Article

Predictors and Moderators of Panic Disorder: Cognitive Behavioral Therapy vs. Acceptance and Commitment Therapy

Leticia León-Quismondo[1], Alberto Fernández-Liria[2,3], Francisca López-Ríos[4], Jerónimo Saiz-Ruiz[1,3], José M. García-Montes[4], Ángela Ibáñez[1,3], Bryan J. Stiles[5] and Guillermo Lahera[2,3]

1 Ramón y Cajal University Hospital (Spain)
2 Príncipe de Asturias University Hospital (Spain)
3 University of Alcalá (Spain)
4 University of Almería (Spain)
5 The University of North Carolina at Chapel Hill (USA)

ABSTRACT

Background: Understanding variables that influence therapy outcomes can improve the results of interventions and reduce socio-health costs. The current study examined possible predictors and moderators of outcome (age, gender, duration of panic disorder, motivation to change, conscientiousness, and experiential avoidance) in Cognitive Behavioral Therapy (CBT) and Acceptance and Commitment Therapy (ACT). **Method:** Eighty participants with a diagnosis of panic disorder, 56 women and 24 men, with an average age of 38 years, received 12 group sessions of CBT or ACT. They were assessed with several measures at pre-treatment, post-treatment, and 3-month follow-up. **Results:** CBT outperformed ACT among older subjects, men, and those with a shorter duration of panic disorder. ACT outperformed CBT among younger subjects, women, and those with a long duration of panic disorder. In general, the greatest improvements in both CBT and ACT were in older subjects, women, those with a long duration of panic disorder, those in the contemplation stage, and those with high experiential avoidance. **Conclusions:** Although future studies are necessary, there appear to be predictors and moderators of the effectiveness of CBT and ACT. Taking these variables into account can help improve treatment for people with panic disorder.

Predictores y Moderadores del Trastorno de Pánico: Terapia Cognitivo Conductual vs. Terapia de Aceptación y Compromiso

RESUMEN

Antecedentes: Conocer las variables que influyen en el resultado de las terapias puede mejorar los resultados y reducir el coste sociosanitario. Se examinaron posibles predictores y moderadores de resultado (edad, género, duración del trastorno de pánico, motivación al cambio, responsabilidad y evitación experiencial) en Terapia Cognitivo Conductual (TCC) y Terapia de Aceptación y Compromiso (ACT). **Método:** Ochenta participantes con trastorno de pánico, 56 mujeres y 24 hombres, con una edad media de 38 años, recibieron 12 sesiones grupales de TCC o ACT. Fueron evaluados con varias medidas antes, después del tratamiento y en un seguimiento a los tres meses. **Resultados:** TCC superó a ACT entre las personas mayores, hombres y con menor duración del trastorno de pánico. ACT superó a TCC entre los más jóvenes, mujeres y con mayor duración del trastorno. En general, las mujeres de mayor edad, con trastorno de pánico de larga duración, en etapa de contemplación y con una alta evitación experiencial mejoraron más, tanto en TCC como en ACT. **Conclusiones:** Aunque son necesarios futuros estudios, parecen existir predictores y moderadores de la efectividad de TCC y ACT. Tener en cuenta estas variables puede ayudar a mejorar el tratamiento de las personas con trastorno de pánico.

Panic disorder involves episodes of sudden fear, with symptoms such a palpitations and fear of dying, affecting 2-3% of people annually, more often women. It often starts with a "false alarm" panic attack, leading to fear of further attacks and avoidance behaviors, impacting daily activities (American Psychiatric Association, 2013; Barlow, 2002).

Panic disorder is often highly comorbid with other mental and personality disorders (Plana-Ripoll et al., 2019). It tends to be chronic, with only 30% achieving full remission (Bilet et al., 2020), and significantly reduces quality of life (Skapinakis et al., 2011). It incurs higher economic costs than other disorders and results in increased use of emergency and medical services (Bandelow & Michaelis, 2015).

Cognitive Behavioral Therapy (CBT) is the most commonly recommended treatment for panic disorder, supported by meta-analyses, systematic reviews, and high-quality clinical trials, as noted in the Clinical Practice Guidelines of the Spanish National Health System (Fonseca-Pedrero et al., 2021), and the American Psychiatric Association (American Psychiatric Association, 2009). The cognitive-behavioral model attributes panic attacks to distorted interpretations of bodily sensations, escalating anxiety and arousal (Manfro et al., 2008). CBT targets these misinterpretations through psychoeducation, relaxation, cognitive restructuring, and exposure therapies to reduce symptoms and agoraphobia (Otto & Deveney, 2005). Numerous studies have shown that CBT is more effective than placebo, waiting lists, relaxation, or drug therapy (McCabe & Gifford, 2009; Tolin, 2010), with 70-80% of people achieving panic-free rates (Hofmann et al., 2012). However, about 25% do not respond successfully, relapse, or need further treatment (Hofmann et al., 2012), and dropout rates are 15-25% (White et al., 2010). Consequently, new therapies such as Acceptance and Commitment Therapy (ACT) have emerged (Hayes et al., 1999).

