16.7)	1 (3.3)	
Unemployed	3 (10.0)	2 (6.7)	4 (13.4)	
Retired/pensioner	4 (13.3)	5 (16.7)	9 (30.0)	
Time on treatment, <i>n</i> (%)				0.82
< 2 months	4 (13.3)	6 (20.0)	5 (16.7)	
2 months to 1 year	6 (20.0)	7 (23.3)	9 (30.0)	
> 1 year	20 (66.7)	17 (58.6)	16 (53.3)	
Type of treatment, <i>n</i> (%)				0.70
Psychological	10 (33.3)	14 (46.5)	12 (40.0)	
Psychiatric	10 (33.3)	6 (20.2)	10 (33.3)	
Psychological and Psychiatric	10 (33.3)	10 (33.3)	8 (26.7)	
Diagnosis, <i>n</i> (%)				0.26
Depression	7 (23.3)	5 (16.7)	9 (30.0)	
Anxiety	9 (30.0)	14 (46.5)	7 (23.3)	
Adaptive	9 (30.0)	8 (26.7)	13 (43.3)	
Mixed	5 (16.7)	3 (10.0)	1 (3.3)	

ABCT Attachment-Based Compassion Therapy, MBSR Mindfulness-Based Stress Reduction, NMW national minimum wage, TAU treatment-as-usual; data are presented as mean (SD) or *n* (%); *p*: *p*-value associated with the comparison

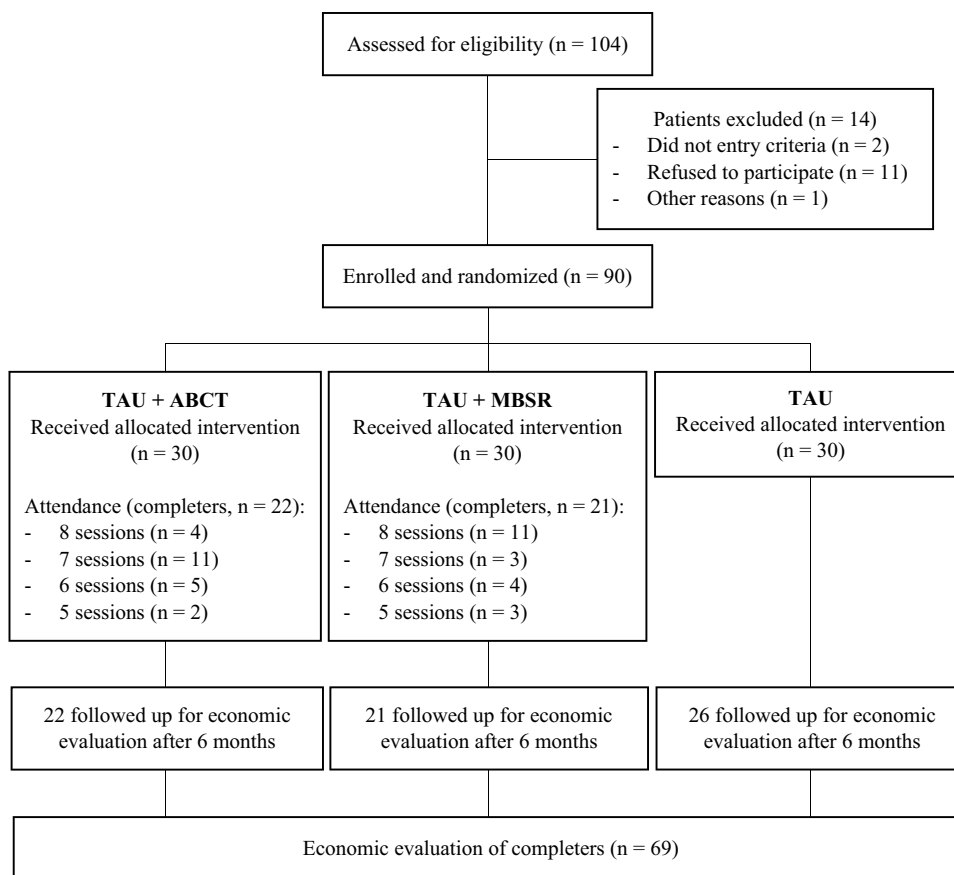
to the clinical criteria; (4) being fluent in Spanish; and (5) having signed an informed consent form. Exclusion criteria included (1) having done any type of meditative or contemplative practice within the previous 12 months; (2) presence of any diseases that could affect the central nervous system; (3) presence of any other psychiatric diagnoses or acute psychiatric illnesses; (4) diagnosis of any medical condition or infectious or degenerative disease that could affect mood; and (5) presence of delusional ideas or hallucinations. Diagnoses were conducted by psychiatrists or psychologists using the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition Research Version 5 (First et al., 2015). In terms of compliance with the assigned treatments, 73% of ABCT participants and 60% of MBSR participants attended six or more sessions. Figure 1 shows the flow of participants through the economic evaluation.

