A neuroaffirmative Self-Determination theory based psychosocial intervention for ADHD Adults: A randomised feasibility study

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Abstract

Background: Neurodevelopmental disorders are complex and heterogeneous, impacting efficacy in treatment design. Multiple syndromes are associated with executive function (EF) deficits, however theories of attention-deficit hyperactivity disorder (ADHD) centralise outcomes arising from impairments in EF for adult treatment. Transdiagnostic approaches are recommended to gain new insights on mental health challenges. Self-Determination Theory (SDT) is a transdiagnostic approach prioritising satisfaction of basic psychological needs and aims to enhance quality of life, identity formation, motivation, and self-regulation.

Objective: This study examines the feasibility and acceptability of a randomised controlled trial to evaluate effectiveness of an SDT-based quality-of-life therapeutic intervention for ADHD adults.

Methods: Recruitment aims were 30 adult participants aged 18+ with a confirmed diagnosis of ADHD and access to a computer or smartphone with an internet connection. Participants were recruited from the Adult ADHD Clinic at the South West Yorkshire Partnership NHS Foundation Trust and allocated through four block randomisation by a non-blinded researcher to an 11-session therapeutic coaching intervention (n=11) or control waitlist (n=9) condition. Feasibility was evaluated by pre- and post-measurements of health-related quality-of-life, psychological distress, ADHD symptomology, ADHD-related quality-of-life, self-reflection and insight, autonomous functioning, and per-session measure of participant impairment issues. Participants also responded to a qualitative feedback interview question on intervention value.

Results: Of the seven measures, only two—the EQ-5D-5L (a brief measure of well-being) and the Index of Autonomous Functioning—failed to detect significant differences across assessment moments. All other measures related to symptomatology, well-being, impairment, and self-reflection detected significant changes. Most participants also provided positive qualitative feedback regarding the intervention's usefulness.

Conclusions: The study suggests that a randomised controlled trial of a Self-Determination Theory-based intervention for adults with ADHD is feasible. Future research should focus on incorporating long-term adherence measures and exploring alternative outcome measures to enhance longitudinal assessment of treatment effects.

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A neuroaffirmative Self-Determination theory based psychosocial intervention for ADHD Adults: A randomised feasibility study

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Abstract

Background: Neurodevelopmental disorders are complex and heterogeneous, creating challenges for efficacy in treatment design. Multiple syndromes are associated with executive function (EF) deficits, however theories of attention-deficit hyperactivity disorder (ADHD) centralise a singular perspective of outcomes arising from impairments in EF for adult treatment. Deficit-based aetiologies state ADHD EF impairments interfere with agentic self-development, perspectives which may inadvertently contribute to social stigma and influence neurotype dysphoria in ADHD identity construction. Challenges to this perspective highlight heterogeneity, context variability, a lack of single EF deficit of origin, correlational neuroimaging data, and minimal investigation into altered brain activity in ADHD research. Recommendations for psychosocial interventions primarily support Cognitive Behavioural Therapy (CBT) which centralises a deficit-based aetiology of ADHD and prioritises symptom reduction and cognitive control of self-regulation as treatment outcomes, skills development requiring additional burdens of cognitive effort and avoidance of emotional experience to minimise negative affect. Transdiagnostic approaches are recommended to gain new insights on mental health challenges. Self-Determination Theory (SDT) presents a transdiagnostic approach providing alternative outcomes through prioritising basic psychological need satisfaction as influential in strong identity formation to support motivation and self-regulation. **Methods:** This study examines the feasibility and effects of an SDT-based quality-of-life therapeutic intervention for ADHD adults. Recruitment aims were 30 adult participants aged 18+ with a confirmed diagnosis of ADHD and access to an internet connection. Participants were recruited from the Adult ADHD Clinic at the South West Yorkshire Partnership NHS Foundation Trust and allocated through four block randomisation by a non-blinded researcher to an 11-session therapeutic coaching intervention (n=11) or control waitlist (n=9) condition. Feasibility was evaluated by pre- and post-measurements of health-related quality-of-life, psychological distress, ADHD symptomology, ADHD-related quality-of-life, self-reflection and insight, autonomous functioning, and individual outcome measure of impairment. Participants also responded to a qualitative feedback interview question on intervention value. **Results:** Adherence was high for both intervention completion (91.6%) and control condition completion (81.8%). Results showed clinically significant improvement on measures of psychological distress, specifically in subscales of Problems ($Z=0.0$, $p(2\alpha)=0.01$), Non Risk ($Z=2.0$; $p(2\alpha)=0.01$), Functions ($Z=5.0$; $p(2\alpha)=0.02$), and Wellbeing ($Z=6.0$; $p(2\alpha)=0.03$); and ADHD symptoms ($Z=3.0$; $p(2\alpha)\leq 0.01$), particularly Inattention ($Z=3.0$; $p(2\alpha)\leq 0.01$), outcomes not specifically targeted by the intervention.