ACT has somewhat more limited evidence than CBT, based on cohort or case-control studies with a low risk of bias and moderate probability of establishing a causal relationship, according to the Clinical Practice Guidelines of the Spanish National Health System (Fonseca-Pedrero et al., 2021). ACT focuses on experiential change, promoting acceptance of symptoms and thoughts as transient, and fosters awareness and non-judgmental acceptance of thoughts as mere mental phenomena, unlike CBT which modifies cognitive interpretations (Hayes, 2004). Despite being a recent therapy, there is evidence that ACT is more effective than placebo, waiting lists, or usual treatments (Ruiz, 2010), and effective for panic disorder (Gloster et al., 2015). Randomized clinical trials compared ACT and CBT, showing equivalent improvements in symptoms, anxiety sensitivity, worry, fear, quality of life, satisfaction, and functioning (Arch et al., 2012; Forman et al., 2007).

In recent years, there has been growing interest in individualized psychotherapy, aiming to tailor treatments to specific person characteristics to enhance effectiveness (Kraemer et al., 2006). Understanding predictors and moderators is crucial, with predictors indicating who might generally respond better to treatments, and moderators identifying who benefits more from one type of treatment (Wolitzky-Taylor et al., 2012).

Studies on predictors and moderators in anxiety disorders show mixed results. Baseline symptom severity did not predict outcomes for CBT and ACT (Wolitzky-Taylor et al., 2012). CBT was slightly superior to Mindfulness-Based Stress Reduction

(MBSR) at medium severity levels, but MBSR was superior at high severity (Arch & Ayers, 2013). High depressive symptoms or comorbid mood disorders predicted better outcomes with ACT or MBSR, while low depressive symptoms or no mood disorders favored CBT (Arch & Ayers, 2013; Wolitzky-Taylor et al., 2012). Comorbidity with depression led to worse outcomes in CBT and ACT for social phobia, but comorbid anxiety showed no predictive effect (Craske et al., 2014; Wolitzky-Taylor et al., 2012). Studies have shown that cognitive factors like anxiety sensitivity affect therapy outcomes differently. CBT was more effective than ACT for moderate anxiety sensitivity, but similar for low and high levels. In ACT, outcomes were consistent across all anxiety sensitivity levels (Wolitzky-Taylor et al., 2012). Conversely, MBSR performed better than CBT at moderate levels, while CBT was more effective at low and high levels of anxiety sensitivity (Arch & Ayers, 2013). Another cognitive factor is catastrophizing cognitions, showing high levels in panic disorder respond better to breathing training, while low levels favor Cognitive Therapy (Meuret et al., 2010). For high experiential avoidance, some studies find ACT superior to CBT (Davies et al., 2015), while others find CBT superior to ACT (Craske et al., 2014; Wolitzky-Taylor et al., 2012), possibly due to different measurement methods (Schneider et al., 2015). High neuroticism predicts worse outcomes in both CBT and ACT (Wolitzky-Taylor et al., 2012). Sociodemographic factors like age, race, or gender do not clearly influence treatment efficacy (Craske et al., 2014; Wolitzky-Taylor et al., 2012).

Recent studies have developed treatments like the Unified Protocol for transdiagnostic treatment (Barlow et al., 2010) and the PsicAP protocol (González-Blanch et al., 2018) for emotional disorders, showing efficacy comparable to CBT in clinical trials and meta-analyses (Cassiello-Robbins et al., 2020; Norton & Roberge, 2017; Osma et al., 2018).

Understanding variables affecting therapy results enhances clinical decision-making, improves intervention effectiveness, and lowers burnout and healthcare costs. Most of the existing studies on moderators and predictors comparing two forms of psychotherapy analyze persons with mixed anxiety disorders. However, the present study intends to be specific to panic disorder. In addition, the available literature primarily uses an individual therapy format, although it shows comparable effectiveness between individual and group CBT (Başaran & Sütcü, 2016). While research on ACT is limited, no definitive studies have compared the efficacy of individual versus group modalities. Our study utilized group therapy, found to be more time- and cost-efficient, aligning with earlier findings (Başaran & Sütcü, 2016).

The specific objectives of this study were (a) identify predictors of greater effectiveness for both CBT and ACT, (b) determine moderators that predict greater effectiveness of CBT or ACT, and (c) analyze the results at post-treatment and 3-month follow-up.

Predictor and/or moderator variables analyzed included potentially underexplored factors, such as age, gender, duration of panic disorder, motivation to change, conscientiousness, and experiential avoidance.