## Procedure

The study protocol was approved by the Ethics Committee of the General University Hospital of Castellón (7/2017). All procedures performed in this study were in accordance with the criteria of the 1964 Declaration of Helsinki and the Declaration of Madrid of the World Psychiatric Association. Confidentiality of participants' personal information was protected under the Spanish Organic Law on Protection of Personal Data and Guarantee of Digital Rights (3/2018, LOPD-GDD) and under all relevant EU legislation on privacy and data protection.

A detailed description of the randomized controlled trial (RCT) protocol is provided elsewhere (Montero-Marin et al., 2019b). In brief, the RCT study includes three treatment groups, assessed at baseline, at post-intervention, and at 6-month follow-up assessment. Potential participants have

**Fig. 1** Flowchart of participants in the economic evaluation.  
Note: ABCT, attachment-based compassion therapy; MBSR, Mindfulness-Based Stress Reduction; TAU, treatment-as-usual



been recruited by mental health professionals between September 2018 and February 2019. Once the required sample size was achieved, the participants were interviewed at the mental health unit by a clinical psychologist, who confirmed suitability according to the aforementioned selection criteria. Participants received a general overview of the study and were informed of the option to withdraw from the study at any time without it affecting the quality of the usual care. An independent statistician computed a simple randomization sequence after baseline evaluation. Written informed consent was obtained from all participants included in the study before randomization. Then, participants were allocated to treatment-as-usual (TAU) + ABCT, TAU + MBSR, or TAU alone using a parallel assignment and a computer-generated randomization list.

As mentioned, both ABCT and MBSR were administered in addition to treatment as usual (TAU) as provided by healthcare professionals of the public Spanish National Health System. TAU included the usual health and social care that would be delivered by the Spanish NHS, which for patients with anxious-depressive disorders usually consists of pharmacological treatment (mainly psychotropic medications) plus some psychological counseling (delivered by a psychiatrist or a clinical psychologist) using classical CBT as general framework.

The economic evaluation alongside this pilot RCT was conducted according to the CHEERS statement (Husereau et al., 2013) and the Good Research Practices for Cost-Effectiveness Analysis Alongside Clinical Trials (Ramsey et al., 2015). Efficacy results of this RCT (registered in Clinicaltrials.gov; NCT03425487) have been reported elsewhere (Collado-Navarro et al., 2021).

Participants underwent the MBSR protocol developed at the University of Massachusetts Medical School, USA, consisting of 8 weekly 2-hr-long group sessions of mindfulness training. MBSR was developed to help people with chronic pain and stress-related conditions (Kabat-Zinn, 1982). To avoid exhaustion or withdrawal from the study and to make it structurally equivalent to ABCT, session duration and daily homework assignments were slightly shortened: sessions took 2 hr instead of 2.5 hr and daily homework assignments took approximately 15–20 min. The half-day of silent MBSR retreat between sessions 6 and 7 was discarded in this study. Both the group and the homework sessions included elements of MBSR practice such as body scan, sitting meditation, and mindful movements/stretching, with the purpose of helping patients to relate to their physical and psychological symptoms conditions in more accepting and non-judgmental ways. The MBSR instructor was a psychologist with accredited

experience who delivered the intervention using a group format (up to 10–15 participants per group).