Additional interesting clinically significant findings of improvement in quality-of-life, specifically in Outlook subscale (Z=21; P(2α)=.67), reduction of distress in problems identified in the individual outcome measure and the Need for Self-Reflection subscale of Self-Reflection for the control group (Z=1.0; P(2α)=.05) indicate potential positive effectiveness despite the impact of COVID-19. Positive qualitative feedback on usefulness and transferability of the intervention was provided by 90% of participants. **Conclusion:** This study suggests a randomised controlled trial of an SDT-based psychosocial intervention with non-deficit based outcomes for adults with ADHD is feasible and recommended.

Keywords: ADHD, adult, treatment, psychotherapy, self-determination theory

Introduction

Neurodevelopmental disorders (NDD) are a category of mental health conditions defined by the DSM-5-TR [1] and includes attention-deficit hyperactivity disorder (ADHD), autism spectrum disorder (ASD), neurodevelopmental motor disorders, including tic disorders, intellectual disability, communication disorders, and specific learning disorders. A shared characteristic of NDDs is atypical brain development that generates impairments in cognition, communication, behaviour, and/or motor skills. Within this heterogeneous category [2], [3], the diagnostic and therapeutic approach to ADHD is overwhelmingly governed by a theoretical framework that posits executive function (EF) deficits as the origin of impairment [4], [5], [6], [7]. This EF deficit model proposes that challenges in metacognitive emotional and behavioural management are critical factors impeding the sustained goal-directed activities necessary for foundational development. Success, according to these theories, is predicated on recognition and support from peers and authority figures, which are essential for achieving both self-actualisation and societal functioning [5], [8], [9].

This dominant EF deficit model, however, faces significant and growing scientific challenges. A primary criticism is that no single EF deficit has been identified as significant enough to cause ADHD [10]. Furthermore, EF impairments themselves are not unique to the condition, and can vary widely between individuals based on context [10], [11], [12]. The neurobiological evidence is also less definitive than often assumed; neuroimaging research has not shown structural differences of a magnitude that is significant when compared to controls, and the data remains correlational, unable to establish a definitive causal link [13], [14], [15]. Notably, when neuroimaging does reveal altered brain activity in ADHD participants, such as the recruitment of different response pathways, these variations are frequently categorised simply as “abnormal” rather than being explored as potentially valid, alternative modes of neural organisation [6], [16]. This conceptual fragility calls the very foundation of current diagnostic protocols into question.

The pervasive focus on deficits has important iatrogenic consequences. The closed-label nature of the ADHD diagnosis, combined with negative narratives and stereotypes often promoted by media, means many individuals encounter judgemental responses that alter their social treatment [17], [18], [19], [20], [21], [22], [23]. This social stigma can become internalised as ableism and neurotype dysphoria, particularly as the need for accommodations leads individuals to identify with diagnostic criteria and seek a "cure" for their inherent neurotype behaviours [24]. This process can be unintentionally reinforced by professional guidance based on the deficit model, as articulated by authorities such as Barkley [25]. This perspective frames ADHD as a chronic, incurable condition where medication is the only effective treatment to normalise EF, functionality is dependent on external scaffolding, and any strengths are attributed to individual talent rather than being recognised as potential aspects of the neurotype itself [7], [26], [27], [28], [29], [30], [31]. Consequently, treatment recommendations from bodies like the National Institute for Health and Care Excellence (NICE) prioritise pharmacotherapy, which, while beneficial for many, often leaves patients with significant residual symptoms and functional impairment [15] [32].