The hypotheses (H) proposed that: (H1) Age is a moderator of the effectiveness of the therapies; (H2) Gender is a predictor of effectiveness in both CBT and ACT; (H3) Duration of panic disorder is a moderator of the effectiveness of the therapies; (H4) Motivation for change is a predictor of effectiveness in both CBT

and ACT; (H5) Conscientiousness is a predictor of effectiveness in both CBT and ACT; (H6) Experiential avoidance is a moderator of the effectiveness of the therapies.

Method

Participants

Based on previous studies (Mesri et al., 2017; Meuret et al., 2010; Niles et al., 2013), it was estimated that at least 60 participants, 30 per treatment, are needed to detect significant differences between groups, assuming a 25% dropout rate and a 5% significance level ($\alpha=0.05$).

Participants were eligible for the study if they (a) met DSM-5 criteria (American Psychiatric Association, 2013) for the diagnosis of panic disorder, evaluated through the Spanish adaptation of the standardized interview *Mini International Neuropsychiatric Interview 5.0.0 (M.I.N.I.)* (Ferrando et al., 2000); (b) were between 18 and 65 years of age; (c) were either medication-free or no change in the last month; and (d) were not undergoing other psychotherapy.

Exclusion criteria included: (a) primary diagnosis of a disorder other than panic disorder; (b) active suicidal ideation; (c) substance abuse or dependence; (d) cognitive impairment, neurological disorders, or intellectual disability.

The recruitment of study participants was conducted consecutively, based on the fulfillment of inclusion and exclusion criteria. Both recruitment and application were carried out among individuals who were receiving treatment at the Mental Health Center of the Príncipe de Asturias Hospital in Alcalá de Henares, Madrid, Spain.

A total of 91 participants were randomized to treatment. Eleven of these participants did not start treatment sessions, leaving 80 participants who started treatment sessions ($N = 40$ in CBT, $N = 40$ in ACT) (see Figure 1 for CONSORT diagram).

All participants were Caucasian and from a middle socioeconomic status. The ACT group had an average age of 37.5 years ($SD = 11.9$), and the CBT group had an average age of 39.1 years ($SD = 10.6$). The sample included 56 women (70%) and 24 men (30%). All participants were receiving mental health treatment. Table 1 provides detailed sociodemographic and clinical variables.

Figure 1
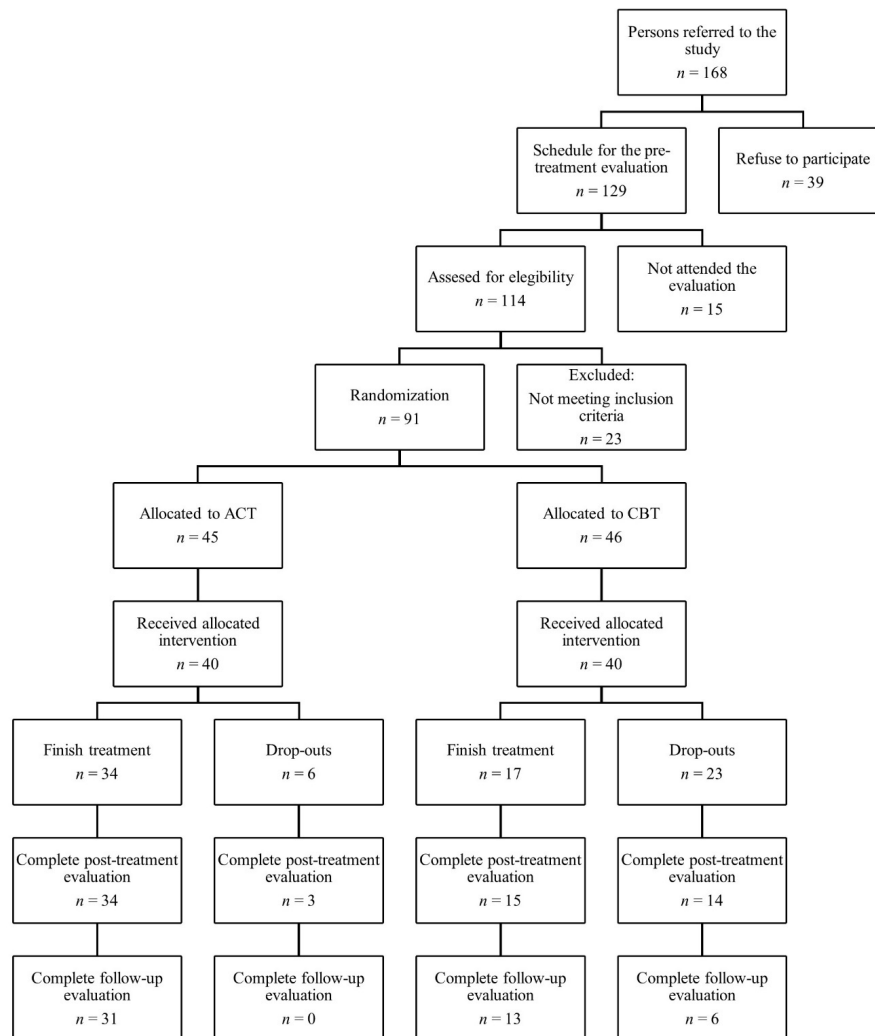*CONSORT Flow Diagram of the Clinical Trial*