ABCT is a compassion-based program focused on augmenting the patients' ability to be considerate and kind towards (i) themselves and their own suffering experience, and (ii) others' experience of suffering (García-Campayo et al., 2016). ABCT comprises 8 weekly 2-hr sessions. It includes formal practices of mindfulness and visualizations based on self-compassion and the attachment style that was generated in childhood. Specific practices oriented to augment the patients' ability to be considerate and kind towards themselves and their own experience of suffering as well as others' experience of suffering are included. The program includes daily homework assignments that take approximately 15–20 min to complete. The instructor was a psychologist with accredited experience in ABCT who delivered the intervention using a group format (up to 10–15 participants per group).

## Measures

**Sociodemographic-clinical questionnaire** It collected the following information: gender (male, female), age, marital status (single, with partner), dwelling (own or others' home), education level (no studies, primary, secondary, university), work status (housework, student, employed, sick leave, unemployed, retired/pensioner), economic status (according to the National Minimum Wage in Spain), and personal medical history (time on treatment, type of treatment).

**The EuroQoL (EQ-5D-3L)** It is a measure of health-related quality of life (HRQoL) which is made of two components (Rabin & de Charro, 2001): the first component is based on a five-domain descriptive system evaluating level of mobility, self-care, usual activities, pain-discomfort, and anxiety-depression. Each domain can be categorized at three levels: “no problems” (Level 1), “some problems” (Level 2), and “extreme problems” (Level 3). Combinations of these categories define a total of 243 unique health states. The second component captures the current subject's health on a Visual Analogue Scale (0 to 100), where the respondent can self-report their current health status, where 100 is the best possible health level. The scores collected in this study are based on the Spanish version (Badia et al., 1999).

**The Client Service Receipt Inventory-Spanish Version** The Client Service Receipt Inventory (CSRI) Spanish version used here was developed to collect retrospective data related to medications and service use (Vázquez-Barquero et al., 1997). Information about medication use includes the name of the prescribed drug, the prescriber, the dosage level, the total number of prescription days, the daily dosage consumed, the reasons for changing the drug (when applicable),

and adherence to the drug treatment. In relation to health and social care service services use, collected information includes emergency services (number of total visits), general medical inpatient hospital admissions (total days), and outpatient healthcare services (number of total visits to GP, nurses, social workers, psychologists, etc.). Additional notes recorded whether services were being provided by the public or by the private sector. Finally, the CSRI also collected information about the type and number of diagnostic tests administered. The CSRI was administered to the participants of the study on two occasions (at baseline and at 6-month follow-up) with different timeframes: retrospectively for 1 year at baseline and the retrospectively for 6 months at follow-up. Baseline costs are helpful in detecting and in adjusting for any unbalance between groups.

## Data Analyses

Healthcare costs have been computed by summing up the costs derived from medication, medical tests, use of health-related services, and cost of the staff delivering ABCT and MBSR. Medication costs have been computed using prices per milligram as available in the Vademecum International (Red Book; edition 2020), which included value-added taxes. Those unit prices per milligram have been multiplied by the daily dosage used (in milligrams) and the number of days that the treatment was received. The main source of the unit cost data for medical tests and health services use was the SOIKOS database (<http://esalud.oblikue.com/>). The calculation of the total costs of the ABCT and MBSR treatments was based on the price per participant per group session of a clinical psychologist, as indicated by the Spanish Official College of Psychology. The cost of both treatments was assumed to be consistent across all sessions and groups, but the number of patients attending those sessions was not. Therefore, treatment costs were dependent on the number of sessions attended by each patient. Unit costs are expressed in Euros (€) based on 2020 prices. Table 2 shows the unit costs of healthcare resources. It was not necessary to apply a discount factor to the costs because the time horizon was less than a year.

Utility scores were obtained from the EQ-5D-3L following the methods described by previous studies (Devlin et al., 2020; Rabin & de Charro, 2001) and were computed to rate patients' HRQoL from 0 (*as bad as death*) to 1 (*perfect health*). These scores reflect how the general population values the health status described by the individual, which is preferred for economic evaluations from a broad perspective. Quality-adjusted life years (QALYs) were calculated using the methods described in Richardson and Manca (2004): the baseline and follow-up utility scores, obtained after applying the Spanish tariffs to the participants' answers to the EQ-5D-3L, were added and divided by 2, and then multiplied by