The primary evidence-based non-pharmacological treatment, Cognitive Behavioural Therapy (CBT), is also rooted in this deficit model [7], [15], [32], [33]. While recent systematic reviews and meta-analyses show that CBT approaches can improve core symptoms and quality of life, their recommendations remain cautious due to methodological limitations such as diverse protocols, small sample sizes, and high risk of bias [34][35] [36], [37]. The central aim of CBT for ADHD is to strengthen cognitive abilities, increase awareness of behaviour, and reframe maladaptive schema through cognitive reappraisal [6], [7]. This approach, however, presents a fundamental paradox: it demands “effortful coping” [38], and a high cognitive load to manage emotions and behaviour, yet the condition is itself characterised by effort avoidance [39] and inability to allocate sufficient cognitive effort [40]. Moreover, emerging research highlights the possibility that the ADHD neurobiological processing style may not be amenable to the reinforcement learning models upon which CBT is based [41].

Given the conceptual and practical limitations of the current paradigm, there is growing support for transdiagnostic approaches to gain new perspectives on mental health difficulties [42], [43]. For ADHD specifically, recommendations are being made for transdiagnostic models due to the cross-disorder nature of EF impairments, as well as the condition's clinical heterogeneity and context variability [3], [44], [45], and current theories are criticised for isolating domains of functioning and therefore lacking dimensionality and an integrative approach [46], [47]. Self-Determination Theory (SDT) presents a robust, empirically based transdiagnostic framework for understanding

psychopathology [21]. A mini-theory of SDT, Basic Psychological Needs Theory (BNPT), posits that the satisfaction of three universal psychological needs - autonomy, competence and relatedness - is essential for growth, well-being and organismic integration. This process provides the energy for the development of an agentic self [23], [22], [24]. Research shows that the satisfaction of these needs supports mature identity formation and contributes to quality of motivation for long-term goals [52]. Conversely, the frustration or thwarting of these needs, predicts problem behaviours, increases risk of psychopathology, and can forestall identity development [21], [26], [27] [52], [55].

Recent research suggests that this experience of need frustration may function as an underlying transdiagnostic mechanism that can explain diverse forms of psychopathology and their comorbidity [56]. Some studies have examined ADHD behaviours and motivation through an SDT lens, particularly within university environments [57], [58], [59], [60], [61], [62]. However, these applications have remained tethered to a deficit model, invariably using SDT as a tool to address symptom management. At the theoretical level, ADHD aetiology has been interpreted as a manifestation of need frustration and impairment of internalisation [6], [48], [56], yet no studies involving practical application of this non-deficit perspective have been published. This reveals a clear paucity of research in the area. Therefore this study aims to address this critical gap by utilising SDT as an alternative theoretical foundation to explore ADHD expression and support outside the confines of the deficit-based paradigm.

The ADAPT Framework

Champ et al. [6] presents a neuroaffirmative aetiology of ADHD based in SDT, describing ADHD behaviours as neurobiologically altered approaches to processing and task engagement. This non-deficit model of natural ADHD behaviours based on neurodivergent neurobiological needs provides a non-stigmatising foundation for self-regulatory functioning. Combining this model with the understanding of the polar nature of the interaction of ADHD consciousness and the environment as described in the Creative Awareness Theory (CAT) [63] creates a new framework for understanding ADHD lived experience, identity formation and self-regulation. The CAT provides both practitioner and client with a positive model of unskilled attempts at self-regulation, forming an active guide to interpret existing strategies and facilitate development of awareness and self-management skills. Using this framework, it is possible to shift the focus from EF deficits and interpret ADHD psychopathology as a history of fundamental misunderstandings of ADHD motivation and engagement processes resulting in impaired internalisation, need frustration, thwarting and neglect, and subsequent development of maladaptive identities, coping strategies and need substitutes. This generates significant challenges to organismic integration by impairing connection with an authentic

inner compass (AIC) [64], [65]. Based in SDT, the AIC is defined as the feeling and perception of what is truly important for us – voluntary and intrinsic self-guiding preferences including values, life aspirations, interests and goals which feel authentic and become long term as we mature. Lack of confidence and confusion regarding these preferences can impact the ability to make choices, resulting in feeling incapable of true self-direction. Research indicates that active and reflective formation of a strong sense of the AIC demonstrates an understanding of authentic core preferences expressed as agency leading to experiences of autonomy, growth, resistance to peer pressure, and resilience [64], [65], [66]. The ADAPT Framework aims to support individuals with ADHD using a multi-modal psychotherapeutic approach to increase self-awareness of their unique neurobiology, develop their AIC, understand their basic psychological needs and needs based on their neurobiological differences, and support internalisation of identity commitments. This foundation will facilitate task and environmental engagement, increase motivational activation, and feelings of confidence in their ability to design strategies to meet their needs, manage self-regulation and develop life crafting skills in a variety of contexts [67], [68], [69]. It is hypothesized that a neuroaffirmative ADHD treatment program which introduces the above framework will reduce symptoms, demonstrate changes in specific psychological difficulties, improve self-awareness, evidence personal experience of change, increase feelings of autonomy, and improve quality of life.