Table 1
Sociodemographic and Clinical Baseline Characteristics of Participants

Variable	ACT (*n*=40)	CBT (*n*=40)	*t*	χ2	*p-value*
Age (*SD*)	37.5 (11.9)	39.1 (10.6)	-0.62		.54
Female (%)	75	65		0.54	.46
Years of schooling (*SD*)	11.0ᵃ (2.9)	11.1ᵃ (3.0)	-0.08		.94
Age of first mental health care (years) (*SD*)	28.5 (12.8)	28.4 (12.1)	0.04		.96
Duration of panic disorder (years) (*SD*)	7.7 (8.1)	7.9 (8.0)	-0.07		.94
Pharmacotherapy (%)	Yes: 67.5 No: 32.5	Yes: 82.5 No: 17.5		1.67	.20
Number of previous psychotherapies (any type) (*SD*)	1.1 (1.5)	0.9 (1.1)	0.59		.56

Note. ACT = Acceptance and Commitment Therapy; CBT = Cognitive Behavioral Therapy. ᵃ Corresponding to compulsory education in Spain.

Instruments

Outcome Measures

For outcome measures, the following instruments were used:

- *Panic Disorder Severity Scale-Self Report (PDSS-SR)* (Shear et al., 1997). The Spanish version validated by Bulbena et al. (2000) was used. The PDSS-SR is a self-administered scale that provides a profile of the severity of panic disorder symptoms in the past month. It is composed of seven items, which explore: (1) frequency of panic attacks, (2) distress provoked by panic attacks, (3) anticipatory anxiety, (4) agoraphobic fear and avoidance, (5) fear and/or avoidance of situations, (6) impairment and/or interference in work activity, and (7) impairment and/or interference in social activity. The person answers using a Likert-type scale from 0 to 4, with 0 being the minimum and 4 the maximum severity of symptoms. It has a Cronbach's alpha of .92.

- *Body Sensations Questionnaire (BSQ)* (Chambless et al., 1984). The Spanish version of Bados (2000) was used. The BSQ is a self-administered questionnaire composed of 17 items plus one final open-ended item. The subject responds to each item according to a 5-point Likert-type scale. This questionnaire evaluates the degree of fear or concern generated by each of the physical symptoms that occur during panic attacks. The final score is obtained by calculating the mean of the 17 items. A high score is indicative of a great fear of the physical symptoms. It has a very good internal consistency, with a Cronbach's alpha of .88.

- *Agoraphobic Cognitions Questionnaire (ACQ)* (Chambless et al., 1984). The Spanish version of Bados (2000) was used. It is a self-administered questionnaire composed of 14 items (plus a final open-ended item) on a 5-point Likert-type scale. It evaluates the frequency with which the person has catastrophic thoughts about the negative consequences of experiencing anxiety when anxious. It is composed of two subscales: catastrophic thoughts about physical consequences of anxiety (heart attack, tumor, etc.) and catastrophic thoughts about social and behavioral consequences (making a fool of oneself, going crazy, etc.). An overall score is obtained by calculating the mean of the total items and the scores on the two subscales: physical level and social-behavioral level. The internal consistency is adequate, with a Cronbach's alpha of .80.

Predictors and Moderators

For potential predictors and moderators, the following instruments were used:

- *Baseline demographic characteristics.* Gender and age, coded categorically as Young (between 18 and 45 years of age) and Older (between 46 and 65 years of age), were analyzed.

- *Duration of panic disorder.* Coded categorically as Less than 10 years, Between 10 and 20 years, and More than 20 years.

- *University of Rhode Island Change Assessment (URICA)* (McConnaughy et al., 1989). The version validated in the Spanish population by Vallejos et al. (2007) was used. The URICA test was conceived to evaluate the stages of change of the Transtheoretical Model of Prochaska & Di Clemente (1982). The items consist of sentences in which the subject must indicate his or her degree of agreement on a 5-point Likert-type scale, with 1 being "completely disagree" and 5 "completely agree". Each stage is represented by the average of seven questions. A score of 8 or lower would indicate that the person is poorly prepared to make a change (precontemplation), a score between 9 and 11 would indicate that the person is moderately prepared to make a change (contemplation), while a score between 12 and 14 would indicate that the person is highly prepared for change (action). Internal consistency has been evaluated and is quite high (between .69 and .89).