**Table 2** Unit costs used in the calculations of direct costs (financial year 2020; values in €)

Service (unit)	Costs (€)	
Healthcare	General practitioner (per appointment)	39.26
	Nurse/psychiatric nurse (per appointment)	36.24
	Social worker (per appointment)	37.99
	Clinical psychologist (per appointment)	48.39
	Psychiatrist (per appointment)	48.39
	Other medical specialists (per appointment)	46.53
	Accident and emergency in hospital (per attendance)	105.50
	Hospital stay (per night)	118.94
	Diagnostic tests (range)	6.51–483.77
	Pharmacological treatment (per daily dose)*	Various
	MBSR and ABCT (per person, the complete program regardless of their attendance) <sup>†</sup>	250

Unit costs were applied to each resource use to compute the total cost of resources used by each participant. All unit costs were for the year 2020

\*The cost of prescribed medications was calculated by determining the price per milligram according to the Vademecum International (Red Book; edition 2020) and included the value-added tax

<sup>†</sup>The cost of ABCT is established by the University of Zaragoza, where the program was originally developed. In the case of MBSR, considering that for this study we used a shorter version (2 hr instead of 2.5 hr per session and excluding the full-day retreat of mindfulness practice) than the original, the cost has been lowered (€350 according to *Instituto esMindfulness*) and equated to that of ABCT, since both programs share the same exact dose in the present study

0.5, as the timeframe of the study was half a year. QALYs are a measure which takes into account both disease-burden and mortality and can be used to provide a common metric to assess the extent of the benefits gained from different treatments in terms of HRQoL and survival for the patient. A QALY places a weight on time in different health states. A year of perfect health is worth 1 and a year of less than perfect health is worth less than 1.

We computed incremental cost-utility ratios (ICURs), defined as the ratio between incremental costs and incremental effects (QALYs). In the cost-utility analysis, incremental costs and incremental effects were estimated computing Seemingly Unrelated Regressions (Willan et al., 2004). Using this methodology, cost and outcome measures were included in a bivariate system that implemented a regression of costs and QALYs on treatment allocations, i.e., whether they were assigned to TAU+ABCT, TAU+MBSR, or TAU. As usual, when a treatment was clinically superior and cost saving, it was referred to as a “dominant” (vs. dominated) intervention (Cohen & Reynolds, 2008). The regressions controlled for the following baseline variables: treatment group, gender, age, marital status, living arrangements, education level, work status, and number of treatment sessions attended. Estimates were run using 1000 bootstrap replications to address a possible skewness in the distribution of the dependent variables (Briggs et al., 1997). We conducted a complete case analysis (21 patients without 6-month follow-up data were excluded). Statistical analyses were carried out using SPSS v26.0 and STATA v16.0.

## Results

Table 3 displays the estimated total mean direct health-related costs per patient over a period of 1 year (baseline) and over a period of 6 months (follow-up). The last columns of Table 3 present the *p*-values of the Wald test. The test is adjusted for the main socio-demographic variables and for the number of treatment sessions attended. At baseline, there were no statistically significant differences in direct costs nor outcome between the treatment groups.

At follow-up, the adjusted *p*-value shows that there were statistically significant differences in primary healthcare services costs between TAU and both TAU + ABCT and TAU + MBSR ( $p = 0.04$ ), showing TAU participants the higher use of primary healthcare services. No other statistically significant differences were found between the two treatment groups with regard to the mean total direct costs per patient at follow-up, nor was there a statistically significant difference in QALYs between the groups. The EQ-5D utility scores for the TAU + MBSR and TAU + ABCT groups showed improvement during the study period but did not differ significantly between the groups.

