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Dog-Assisted Therapy as a Complementary Intervention in the Therapeutic Process of Adolescents in a Mental Health Day Hospital: A Randomized Controlled Mixed-Methods Study

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Abstract

Background

Adolescents receiving intensive treatment in mental health day hospitals often present severe emotional dysregulation and low therapeutic engagement. Dog-assisted therapy has been proposed as a complementary intervention; however, evidence in structured clinical settings remains limited.

Methods

A mixed-methods study was conducted at an adolescent mental health day hospital. The quantitative phase consisted of a randomized controlled trial including 70 adolescents aged 12–18 years, allocated to Dog-assisted therapy or treatment as usual. The intervention comprised eight structured Dog-assisted therapy sessions. The primary outcome was global clinical functioning (HoNOSCA), while secondary outcomes included anxiety, emotion regulation, depressive symptoms, and eating disorder symptomatology. Immediate emotional changes were assessed before and after each session using the Facial Image Scale. The qualitative phase involved in-depth interviews analyzed using a hermeneutic phenomenological approach.

Results

No statistically significant between-group differences were observed in primary or secondary outcomes following the intervention. However, Dog-assisted therapy participation was associated with significant and consistent reductions in immediate emotional distress across sessions (Facial Imagine Scale; $p < 0.001$). Qualitative findings indicated that Dog-assisted therapy facilitated emotional regulation, improved mood, and enhanced therapeutic engagement and interpersonal communication.

Conclusions

Dog-assisted therapy does not appear to modify global psychopathology in short-term day hospital interventions; however, it was associated with consistent improvements in immediate emotional regulation and therapeutic engagement. These findings support its role as a process-oriented complementary intervention in intensive adolescent psychiatric care

1. INTRODUCTION

Mental disorders in adolescence represent an increasing challenge for public health systems due to their high prevalence and complexity [1]. Global estimates indicate that approximately one in seven adolescents experience a mental health condition, with depression, anxiety, and behavioural disorders

standing as leading causes of morbidity and disability. Moreover, suicide remains one of the primary causes of mortality in this age group [2].

Within this context, mental health day hospitals (DH) have emerged as intermediate therapeutic settings that offer intensive care without requiring full hospitalization, thereby supporting the educational, family, and social continuity of patients [3, 4]. The clinical profiles of children and adolescents attending DHs are highly heterogeneous, including neurodevelopmental disorders, such as autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD), affective and anxiety disorders, eating disorders (ED), behavioural problems, early psychotic symptoms, and self-injurious or suicidal behaviours, among others. These conditions often present transdiagnostic difficulties that impair emotional, relational, and academic functioning. Studies conducted in child and adolescent DHs have reported significant improvements in global clinical outcomes between admission and discharge, supporting the clinical utility of this model for complex populations [5]. Nevertheless, the organizational and clinical heterogeneity of DH introduces methodological challenges for rigorous outcome evaluation and for the generalization of findings across such services.

In parallel, over the last decade, Animal-Assisted Interventions (AAI), and, more specifically, Dog-Assisted Therapy (DAT), have gained increasing attention as complementary therapeutic approaches in mental health [6, 7]. This modality is grounded in structured interactions between patients and trained dogs, with the aim of facilitating therapeutic processes through the human–animal bond. Scientific literature has begun to document a wide range of benefits associated with these interventions, including improvements in emotional regulation, reductions in disruptive behaviours, enhanced social and relational skills, and positive effects on biological markers, particularly among vulnerable populations such as children and adolescents with mental health disorders [8–10]. A systematic review on dog-assisted psychotherapy[11] also identified additional benefits for mental health disorders, along with greater therapeutic engagement and reduced disruptive behaviour during sessions. More recently, a study incorporating biological measures demonstrated the beneficial effects of DAT on stress reduction, specifically decreases in cortisol, blood pressure, and heart rate [10]. Current models propose neurocognitive changes in emotional networks and neuroendocrine mechanisms as underlying foundations for the effectiveness of AAI [12]. However, scientific evidence regarding their implementation in structured clinical settings such as DH remains limited, particularly in terms of feasibility, effectiveness, and adolescents' subjective experiences [13, 14].

In structured clinical environments such as child and adolescent mental health DH, the literature is still scarce but promising. A study conducted at Hospital Clínic of Barcelona involving participants under 13 years of age reported fewer emotional crises and higher attendance on DAT days, along with improved self-control and social functioning, findings that support the feasibility and potential added value of DAT in day-hospital settings [8]. However, that study included a limited age range and used only a single experimental group, highlighting the need to expand research to broader age ranges and incorporate control groups. The inclusion of randomized controlled trials (RCTs) will allow for more robust and generalizable results [13].

Therefore, there is a need for rigorously designed randomized controlled trials evaluating DAT in intensive clinical settings such as adolescent mental health DH, incorporating both objective clinical outcomes and subjective patient experience. The present study aims to address this gap by evaluating the clinical effectiveness of an eight-session DAT program on global psychopathology and immediate emotional regulation through a randomized controlled trial, while simultaneously exploring adolescents lived experiences of the intervention using a hermeneutic phenomenological approach. We hypothesized that the incorporation of DAT as a complementary intervention in a mental health DH would be associated with improvements in adolescents' immediate emotional regulation and therapeutic engagement during treatment and would be perceived by adolescents as a positive contribution to the therapeutic process.