- *Neo Five Factor Inventory (NEO-FFI)* (Costa & McCrae, 2002). Validated in the Spanish population by Costa & McCrae (2002). This questionnaire follows the Big Five model: neuroticism, extraversion, openness to experience, agreeableness and conscientiousness. It is composed of 60 items on a 5-point Likert-type scale. To assess conscientiousness, 12 items from the conscientiousness subscale were used. It has a Cronbach's alpha of .81. Conscientiousness factor includes the tendency to a sense of duty, organization and order. It was specifically assessed because individuals who score high on measures of conscientiousness are often more meticulous, disciplined, and perseverant (Costa & McCrae, 2002). These traits might lead to better adherence in therapy, potentially enhancing the overall clinical results by these persons. Categorization indicated by the NEO-FFI was used, distinguishing five levels of conscientiousness: very low, low, medium, high and very high.

- *Acceptance and Action Questionnaire (AAQ-II)* (Bond et al., 2011). The Spanish adaptation of Ruiz et al. (2013) was used. It is a self-administered questionnaire that provides a general measure of experiential avoidance and psychological inflexibility. It is composed of seven items that are answered using a 7-point Likert scale. High scores on the AAQ-II correspond to high experiential avoidance. Results were divided into three categories: low experiential avoidance (at least one standard deviation below the mean), medium experiential avoidance (between one standard deviation below and one standard deviation above the mean), and high experiential avoidance (at least one standard deviation above the mean). It has a Cronbach's alpha of .82.

Procedure

This study was reviewed and approved by the Clinical Research Ethics Committee of the Príncipe de Asturias University Hospital (Alcalá de Henares, Madrid, Spain). This study was registered with ClinicalTrials, with ID: NCT05462184.

Participation in the study was offered to 168 persons undergoing mental health treatment at Mental Health Center attached to the Príncipe de Asturias University Hospital (Madrid, Spain). Of these individuals, 39 declined to participate for various reasons: 18 did not want to participate in the study, 17 could not due to schedule reasons and four could not be contacted. Finally, 129 participants were scheduled to evaluation. The individual evaluation of the participants was carried out by clinical psychologists to confirm that they met the criteria for participation and a baseline assessment was completed: Sociodemographic and clinical baseline characteristics (age, gender, years of schooling, age of first mental health care, whether they received pharmacological treatment or not, number of previous psychotherapies and duration of current panic disorder), M.I.N.I., URICA, NEO-FFI, AAQ-II, PDSS-SR, BSQ and ACQ. Participants also signed the informed consent for their participation in the study. The evaluation lasted approximately one and a half hours and was carried out in the Mental Health Center collaborating in the study, attached to the Príncipe de Asturias University Hospital (Madrid, Spain).

Of the 114 persons evaluated, 91 met the inclusion criteria for the study and were randomized to the two treatment groups (46 to CBT and 45 to ACT). Simple randomization was performed through a computerized randomization program, programmed by an external statistician blind to treatment condition. Participants did not know to which treatment group they had been assigned (single-blind). Eleven participants did not start treatment sessions, leaving 80 participants who started treatment sessions ($N = 40$ in CBT, $N = 40$ in ACT).

In CBT, six participants missed all sessions, 23 dropped out, and 17 completed the treatment. In ACT, five missed all sessions, six dropped out, and 34 completed the treatment. Completion required attendance at eight or more sessions; fewer counted as dropping out (Erickson et al., 2007) (see CONSORT diagram in Figure 1).

Participants received 12 weekly group therapy sessions, each lasting 1 hour, of either CBT or ACT. Four ACT groups and four CBT groups were conducted, each consisting of ten people. Treatments were carried out by clinical psychologists with specific training in the corresponding therapy and blinded to pre-treatment assessment results. Specifically, there were two therapists involved: one specialized in ACT who conducted all the ACT groups, and another specialized in CBT who managed all the CBT groups. Both therapists were women with over five years of experience in administering these therapies. Treatment protocols were standardized using the treatment manuals described below. To ensure the correct application of therapies and the fidelity to the treatment manuals, at least three sessions were audio recorded and the therapists were supervised by an external specialist. After treatments, all participants were administered an assessment consisting of the outcome measures through the following questionnaires: PDSS-SR, BSQ and ACQ. At 3-month follow-up, participants again completed the battery of outcome measure questionnaires: PDSS-SR, BSQ, and ACQ.

Cognitive Behavioral Therapy (CBT)

CBT followed Craske & Barlow's (2007) manual, which contains a session-by-session description of CBT for panic disorder. The treatment protocol included the following components: (a) psychoeducation about the nature of anxiety and panic, (b) diaphragmatic breathing training, (c) identification and correction of maladaptive thoughts about anxiety and its consequences, (d) exposure to interoceptive sensations, and (e) exposure to feared situations.