As shown in Table 4, TAU + MBSR obtained “dominant” ICURs for direct medical costs per QALY gained. Concretely, TAU + MBSR participants showed a tendency towards lower direct medical costs (€ − 14.77; 95% CI [− 463.55 to 564.23]) and better incremental outcomes compared to TAU (0.014 QALY; 95% CI [− 0.012 to 0.05]); compared to TAU + ABCT, the incremental effect also

**Table 3** Mean (*SD*) costs and outcomes in each study group

Baseline ( <i>n</i> = 90)	TAU + ABCT ( <i>n</i> = 30)	TAU + MBSR ( <i>n</i> = 30)	TAU ( <i>n</i> = 30)		
Time frame: last 12 months	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>p</i>	<i>adj p</i>
Costs (€)					
Primary healthcare services	645.8 (1018.4)	533.4 (579)	515 (414.4)	0.81	0.91
Specialized healthcare services	947.4 (602.4)	1035.3 (1282.7)	764.8 (496.9)	0.35	0.72
Medical tests	279.1 (396.4)	347.6 (633.4)	313.9 (418.8)	0.86	0.38
Medications	419.2 (952.0)	434.8 (892.2)	140.9 (262.1)	0.08	0.27
Direct costs	2291.5 (1814.1)	2351.1 (2551.1)	1734.6 (957.5)	0.22	0.98
Outcomes					
EQ-5D Utility score	0.62 (0.20)	0.58 (0.23)	0.60 (0.19)	0.73	0.32
Follow-up ( <i>n</i> = 69)	TAU + ABCT ( <i>n</i> = 22)	TAU + MBSR ( <i>n</i> = 21)	TAU ( <i>n</i> = 26)		
Time frame: last 6 months	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>p</i>	<i>adj p</i>
Costs (€)					
Primary healthcare services	136.8 (214.2)	135.7 (213.7)	222 (220.1)	0.13	0.04
Specialized healthcare services	327.4 (186.1)	384.3 (407.4)	330.8 (472.4)	0.86	0.15
Medical tests	139.1 (207.2)	145 (223.9)	158.8 (214)	0.72	0.39
Medications	94.3 (220.1)	90.1 (141.8)	74.6 (134.3)	0.91	0.95
Programs (MBSR–ABCT)	250 (0)	250 (0)	0.0 (0.0)	-	-
Direct costs	822.7 (552.2)	880.1 (690.5)	786.1 (630)	0.88	0.80
Outcomes					
EQ-5D Utility score	0.66 (0.19)	0.67 (0.21)	0.59 (0.21)	0.39	0.92
QALY (based on EQ-5D utility score)	0.32 (0.10)	0.31 (0.10)	0.29 (0.10)	0.71	0.97

**Table 4** Incremental cost, effect, and cost-effectiveness ratios from the healthcare perspective, based on the regression results from the seemingly unrelated regression analysis

Completers ( <i>n</i> = 69)	<i>Incremental cost</i>	<i>Incremental effect</i>	ICUR
	Mean (95% Bootstrap CI)	Mean (95% Bootstrap CI)	
<b>TAU + MBSR vs. TAU</b>	<b>-14.77 [-463.55 to 564.23]</b>	0.014 [-0.012 to 0.057]	<b>TAU + MBSR dominant</b>
<b>TAU + ABCT vs. TAU</b>	<b>-68.46 [-422.28 to 583.24]</b>	0.009 [-0.032 to 0.061]	<b>TAU + ABCT dominant</b>
<b>TAU + MBSR vs. TAU + ABCT</b>	<b>53.69 [-571.27 to 513.14]</b>	0.004 [-0.031 to 0.049]	<b>ICUR = €13,422.50/QALY<sup>†</sup></b>

Significant values ( $p < 0.05$ ) in bold. Incremental cost-utility ratios (ICURs) are cost (in €)/QALY points gained

<sup>†</sup>This value should be considered explorative since both the incremental costs and the incremental effect showed statistically not significant values

favored TAU + MBSR (0.004 QALY; 95% CI [-0.031 to 0.049]), while this intervention also increased the costs (€53.69; 95% CI [-571.27 to 513.14]). The ICUR was established at €13,422.50/QALY, although the results were not statistically significant (confidence intervals included 0).

Regarding TAU + ABCT, its participants showed a statistically non-significant tendency towards lower direct medical costs compared to TAU (€ - 68.46; 95% CI [-422.28 to 583.24]), as well as a non-significant positive incremental effect (0.009 QALY; 95% CI [-0.032 to 0.061]).