2. METHODOLOGY

Study Design

A single-center mixed-methods study was conducted, integrating both quantitative and qualitative components.

The quantitative phase consisted of a RCT with two parallel groups, designed to evaluate the effectiveness of DAT as a complementary intervention to treatment as usual.

The qualitative phase followed a hermeneutic phenomenological approach aimed at exploring adolescents lived experiences of participation in DAT.

The study was carried out at the Child and Adolescent Mental Health DH of Hospital Clínic de Barcelona between January 2024 and December 2025.

The study was retrospectively registered at ClinicalTrials.gov (ID: NCT07663916). The delay in registration was due to administrative procedures related to study completion and submission. Importantly, all study procedures, outcomes, and analyses were defined prior to the initiation of data analysis, and no changes were made after data collection had commenced. Although the study was retrospectively registered, both the study protocol and the statistical analysis plan were predefined prior to data analysis, thereby reducing the risk of outcome reporting bias.

2.1. Quantitative Study

2.1.1. Participant Selection

Eligible participants were adolescents aged 12 to 18 years receiving care at the Day Hospital during the study period.

Prior to recruitment, an informational group session was conducted to explain the study procedures in an accessible manner and to explore adolescents' initial perceptions of DAT. Adolescents who met

inclusion criteria and expressed interest in participation were invited to enrol, along with their legal guardians.

Inclusion criteria:

- Aged between 12 and 18 years.
- Receiving treatment at the Child and Adolescent Mental Health DH.
- Willingness to participate in the intervention.
- Written informed consent obtained from both adolescents and their legal guardians.

Exclusion criteria:

- Intelligence quotient (IQ) below 80.
- Presence of dog allergy, dog phobia, or history of aggression towards animals.

2.1.2. Procedures and Description of the Intervention

A total of 70 participants were included, randomly allocated in a 1:1 ratio to the experimental group (n = 35) or control group (n = 35). Simple randomization was performed by an external professional to ensure impartiality. Each adolescent receiving treatment at the Day Hospital was assigned a numerical code and anonymized, allocation was conducted by an independent researcher using a concealed method to ensure allocation concealment and minimize selection bias.

Intervention:

Participants in the experimental group received eight structured DAT sessions, each lasting approximately 45 minutes, integrated into routine DH activities. The intervention comprised 14 independent groups: seven experimental groups (n = 35) and seven control groups (n = 35), with five participants per group. The intervention was conducted in parallel for each experimental–control group pair, sharing the same physical and temporal setting. However, only participants assigned to the experimental group actively engaged in DAT, whereas participants in the control group received treatment as usual within the DH. This design aimed to control potential contextual effects and to minimize confounding factors related to group dynamics.

Each session followed a three-phase structure:

- Welcome (10 minutes): Initial contact with the dog to facilitate adaptation and foster a trusting atmosphere.
- Main activity (30 minutes): Implementation of exercises and activities with the dog aimed at developing specific therapeutic skills.
- Closing (5 minutes): Farewell to the animal to promote reflection and integration of the experience.

The therapeutic objectives addressed throughout the intervention included:

1. Establishment of the user–dog bond;
2. Strengthening of the therapeutic alliance;
3. Body awareness;
4. Teamwork;
5. Identification and expression of emotions;
6. Development of empathy;
7. Promotion of cognitive flexibility;
8. Closing.

The control group received the standard care offered by the DH, which includes individual and group psychotherapy, psychoeducation, academic tutoring, educational support, and therapeutic activities, without exposure to DAT.

Upon completion of the study, adolescents in the control group were offered intervention access to the DAT.

DAT sessions were delivered by mental health specialist nurses and social educators, supported by a certified canine technician (recognized by K-Partners and certified in the method of the Dog-Assisted Therapy Centre (CTAC)). All sessions were supervised by a member of the research team.

The responsibilities of the canine technicians included:

- Ensuring and managing interaction with the dog.
- Identifying themselves and the dog upon entering the hospital.
- Guaranteeing the hygiene and well-being conditions of the dogs.
- Providing all materials necessary for the activities.

Animal welfare was a priority throughout the implementation of DAT. All CTAC health and hygiene protocols were followed. CTAC is a private centre specialized in dog training and assisted therapies, with previous experience delivering these interventions in other hospitals in Barcelona.

This organization complies with and applies the IAHAIO White Paper, the international reference document for animal welfare standards in interventions involving the human–animal bond. The canine professional likewise adhered to all IAHAIO animal welfare guidelines.

Five dogs participated in the intervention: two medium-sized dogs (one Golden Retriever and one Labrador Retriever, approximately 30 kg each) and two small dogs (Cavalier King Charles Spaniels, approximately 12 kg each). All dogs were between two and five years old and had passed the K-Partners assessment for CTAC, physical aptitude evaluations, and certification as therapy dogs.

2.1.3 Variables and Data Collection

Sociodemographic and clinical variables: gender, age, diagnosis, and school status.

Participants also completed the following questionnaires before the intervention and after the eight intervention sessions. Assessments were conducted before and after the intervention.

Health of the Nation Outcome Scales for Children and Adolescents (HoNOSCA).