Acceptance and Commitment Therapy (ACT)

ACT was conducted following Eifert & Forsyth's (2005) manual, which contains a session-by-session description of the application of ACT to anxiety disorders. In the current study, exercises were adapted to the panic disorder treatment. The treatment included the following components: (a) acceptance of internal experiences, (b) cognitive defusion, (c) work with the "self as context", (d) contact with the present moment, (e) work with life values, and values, and (f) commitment to action.

Data Analysis

Data analysis was performed using the statistical computing software R version 3.5 (R Development Core Team, 2013). Statistical analysis was performed by intention to treat (ITT).

The descriptive data are described as mean, standard deviation, and percentages. The Kolmogorov-Smirnov analysis indicated a normal distribution of the data. For the comparison of the sociodemographic and clinical characteristics between the two groups, Student's t-test was used for quantitative variables and the chi-square test for qualitative variables.

For the hypothesis testing, a statistical approach was conducted with the following steps: a full model was calibrated using the random forest technique (De'ath, 2007), which does not make prior assumptions about the distribution of data in the response variables or assume equal variances between groups. This model incorporated the time variable, representing the temporal factor of each of the outcome variable at three stages: pre-treatment, post-treatment, and 3-month follow-up. In addition, it incorporated the assigned group variable (type of treatment) and the dependent variable to study. In the model, the time variable was considered a covariate, accounting the initial values before treatment and their grouping based on the independent variable under examination. The combination of variables and interactions, as well as the nature of the model, were

determined by calculating the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC). The final model was used to perform the type III analysis of covariance (ANCOVA).

Post-hoc analyses used the multcomp package in R (Hothorn et al., 2008) for simultaneous comparison tests like Tukey's in generalized and mixed-effects models, with significance level at $p < .05$. Outliers were removed and multiple imputation handled missing data from dropouts.

Results

Dropouts Analysis

As a complementary analysis, we studied if predictive or moderating variables (age, gender, duration of panic disorder, motivation to change, conscientiousness, experiential avoidance) affected dropouts. No statistically significant differences were found between completers and dropouts based on age, gender, motivation, conscientiousness, or experiential avoidance. However, statistically significant differences were found according to the duration of panic disorder: those who dropped out had a shorter mean duration (5.1 years) than those who completed therapy (9.3 years) in both therapies ($F = 5.67$; $p = .020$).

Predictors and Moderators Analysis

Age

A statistically significant main effect of age was found on PDSS-SR ($F = 7.23$; $p = .008$), indicating that the severity of the disorder decreased more in older people than in younger ones (diff = 2.16; $p = .008$), between pre-treatment and post-treatment (diff = 2.95; $p = .002$), and between post-treatment and follow-up (diff = 3.16; $p = .004$).

A statistically significant main effect of age was found on BSQ ($F = 10.14$; $p = .002$), indicating that the fear of physical symptoms decreased more in older people than in younger ones (diff = 0.43; $p = .002$), between pre-treatment and follow-up (diff = 0.70; $p < .001$), and between post-treatment and follow-up (diff = 0.49; $p = .011$).

A statistically significant interaction effect of age was found on ACQ between age and therapy group ($F = 5.23$; $p = .023$), such that in older individuals, catastrophic thoughts decreased more among those who received CBT compared to ACT (diff = 0.65; $p = .028$), between pre-treatment and follow-up (diff = 0.42; $p = .032$).

Gender

A statistically significant main effect of gender was found on BSQ ($F = 11.25$; $p = .001$), indicating that the fear of physical symptoms decreased, overall, more in women than in men (diff = 0.66; $p < .001$), between pre-treatment and follow-up (diff = 0.70; $p < .001$), and between post-treatment and follow-up (diff = 0.49; $p = .010$). Moreover, a statistically significant interaction effect was found between gender and therapy group (CBT or ACT) ($F = 5.78$; $p = .020$), whereby in men, fear of physical symptoms decreased more in CBT than in ACT (diff = 0.89; $p < .001$) at these time points.

A statistically significant main effect of gender was found on ACQ ($F = 4.55$; $p = .036$), indicating that catastrophic thoughts decreased more in women than in men (diff = 0.41; $p < .001$), between pre-treatment and follow-up (diff = 0.49; $p = .001$). Moreover, a statistically significant interaction effect was found between gender and therapy group (CBT or ACT) ($F = 3.98$; $p = .049$), whereby in men, catastrophic thoughts decreased more in CBT than in ACT (diff = 0.52; $p = .050$) at these time points.

Duration of Panic Disorder

A statistically significant main effect of duration of panic disorder was found on ACQ ($F = 4.40$; $p = .014$), indicating that catastrophic thoughts decreased more in people with more than 20 years of duration than in those with less than 10 years (diff = 0.42; $p = .026$), between pre-treatment and follow-up (diff = 0.49; $p = .001$).

Motivation to Change

A statistically significant main effect of motivation to change was found on PDSS-SR ($F = 7.90$; $p < .001$), indicating that the severity of the disorder decreased more in people who were in contemplation and less in those in precontemplation stage (diff = 5.08; $p = .001$), between pre-treatment and post-treatment (diff = 3.04; $p = .001$), and between post-treatment and follow-up (diff = 3.16; $p = .004$).