## Discussion

In the present study, we reported the cost-utility of ABCT, MBSR, and TAU on patients with depressive, anxious, and/or adjustment disorder from the public healthcare system perspective in the context of a 6-month RCT, expecting that the two active programs (i.e., ABCT and MBSR) would be cost-effective compared to the inactive control group. Firstly, regarding the costs, the findings support our hypothesis, since participants who underwent MBSR and ABCT in addition to TAU showed statistically significant

lower costs related to primary healthcare services than participants who received TAU alone during the treatment period and the next 4 months. Additionally, MBSR as a coadjutant in the treatment of depressive, anxious, and/or adjustment disorder patients presented a tendency to increased quality of life compared to the other two study groups, which suggests that MBSR might be the best option for healthcare systems in terms of cost-utility compared to ABCT and TAU alone, though the lack of statistical significance in this result does not permit any definite conclusions to be drawn.

These results are in line with the study of Knight et al. (2015), in which MBSR participants showed a statistically significant decrease of healthcare utilization at a 1-year interval. Similarly, Kurdyak et al. (2014) showed that the implementation of mindfulness-based cognitive therapy (MBCT) reduced non-mental health service utilization of individuals who were high primary care utilizers also at a 1-year interval. Therefore, the effectiveness of these “first-generation” MBPs on individuals’ psychological functioning may reduce their need of healthcare utilization. This is especially true for MBSR, taking into account the higher amount of empirical studies, but also possibly MBCT.

Regarding ABCT, our results suggest a tendency to increase quality of life while reducing costs in comparison to TAU. In a previous study, D’Amico et al. (2020) reported that ABCT was clearly more cost-effective than a relaxation intervention for fibromyalgia patients from a healthcare system perspective. In the present study, ABCT resulted in reduced costs compared to MBSR, but this latter increased quality of life; these findings suggest that MBSR might be more cost-effective than ABCT, although they are based on statistically not significant results, and therefore more studies are required. To our knowledge, these are the only two studies of compassion-based programs reporting cost-effectiveness analyses up to now. However, recently published controlled trial protocols promise more information about this field (e.g., Campos et al., 2020; Finlay-Jones et al., 2020).

Overall, the knowledge about the economic evidence of MBPs and CBPs is limited, and more well-designed studies are needed to expand it (Duarte et al., 2018). It has been more than 40 years since Kabat-Zinn (1982) opened the floor for mindfulness teachings in Western psychology. After hundreds of RCTs suggesting a considerable effectiveness evidence of MBPs (Goldberg et al., 2022), extra efforts should be made to know, additionally, how efficient they are. In parallel, the number of effectiveness studies of CBPs is substantially lower than that for MBPs (Ferrari et al., 2019; Kirby et al., 2017), as is the number of studies examining the efficiency of those programs, an issue in which there is much more to discover.

## Limitations and Future Research

The findings of the present study should be considered preliminary and interpreted in the light of the following limitations. First, the small sample size limits the precision of the findings, so they need replication in large samples. Second, our analyses are only based on data collected through self-report measures (EQ-5D-3L for assessing quality of life and CSRI for medical costs), a procedure that implies a recall bias. Third, there is a shortage of psychotherapists certified in MBSR and ABCT or sufficiently experienced to deliver such programs in the Spanish healthcare system to teach MBSR and ABCT which limits the implementation of both protocols in real world clinical practice. Lastly, our sample mainly comprised middle-aged women from Spain, which limits the generalizability of the findings to other European countries. Future research should test the efficiency of these programs with larger samples and include data from public registers (e.g., service use). In addition, longer follow-up periods would increase knowledge about how much time remain these effects on healthcare utilization.

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**Data Availability** For transparency and analytical reproducibility purposes, SPSS data can be accessed at OSF: <https://osf.io/xjn9y>.

## Declarations

**Ethics Statement** The study followed the Helsinki Convention norms and subsequent updates. The study protocol was approved by the Ethics Committee of the General University Hospital of Castellón (7/2017). All procedures performed in this study were in accordance with the criteria of the 1964 Declaration of Helsinki and the Declaration of Madrid of the World Psychiatric Association. The confidentiality of participants was protected by the Spanish Organic Law on Protection of Personal Data and Guarantee of Digital Rights (3/2018, LOPD-GDD), and all relevant EU legislation on privacy and data protection.

**Informed Consent** Freely given, written informed consent to participate in the study was obtained from participants.



**Conflict of Interest** The authors declare no competing interests.

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