HoNOSCA was used to assess behavioural, emotional, and psychosocial functioning [15]. It evaluates problem severity across items scored from 0 to 4, with total scores ranging from 0 to 52, where higher scores indicate greater severity. The Spanish adaptation [5] was used, showing adequate internal consistency, reliability, and concurrent validity in clinical child and adolescent samples.

State-Trait Anxiety Inventory for Children (STAI-C). Anxiety levels were assessed with the state anxiety subscale of the STAI-C [16]. The Spanish version consists of 20 items rated on a 1-to-3 scale, yielding scores from 20 to 60, with higher values indicating greater anxiety [17].

Difficulties in Emotion Regulation Scale (DERS). Emotion regulation difficulties were evaluated using the DERS [18], a 36-item self-report scale rated on a 5-point Likert scale. The Spanish adaptation was administered [19].

Children's Depression Inventory (CDI). Depressive symptoms were assessed with the CDI [20], composed of 27 items with response options ranging from 0 to 2. The validated Spanish version[21] was used. Total scores range from 0 to 54, with higher scores reflecting greater depressive symptomatology.

Eating Disorder Inventory-2 (EDI-2). The Spanish version of the EDI-2 [22, 23] was used to assess eating disorder symptomatology, including anorexia nervosa and bulimia nervosa. The instrument comprises 91 items grouped into 11 subscales and is rated on a Likert scale from 5 (always) to 0 (never). Higher total scores indicate greater symptom severity. This measure was administered only to participants diagnosed with eating disorders.

Additionally, in addition to standardized measures of global functioning, emotional responses were assessed to capture the immediate effects of the intervention, each participant completed the following scale briefly during every session:

Facial Image Scale (FIS): The standardized FIS[24] was used to assess adolescents' self-reported emotional state immediately before and after each DAT session. The scale consists of five facial drawings ranging from a very happy face to a very sad face. Participants select the face that best represents their current emotional state, resulting in a score from 1 to 5: the most negative expression scores 1 point and the most positive expression scores 5 points. This instrument is considered valid for clinical use in children aged three years and older.

The primary outcome was global clinical functioning measured using HoNOSCA. Secondary outcomes included STAIC, DERS, CDI, and EDI-2. Additionally, immediate emotional changes before and after each

session were assessed using the FIS as a proximal measure of emotional response.

2.1.4. Statistical Analysis

Continuous variables were presented as mean ± standard deviation, and categorical variables were expressed as absolute frequencies and percentages. To compare pre-post values, paired t-tests were performed. Between-group differences in post-intervention outcomes to compare final results, ANCOVA models were applied, adjusting for baseline values. Residual plots were used to assess model validation. Statistical comparisons were conducted using the emmeans package (v. 2.0.1). All analyses were performed using a two-sided Type I error level of 5%. Statistical analyses were conducted using R (v. 4.5.2).

The sample size was calculated a priori using the GRAMMO tool for a randomized controlled trial with two independent groups and a two-sided contrast. A significance level of $\alpha = 0.05$ and a statistical power greater than 80% were assumed. A minimum clinically relevant difference of 1 unit was considered for the primary outcome, with an assumed standard deviation of 1.5. Under these parameters, a required sample size of 42 participants per group was estimated.

Allowing for an expected dropout rate of 15%, the target sample size was set at 84 participants, equally distributed between the experimental and control groups. However, due to budgetary constraints, the final sample comprised 70 participants (35 per group).

The final sample size was sufficient to detect moderate between-group effects but may have been underpowered to detect small effect sizes, increasing the risk of Type II error. Therefore, the study may have been underpowered to detect small between-group differences, particularly for secondary outcomes. This should be considered when interpreting the absence of statistically significant between-group differences. Notably, the consistent within-session improvements observed suggest that DAT may primarily exert proximal regulatory effects, which may not be adequately captured by broad standardized outcome measures.

2.2 Qualitative Study

The study adopted a hermeneutic phenomenological qualitative approach. This methodological framework seeks to obtain an in-depth understanding of the phenomenon under investigation by entering the world and living experiences of the participants. Such a paradigm enables the exploration of informant's experiences through open-ended interviews, allowing participants to express themselves freely and thus facilitating a deeper comprehension of their perspectives.

2.2.1 Participants

A convenience sampling strategy was employed to select six adolescents who had participated in the DAT and who demonstrated willingness to describe their experience in depth.

2.2.2 Procedure and Instrument

The instrument used was a semi-structured open interview [25]. The interviewer encouraged participants to speak freely about their experiences with the DAT. All interviews were conducted face to face, audio-recorded, and transcribed immediately, followed by participant verification to ensure accuracy. Participants signed informed consent forms authorizing the recording of the interviews. Each interview lasted approximately 35 minutes. Data collection and analysis continued until theoretical saturation was reached. Additional information was also obtained through the field diary of the principal investigator.

2.2.3 Data Analysis

The data analysis followed several stages:

1. **Open coding**: The principal investigator read each interview transcript line by line, taking notes to identify initial units of meaning (categories).
2. **Theme review**: The principal investigator, together with another researcher, reviewed and discussed the main emerging themes.
3. **Axial coding**: All interviews were read a second time, and both researchers identified associations between themes and subthemes in relation to context and content. All completed interview transcripts were compared to consolidate meanings and develop a theoretical construct.
4. **Integration**: The core themes or main categories emerging from the data were conceptually reorganized and contextualized.
5. **ETHICAL AND LEGAL CONSIDERATIONS**

The study was conducted in accordance with the protocol and with the relevant legal requirements established in Law 14/2007 of July 3 on Biomedical Research and Declaration of Helsinki. It received approval from the Clinical Research Ethics Committee (CEIM) of Hospital Clínic de Barcelona (2023-0075).