A statistically significant main effect of motivation to change was found on BSQ ($F = 10.68$; $p < .001$), indicating that the fear of physical symptoms decreased more in people who were in contemplation and less in those in precontemplation stage (diff = 0.61; $p = .026$), between pre-treatment and follow-up (diff = 0.70; $p < .001$), and between post-treatment and follow-up (diff = 0.49; $p = .008$).

A statistically significant main effect of motivation to change was found on ACQ ($F = 4.53$; $p = .012$), indicating that catastrophic thoughts decreased more in people who were in contemplation and less in those in precontemplation stage (diff = 0.60; $p = .010$), between pre-treatment and follow-up (diff = 0.49; $p = .001$).

Conscientiousness

A statistically significant main effect of conscientiousness was found on PDSS-SR ($F = 7.27$; $p < .001$), indicating that the severity of the disorder decreased less in people with a medium level of conscientiousness between pre-treatment and post-treatment (diff = 2.97; $p = .002$), and between post-treatment and follow-up (diff = 3.14; $p = .003$).

A statistically significant main effect of conscientiousness was found on BSQ ($F = 4.81$; $p = .001$), indicating that the fear of physical symptoms decreased less in people with a medium level of conscientiousness between pre-treatment and follow-up (diff = 0.70; $p < .001$), and between post-treatment and follow-up (diff = 0.51; $p = .005$).

A statistically significant main effect of conscientiousness was found on ACQ ($F = 3.08$; $p = .017$), indicating that catastrophic thoughts decreased less in people with a medium level of conscientiousness between pre-treatment and follow-up (diff = 0.49; $p = .001$).

Experiential Avoidance

A statistically significant main effect of experiential avoidance was found on PDSS-SR ($F = 23.04$; $p < .001$), indicating that the severity of the disorder decreased more in people with high experiential avoidance compared to those with medium (diff = 3.95; $p < .001$), and more in people with medium compared to those with low experiential avoidance (diff = 4.18; $p < .001$), between pre-treatment and post-treatment (diff = 3.04; $p = .001$), and between post-treatment and follow-up (diff = 3.16; $p = .002$).

A statistically significant main effect of experiential avoidance was found on BSQ ($F = 20.85$; $p < .001$), indicating that the fear of physical symptoms decreased more in people with high experiential avoidance compared to those with medium (diff = 0.49; $p = .010$), and more in people with medium compared to those with low experiential avoidance (diff = 0.80; $p < .001$), between pre-treatment and follow-up (diff = 0.70; $p < .001$), and between post-treatment and follow-up (diff = 0.49; $p = .010$).

A statistically significant main effect of experiential avoidance was found on ACQ ($F = 22.41$; $p < .001$), indicating that catastrophic thoughts decreased more in people with high experiential avoidance compared to those with medium (diff = 0.64; $p < .001$), and more in people with medium compared to those with low experiential avoidance (diff = 0.52; $p < .001$), between pre-treatment and follow-up (diff = 0.49; $p < .001$).

Discussion

The main results show the effect of potentially predictor and/or moderator variables on CBT and ACT effectiveness, including the results at post-treatment and 3-month follow-up.

According to our results, older age predicted a greater decline in severity of the disorder and fear of physical symptoms. H1 was partially confirmed by obtaining an age moderator effect on the effectiveness of CBT and ACT on catastrophic thoughts, particularly among older individuals who benefited more from CBT. Older individuals may benefit more from CBT as it aligns with their existing beliefs about addressing cognitive discomfort, aiming to change or eliminate it. Conversely, younger people may be more open to ACT's alternative approach. Previous studies on the relationship between participants' age and psychotherapy outcomes are scarce and inconclusive, but they focus on individuals with social phobia (Craske et al., 2014; Hofmann, 2004; Lincoln et al., 2005), or mixed anxiety disorder diagnoses (Wolitzky-Taylor et al., 2012).

In relation to gender, H2 was confirmed, as being a woman functioned as a predictor of improvement in both CBT and ACT. Fear of physical symptoms and catastrophic thoughts declined more in women than in men. Our results support those obtained in previous studies by Lincoln et al. (2005), who found that, when a subjective measure was used, women had a higher perception of recovery than men. Furthermore, a moderating effect was found within the group of men, since CBT was more effective than ACT in reducing fear of physical symptoms. It is possible that ACT is more in line with the expression and acceptance of suffering socially attributed to the female role, while CBT would be more in line with the elimination of the discomfort usually attributed to the male role (Liddon et al., 2019). Given that women comprise 70% of our study's participants, this gender imbalance may have slightly influenced the findings,

especially considering the higher prevalence of anxiety disorders among women, potentially affecting the generalizability of the results.