All parents or legal guardians, as well as the adolescent participants, signed informed consent forms.

4. RESULTS

4.1. Quantitative Phase Results

4.1.1. Sample Description

Table 1
Sample Description

Characteristic	***Experimental Group*** ***N = 35¹***	***Control Group*** ***N = 35¹***
AGE	14.6 (1.4)	15.0 (1.7)
GENDER *N = 70*		
- Male	11 / 35 (31%)	7 / 35 (20%)
- Female	24 / 35 (69%)	28 / 35 (80%)
DIAGNOSIS *N = 70*		
- ASD	13 / 35 (37%)	8 / 35 (23%)
- Eating Disorders	9 / 35 (26%)	15 / 35 (43%)
- Other	13 / 35 (37%)	12 / 35 (34%)
SCHOOL STATUS *N = 70*		
- School absenteeism	16 / 35 (46%)	14 / 35 (40%)
- Actively enrolled	19 / 35 (54%)	21 / 35 (60%)
¹ mean (SD); n / N (%)		
² Wilcoxon rank-sum test; Pearson's chi-square test		

No statistically significant differences were observed between groups at baseline in sociodemographic and clinical characteristics.

4.1.2 Pre-Post Intervention Comparison (Primary outcomes)

Comparative analyses between groups did not reveal statistically significant pre-post intervention differences in any of the evaluated variables (Table 2). For global functioning (HoNOSCA), the experimental group showed an adjusted mean of 22.5 ± 1.06 compared with 22.8 ± 1.06 in the control group (95% CI: − 1.51 to 1.10; p = 0.89).

Regarding state-trait anxiety (STAI-C), scores were 39.2 ± 0.34 in the experimental group and 38.5 ± 0.35 in the control group (95% CI: − 0.33 to 1.62; p = 0.19). Emotional regulation difficulties (DERS) yielded mean values of 110 ± 2.96 and 112 ± 3.05, respectively, with a 95% CI of − 10.5 to 6.5 (p = 0.64).

For depressive symptomatology (CDI), average scores were 14.4 ± 0.84 for the experimental group and 13.9 ± 0.65 for the control group (95% CI: − 3.84 to 3.30; p = 0.88). Finally, EDI-2 scores were 120 ± 6.0 in the experimental group compared with 117 ± 4.7 in the control group (95% CI: − 13.4 to 18.6; p = 0.73).

Overall, the results indicate no statistically significant differences between groups across all standardized clinical outcomes of global psychopathology within the intervention period.

Table 2
Pre-Post Intervention Comparison

Variable	Experimental Group	Control Group	95% CI of the Difference	p-value
HoNOSCA	22.5 ± 1.06	22.8 ± 1.06	−1.51 to 1.10	0.89
STAI-C	39.2 ± 0.34	38.5 ± 0.35	−0.33 to 1.62	0.19
DERS	110 ± 2.96	112 ± 3.05	−10.5 to 6.5	0.64
CDI	14.4 ± 0.84	13.9 ± 0.65	−3.84 to 3.30	0.88
EDI-2	120 ± 6.0	117 ± 4.7	−13.4 to 18.6	0.73
Note: Values are adjusted post-intervention estimated marginal means derived from ANCOVA models controlling for baseline scores. SE = standard error; CI = confidence interval.				

†EDI-2 analyses were conducted only in participants diagnosed with an eating disorder.

The analysis of immediate emotional responses revealed a robust and consistent effect of DAT at the session level. Participants showed a significant reduction in emotional distress following each of the eight sessions, with a mean decrease of − 0.75 points on the FIS (t = − 8.81; p < 0.001).

4.2. Qualitative Phase Results

The qualitative study yielded three main observations: 1) DAT acts as an immediate facilitator of emotional calm. 2) DAT enhances mood and increases motivation in the immediate therapeutic context. 3) DAT is perceived as improving communication and social skills.

Observation 1. Immediate facilitator of calm.

The phenomenological analysis of the interviews revealed that all participants described the presence of the dog during DAT as an immediate facilitator of tranquility and emotional calm. This theme consistently emerged through codes related to stress reduction, emotional regulation, and the perception of a safer therapeutic environment.

Overall, adolescents explained that contact with the dog produced a noticeable decrease in emotional tension. This sense of relief appeared both at the beginning of the session and during guided activities, acting as a regulatory element that supported engagement and emotional openness. As one participant

expressed: *"When I participated in the DAT, I felt somewhat calmer. My thoughts didn't change, but sometimes it helped me to distract myself or reduce my anxiety."*

Similarly, another adolescent highlighted DAT as a safe and comforting space that promoted relaxation and reduced nervousness: *"I felt very relaxed because I knew it was a moment when I could be with the dogs. It was a space that helped me disconnect. We did small activities that invited us to reflect, and at no point did I feel bad or nervous; on the contrary, I was very calm."*

A participant diagnosed with an eating disorder (ED) also described a functional impact of emotional regulation beyond the session itself, stating: *"After DAT, I went to the dining room with less anxiety, and it helped me face meals better."* This testimony reinforces the idea that, for some adolescents, the calming effect of DAT extends beyond the immediate therapeutic moment.

However, not all perceptions were homogeneous. One participant reported that although DAT momentarily reduced her anxiety, the effect did not persist long-term: *"I think the impact was shorter than long-term. It reduced my anxiety in the moment, but now I don't feel any difference that I could associate with DAT."*

Observation 2. Enhanced mood and motivation:

Interview analyses revealed that several participants experienced an improvement in mood directly linked to their participation in DAT. This emotional shift was described as an immediate effect associated both with the positive anticipation of the session and with the feelings generated during interaction with the dog.

Adolescents noted that even on particularly difficult days, remembering that they had a DAT session served as an emotional regulator. As one participant explained: *"Yes, I think it helped me change my mood. Many times, I was having a bad day, but then I remembered that I had therapy with the dogs, and that completely changed things. My mood was much happier, much calmer, and when I finished the sessions, I felt much better about myself."*

Another adolescent described this effect as a momentary but noticeable mood elevation, observable when comparing her emotional state before and after the session: *"In the long term, I didn't really feel it. But if we're talking about the moment itself, then yes: it lifted my spirits. We had to answer some questions afterward, like choosing an emoji to describe how we felt. I could tell there was a difference between how I entered and how I left. In that specific moment, it really lifted my mood."*

In addition to mood changes, some participants associated with DAT increased motivation to attend the Day Hospital. The presence of the dogs appeared to introduce a positive component into their therapeutic routine, acting as a catalyst for adherence. As one participant stated: *"The difference on a day with DAT is that I felt more motivated to go to the Day Hospital."*

Observation 3. Social and Communication facilitator

Analysis of participants' narratives showed that DAT not only provided immediate emotional benefits but was also perceived as a helpful tool for improving communication and social abilities.

Several adolescents indicated that DAT served as a bridge for enhancing communication skills, particularly with peers and with therapeutic staff. As one participant noted: *"I would say it can be useful for communicating with other people."*

The dog's presence also functioned as a social modulator, reducing discomfort during direct interpersonal interactions and facilitating both emotional and verbal expression. One adolescent described this effect as follows: *"I feel more at ease. When I'm alone with someone and talking about my things, I feel a bit uncomfortable and sometimes don't know exactly what to say. But when I'm with dogs, I feel more like myself. I can be calmer, as I said before, and I can express myself better around them"*.

Another participant expanded on this idea, emphasizing the learning derived from observing the animal's nonverbal communication and reflecting on how these skills could translate to human interactions: *"I would also say that you learn to relate not only to animals but also to apply that to people. We talked a lot about nonverbal communication, since dogs don't talk. From their gestures and the way, they express themselves, you learn a lot"*.

5. DISCUSSIÓN

The findings of this RCT, complemented by a hermeneutic phenomenological study, allow for an integrated analysis of both the effectiveness and the subjective experience of DAT in a youth mental health DH. Quantitative results did not show significant differences between the experimental and control groups on standardized measures of clinical functioning, emotional regulation, anxiety, depression, or eating-related symptomatology. However, the randomized controlled trial did not demonstrate significant effects of DAT on global clinical outcomes. Nevertheless, consistent within-session improvements in emotional distress, along with qualitative findings, point to a specific role of DAT in the modulation of therapeutic processes. DAT may not operate primarily as a symptom-reduction intervention, but rather as a process-oriented approach that facilitates emotional activation and contributes to improved therapeutic outcomes.

The absence of statistically significant between-group differences should be interpreted in light of the study's statistical power. Although the sample size was sufficient to detect moderate effects, the study may have been underpowered to detect small but clinically meaningful differences, increasing the risk of Type II error. This limitation is particularly relevant in the context of DAT, as these interventions tend to produce immediate emotional benefits, whereas more stable symptomatic changes often require longer or more intensive therapeutic programs or must be complemented by additional treatment strategies [13, 26]. Furthermore, recent systematic reviews suggest that broad standardized instruments may lack the sensitivity to detect rapid emotional fluctuations in adolescents with complex psychopathology [27].

In this study, participants attended eight DAT sessions. From an evidence-based perspective, dose-response models in child psychotherapy indicate that most young people require between 8 and 11 sessions to reach detectable clinical change, while deeper and more sustained improvements typically require longer interventions [28]. Additionally, methodological reviews of complex interventions highlight that brief exposures may generate immediate effects, but not necessarily sustained changes in global outcome scales [29]. Within this framework, our quantitative findings are coherent with literature indicating that DAT produces predominantly primarily short-term regulatory effects rather than cumulative effects associated with longer interventions [30].

A key aspect of interpretation is the high-complexity clinical profile of adolescents treated at a DH. Unlike outpatient settings, DH provide intensive care to young people presenting severe, fluctuating, and multidimensional symptomatology, including marked dissociation and low emotional awareness [3, 4]. In such contexts, detectable improvements on broad assessment instruments typically require longer timeframes. Indeed, research on psychotherapy in highly symptomatic populations suggests that awareness of improvement may lag behind actual clinical change by weeks or even months [31].