Considering the duration of panic disorder, greater amount of time since onset of symptoms predicted a greater decrease in catastrophic thoughts, both in CBT and ACT, so, H3 was refuted. This finding is in juxtaposition with previous studies which have found that the longer the time elapsed, the less improvement (Hendriks et al., 2012; Nakano et al., 2008). These different results could suggest that the group format of therapy confers greater benefit for people with a longer duration of panic disorder when compared to the individual formats, since the therapeutic group reinforces the feeling of cohesion and belonging, which in turn favors attendance at therapy and making changes at a particular level.

Regarding the motivation to change, the contemplation stage functioned as a predictor of improvement in both CBT and ACT, so, H4 was confirmed. Although previous studies have not found an effect of motivation on treatment outcome (Dozois et al., 2004; Kampman et al., 2008; Ramnerö & Öst, 2004), our results suggest that the therapies could act as drivers of the resolution of ambivalence towards change in people in the contemplation stage, helping them to take action in an effective way (Prochaska & Di Clemente, 1982).

Regarding conscientiousness, H5 was partially confirmed, as a medium level functioned as a predictor of less improvement in both CBT and ACT. However, no one particular level of conscientiousness was consistently associated with a greater decrease. It is possible that session attendance by people with a moderate level of conscientiousness is irregular, and that this pattern of attendance complicates the ability to obtain benefits from manualized psychotherapies (Costa & McCrae, 2002). In the literature, there are few studies on the influence of personality traits on the effectiveness of psychotherapy. Neuroticism has been the most analyzed trait, with some studies finding a relationship between high neuroticism and worse results of psychotherapy (Wolitzky-Taylor et al., 2012), while others have found no effect of this variable (Craske et al., 2014; Rosser et al., 2003).

Finally, a high level of experiential avoidance functioned as a predictor of improvement in both CBT and ACT, so, H6 was refuted. This finding seems to indicate a greater benefit of these persons from the therapeutic work, as well as that both therapies work with avoided or suppressed material and could share some mechanisms of action, although they do so from different approaches (Arch & Craske, 2008).

In relation to dropouts, it could be that people with a shorter duration of panic disorder achieve faster improvement, which could cause them to abandon therapy, perceiving that they no longer need it. However, people with a longer duration of the disorder may require a greater number of therapy sessions.

The study's main limitation is its small sample size, potentially affecting the detection of differences between interventions. A larger sample could clarify results, especially regarding moderating effects. More participants dropped out of the CBT group than the ACT group, possibly due to the different locations of the centers. It would be interesting to examine whether location, transportation, and familiarity influenced dropout rates. Additionally, the use of subjective outcome measures may introduce bias, and extending follow-up evaluations to 6 and 12 months could help detect moderating effects.

Future studies should verify these results with larger samples, include objective outcome measures, extend follow-up periods, and assess quality of life using tools like the Quality of Life Inventory (QOLI) (Frisch et al., 2005). Additionally, analyzing compound predictors and moderators could enhance the predictive power of psychotherapy outcomes (Niles et al., 2017).

In summary, this study is a pioneer in analyzing predictors and moderators of the psychotherapy efficacy by comparing CBT and ACT in people with panic disorder. Key recommendations include: First, those older, women, with a long duration of panic disorder, in the contemplation stage and with high experiential avoidance may improve more in both group CBT and ACT. Second, those older, men and with less duration of panic disorder may be better suited for CBT compared to ACT. On the other hand, those younger, women and with a long duration of panic disorder may improve more in ACT.

These findings aim to guide Mental Health professionals in choosing the most effective type of psychotherapy for each person with panic disorder, depending on specific characteristics.

This aids decision-making and prevents exhaustion for individuals receiving ineffective treatments and professionals feeling helpless without improvement. The study results enable quicker, more effective therapeutic responses, leading to a better prognosis, shorter disorder duration, less functional deterioration, and lower comorbidity, benefiting individuals, professionals, and healthcare management. Furthermore, group psychotherapy is more efficient than individual psychotherapy, which can result in great benefit in public mental health services.

Author Contributions

Leticia León-Quismondo: Conceptualization, Data Curation, Formal Analysis, Methodology, Writing – Original Draft, Writing – Review & Editing. **Alberto Fernández-Liria:** Conceptualization, Methodology, Resources. **Francisca López-Ríos:** Supervision, Writing – Review & Editing. **Jerónimo Saiz-Ruiz:** Validation, Writing – Review & Editing. **José M. García-Montes:** Validation, Writing – Review & Editing. **Ángela Ibáñez:** Visualization, Writing – Review & Editing. **Bryan J. Stiles:** Writing – Original Draft, Writing – Review & Editing. **Guillermo Lahera:** Conceptualization, Methodology, Project Administration, Writing – Review & Editing.

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Declaration of Interests

The authors declares that there is no conflict of interest.

Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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