Despite the absence of change in questionnaries, the FIS analyses demonstrated significant session-by-session reductions in emotional distress. Such immediate effects are particularly relevant. These findings align with physiological evidence showing immediate reductions in cortisol, heart rate, and blood pressure following interactions with dogs in children and adolescents [10, 32]. The consistent session-by-session improvements observed on the FIS provide strong evidence that DAT exerts its primary effects at the level of immediate emotional regulation. These proximal changes may reflect rapid modulation of affective arousal and stress response, which are critical for facilitating engagement in subsequent therapeutic activities.

In the context of a mental health DH, where the ability to regulate affect and engage in daily therapeutic activities is essential, these proximal effects may have substantial clinical relevance, even in the absence of measurable changes in global psychopathology during short-term interventions.

The qualitative findings reinforce this interpretation, as adolescents consistently described DAT as facilitating emotional calm, improving mood, and enhancing communication. This convergence between quantitative session-level effects and subjective experience strengthens the validity of DAT as a clinically meaningful adjunctive intervention, which is consistent with literature highlighting the dog's role as a therapeutic environmental modulator and facilitator of affective expression [33].

Additionally, participants reported immediate improvements in mood, increased motivation, and a greater desire to attend the DH on days when DAT was offered. This is a critical observation: several adolescents explicitly expressed that they would like DAT to continue and believed it should remain a stable component of the DH program. The literature identifies such responses as strong indicators of clinical acceptability and perceived usefulness, which are central to decisions regarding the implementation of innovative programs in healthcare settings [14].

Finally, participants reported improvements in communication, and these findings suggest that DAT can facilitate social enrichment, a finding consistent with experimental studies showing that dogs can act as social mediators in clinical youth populations [11, 34].

Taken together, the quantitative and qualitative findings suggest that DAT does not operate primarily as a symptom-change intervention, but rather as a clinically valuable emotional and relational facilitator within intensive treatment environments. In a DH, adherence, participation, and therapeutic engagement are essential prerequisites for the effective delivery of psychotherapeutic interventions. DAT appears to support these prerequisites by enhancing emotional readiness, motivation, and interpersonal openness, thereby contributing meaningfully to the therapeutic milieu.

Limitations

This study presents several limitations that should be considered when interpreting the findings. First, the intervention was brief and did not include longitudinal follow-up, preventing conclusions about the persistence of the subjective benefits reported by participants. Additionally, the standardized instruments used were broad in scope and may not be sensitive enough to detect specific domains in which DAT may be particularly effective, such as immediate emotional regulation, therapeutic alliance, or engagement in therapeutic activities. The study may have been underpowered to detect small effect sizes. Furthermore, the shared therapeutic setting between the experimental and control groups may have introduced potential contamination effects, which should be considered when interpreting the findings. Finally, although the mixed-methods design enhances interpretive richness, the generalizability of the qualitative findings remains limited.

Additionally, some imbalance in diagnostic distribution between groups was observed at baseline, particularly in the proportions of autism spectrum disorder and eating disorders. Although randomization was performed, this variability may have influenced the results, given the heterogeneity and differential clinical trajectories associated with these conditions. However, both groups reflected the complexity and diagnostic diversity typical of day hospital settings, supporting the ecological validity of the findings.

5. CONCLUSIONS

DAT implemented within a child and adolescent mental health day hospital setting proved to be a safe and well-accepted intervention capable of generating immediate benefits in emotional regulation, mood, motivation, and adolescents' interpersonal communication. However, the findings did not demonstrate a measurable effect on either global clinical outcomes. Although no significant differences were observed between the experimental and control groups in the overall results of the psychometrics, the adolescents' subjective experiences and the consistent pre-post session improvements indicate that DAT provides added clinical value to the multidisciplinary treatment offered in the DH as a facilitator of emotional stabilization and therapeutic engagement.

These findings also highlight the need for studies with longer intervention periods, larger sample sizes, and the incorporation of measures more sensitive to immediate therapeutic effects (momentary emotional regulation, therapeutic alliance). In this regard, DAT emerges as a promising complementary resource for enhancing therapeutic approaches in adolescents, particularly in settings that prioritize daily emotional regulation, adherence to treatment, and the strengthening of the therapeutic alliance.

Declarations

Competing interests:

The authors declare no competing interests.

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Author Contribution

According to the author statement, Elias Guillén-Guzmán contributed with Conceptualization, Methodology, Investigation, Project administration, Formal analysis, Visualization, and Writing – Original Draft. Roger Borras contributed with Methodology, Formal analysis, Data curation, and Writing – Review & Editing. Irene Solà-Caralps, Laura Real-Gisbert, Miquel Salmeron-Medina, Sara Beatriz Garcia-Herrero, Anna Ballesteros-Urpi, Soledad Romero-Cela, Miguel Romero-Gonzalez, Oaia Irondo-Blanco, Eva Domenec-Elizalbe, Fransesc Ristol-Ubach, Ma Teresa Plana, Rosa M Calvo and Luisa Lázaro contributed with Investigation, Resources, and Writing - Review & Editing. Astrid Morer-Liñan and Pilar Santamarina-Perez contributed with Funding acquisition, Resources, Methodology, Imvestigation, Supervision, Project administration, Writing - Review & Editing.

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Data availability:

Data will be made available upon reasonable request. Only a subset of the data, excluding identifiable individual-level information will be shared.

References

1. Piao J, Huang Y, Han C, Li Y, Xu Y, Liu Y et al (2022) Alarming changes in the global burden of mental disorders in children and adolescents from 1990 to 2019: a systematic analysis for the Global Burden of Disease study. Eur Child Adolesc Psychiatry 31(11):1827–1845. 10.1007/s00787-022-02040-4
2. World (2025) Health Organization. Mental health of adolescents
3. Buiza Aguado C, Uría Rivera T, Serrano Coello de Portugal A, Ahijado Guzmán Z, Delfa Álvarez A, Frigolet Mayo P et al (2014) El Hospital de Día-Centro Educativo Terapéutico Pradera de San Isidro: Un dispositivo para el tratamiento intensivo de trastornos mentales graves en niños y adolescentes. Pediatría Atención Primaria 16(61):e19–32. 10.4321/S1139-76322014000100004
4. Mendonca R, Pantano T, Casella CB, Scivoletto S (2017) Day Hospital in Child and Adolescent Psychiatry: Is It Effective for Whom? Effectiveness of Infant Psychiatric Day Hospital. J Psychiatry Psychiatr Disord 01(06):337–348. 10.26502/jppd.2572-519X0033
5. Ballesteros-Urpí A, Pardo-Hernández H, Ferrero-Gregori A, Torralbas-Ortega J, Puntí-Vidal J, Tàpies Olivet P et al (2018) Validation of the Spanish and Catalan versions of the Health of the Nation Outcome Scale for Children and Adolescents (HoNOSCA). Psychiatry Res 261:554–559. 10.1016/j.psychres.2017.12.057
6. Feng X, Zhao S, Zhang D, Yi Q, Chen Y, Zhang X (2025) A bibliometric study for global hotspots and trends in animal-assisted interventions (1983–2023). Front Psychiatry 16. 10.3389/fpsyt.2025.1490122
7. Hüsgen CJ, Peters-Scheffer N, Didden R (2025) Exploring Interaction Dynamics in Dog-Assisted Therapy: An Observational Study. Behav Sci 15(8):1115. 10.3390/bs15081115
8. Guillen Guzmán E, Sastre RodríguezL, Santamarina-Perez P, Hermida Barros L, García Giralt M, Domenec Elizalde E et al (2022) The Benefits of Dog-Assisted Therapy as Complementary Treatment in a Children's Mental Health Day Hospital. Animals 12(20):2841. 10.3390/ani12202841
9. Kovács KE, Balogh ÉZ, Lovas B, Boris P, Nagy BE (2024) The role of animal-assisted programs in physical health improvement of children and adolescents with special education needs - a systematic review. BMC Public Health 24(1):824. 10.1186/s12889-024-18326-y
10. Schuck SEB, Zeiler CN, Stehli A, Steinhoff LA, Stokes RY, Jeffrey SE et al (2024) Acute salivary cortisol response in children with ADHD during psychosocial intervention with and without therapy dogs. Front Psychiatry 15. 10.3389/fpsyt.2024.1476522
11. Jones MG, Rice SM, Cotton SM (2019) Incorporating animal-assisted therapy in mental health treatments for adolescents: A systematic review of canine assisted psychotherapy. PLoS ONE 14(1):e0210761. 10.1371/journal.pone.0210761
12. Liu H, Lin J, Lin W (2024) Cognitive mechanisms and neurological foundations of companion animals' role in enhancing human psychological well-being. Front Psychol 15. 10.3389/fpsyg.2024.1354220

13. Shoesmith E, Hall S, Sowden A, Stevens H, Pervin J, Riga J et al (2026) Dog-assisted interventions for children and adults with mental health or neurodevelopmental conditions: systematic review. Br J Psychiatry 228(2):150–163. 10.1192/bjp.2025.8
14. Fornefeld D, Zellin U, Schmidt P, Fricke O (2025) The supporting role of dogs in the inpatient setting: a systematic review of the therapeutic effects of animal-assisted therapy with dogs for children and adolescents in an inpatient setting. Eur Child Adolesc Psychiatry 34(1):3–17. 10.1007/s00787-023-02326-1
15. Gowers SG, Harrington RC, Whitton A, Lelliott P, Beevor A, Wing J et al (1999) Brief scale for measuring the outcomes of emotional and behavioural disorders in children. Br J Psychiatry 174(5):413–416. 10.1192/bjp.174.5.413
16. Spielberger CD (1973) Inventario de Ansiedad Estado - Rasgo para niños, STAIC. TEA Ediciones., Madrid.
17. Castrillón-Moreno, Borrero Copete (2005) Validación del Inventario de Ansiedad Estado-Rasgo (STAIC) en niños escolarizados entre los 8 y los 15 años. Acta Colombiana de Psicología 13:79–90
18. Gratz KL, Roemer L (2008) Multidimensional Assessment of Emotion Regulation and Dysregulation: Development, Factor Structure, and Initial Validation of the Difficulties in Emotion Regulation Scale. J Psychopathol Behav Assess 30(4):315–315. 10.1007/s10862-008-9102-4
19. Hervás G, Jodar R (2008) The spanish version of the Difficulties in Emotion Regulation Scale. Clin Salud 19:139–156
20. Kovacs M (1985) The Children's Depression, Inventory (CDI). Psychopharmacol Bull 21(4):995–998 PubMed PMID: 4089116
21. Del Barrio V, Carrasco MA (2004) CDI. Inventario de depresión infantil. TEA Ediciones. Madrid
22. Garner DM, Olmstead MP, Polivy J (1983) Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. Int J Eat Disord 2(2):15–34. 10.1002/1098-108X(198321)2:2%3C15::AID-EAT2260020203%3E3.0.CO;2-6
23. Urzúa MA, Castro RS, Lillo OA, Leal PC, EVALUACIÓN DE LOS TRASTORNOS, ALIMENTARIOS: PROPIEDADES PSICOMÉTRICAS DEL TEST EDI-2 EN ADOLESCENTES ESCOLARIZADOS(AS (2009) DE 13 A 18 AÑOS. Revista Chil de nutrición 36(4). 10.4067/S0717-75182009000400002
24. Buchanan H, Niven N (2003) Further evidence for the validity of the Facial Image Scale. Int J Paediatr Dent 13(5):368–369. 10.1046/j.1365-263X.2003.00488.x
25. Patton MQ (2002) Two Decades of Developments in Qualitative Inquiry. Qualitative Social Work 1(3):261–283. 10.1177/1473325002001003636
26. Pandey RP, Himanshu, Gunjan, Mukherjee R, Chang CM (2024) The Role of Animal-Assisted Therapy in Enhancing Patients' Well-Being: Systematic Study of the Qualitative and Quantitative Evidence. JMIRx Med 5:e51787–e51787. 10.2196/51787
27. Pourjafari PM, Sadek M, Paramasivam T, Daros AR (2025) How Well Does the Difficulties in Emotion Regulation Scale Measure Emotion Dysregulation Beyond Psychopathology? A Scoping Review and

Synthesis of its Construct Validity. J Psychopathol Behav Assess 47(2):46. 10.1007/s10862-025-10224-w

28. Chen B, Keenan-Miller D (2021) How much therapy is enough? The dose–response effect and its moderators in a psychology training clinic. J Clin Psychol 77(1):20–35. 10.1002/jclp.23025
29. Payne M, Stringer D, Carter B, Hardy A, Emsley R (2025) Reviewing methodological approaches to dose-response modelling in complex interventions: insights and perspectives. BMC Med Res Methodol 25(1):135. 10.1186/s12874-025-02585-3
30. Brandão C, Sampaio M, Sousa-Gomes V, Fávero M, Moreira D (2025) Effects of Animal-Assisted Therapy for Anxiety Reduction in Children and Adolescents: A Systematic Review. J Clin Med 14(1):287. 10.3390/jcm14010287
31. Moreta-Herrera R, Vaca-Quintana D, Rodríguez-Lorenzana A, Salinas-Palma A, Moya-Solís A, López-Barrionuevo C et al (2024) Psychometric properties of the 16-item Difficulties in Emotional Regulation Scale (DERS-16) in Ecuadorian teenagers. Revista de Psicología Clínica con Niños y Adolescentes [Internet]. Available from:
32. Crossman MK, Kazdin AE, Matijczak A, Kitt ER, Santos LR (2020) The Influence of Interactions with Dogs on Affect, Anxiety, and Arousal in Children. J Clin Child Adolesc Psychol 49(4):535–548. 10.1080/15374416.2018.1520119
33. Zacks A, Nitsani O (2025 Jul) A methodological tool for characterizing the therapeutic acts of animal-assisted therapy. Human-Animal Interact 3. 10.1079/hai.2025.0029
34. Arnskötter W, Martin S, Walitza S, Hediger K (2024) Effects of including a dog on treatment motivation and the therapeutic alliance in child and adolescent psychotherapy: study protocol for a randomized controlled trial. Trials 25(1):26. 10.1186/s13063-023-07854-4

Figures

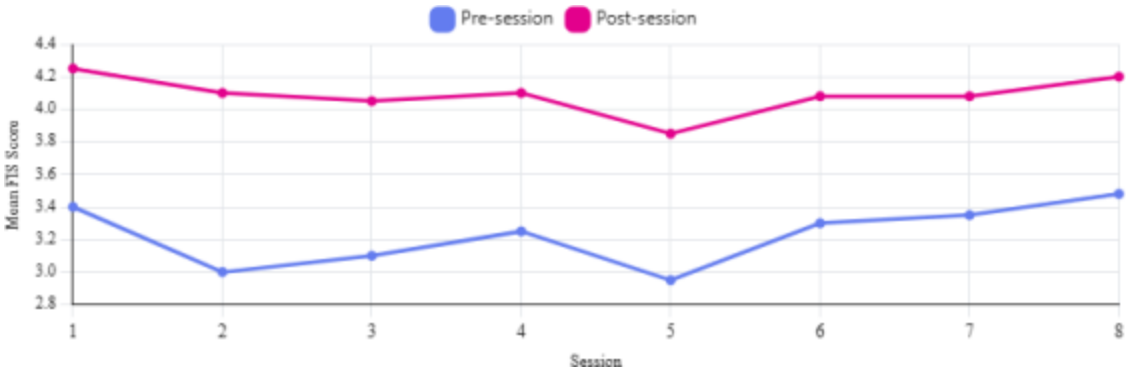


Figure 1

Evolution of FIS scores pre- and post-session.