Aims and Objectives

To progress to an RCT, it is critical to identify the most appropriate outcome measures for an SDT-based intervention for adults with ADHD. To provide clear guidance of good research conduct specifically for pilot and feasibility studies in preparation for an RCT assessing intervention or therapy effectiveness, Eldridge et al. (2016) developed an extension to the 2010 CONSORT guidelines for RCTs. This framework aligns with UK MRC guidance on complex interventions and NIHR definition of pilot studies. Throughout this study, the design will be referred to as a randomised feasibility study and therefore will refer to this framework as guidance. In maintaining this standard, the extension for nonpharmacologic treatment interventions to the 2010 CONSORT guidelines for reporting has been added [71] (See S1).

As randomised controlled trials (RCT) are still upheld as vital for informing policy decisions [72], the call for transdiagnostic-based perspectives provides a good opportunity to offer the ADAPT Framework as a novel non-pharmacological ADHD treatment approach. Therefore, this study aims to examine the feasibility, acceptability, and potential effectiveness of a randomised feasibility study evaluating a novel SDT-based programme of therapeutic self-development, psychoeducation and skills training for adults with a diagnosis of ADHD. The study objectives were to:

- Evaluate feasibility of delivering an 11-session online self-development therapeutic intervention to an adult ADHD patient group accounting for attrition rates of recruited participants
- Evaluate acceptability of randomisation to an adult ADHD population for a therapeutic self-development intervention
- Evaluate acceptability of multiple measures to an adult ADHD population, including SDT-based measures for autonomy and self-reflection
- Evaluate the most appropriate outcome measure for the ADAPT Framework for adults with ADHD
- Evaluate the potential effectiveness of the ADAPT Framework on ADHD symptoms, quality of life, self-awareness, autonomous functioning and personal experience of change

Methods

Sample

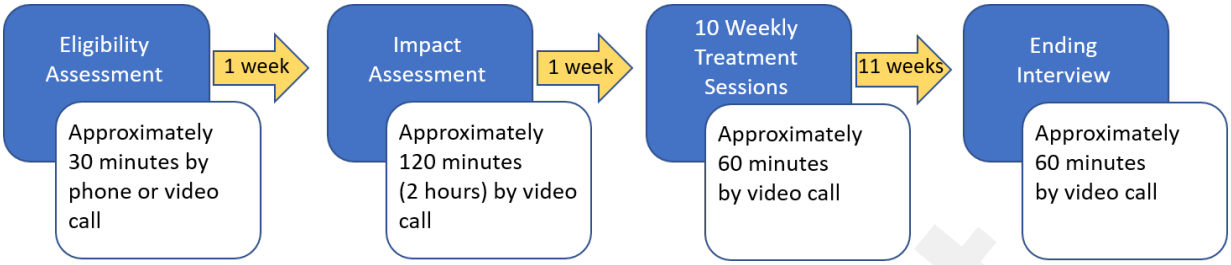
Sample sizes for feasibility studies are much debated [73] and recommendations vary from 10 – 12 per group to 60 – 75 per group depending on study objectives [74]. Consultation with a University of Huddersfield statistician did not result in formal sample size calculation recommendations. To achieve ethical approval and with reference to the rule of thumb for a medium to large effect size ($0.3 < 0.7$), sample was set at 2 groups of 10, however in anticipation of dropouts the study aimed to recruit 30 participants.

ADAPT Framework Intervention

Eleven participants received 11 sessions of online individually focused therapeutic coaching not currently accessible within the service (See S2). Treatment included 1 two-hour assessment session exploring personal challenges and lived experience of ADHD including a foundation section in neuroaffirmative SDT-based psychoeducation focused on neurobiological responses to environmental engagement [6], followed by 10 one-hour sessions of therapeutic coaching. Excluding Session 1 of 10 which focused on time management skills for immediate and overinclusive processing styles [6], each session centralised autonomy-supportive client-led problem identification, facilitating development of self-awareness of motivational factors in task initiation and engagement, application of context-oriented strategy development, and support for neurobiological and basic psychological needs. The researcher delivering the intervention was a psychotherapist and coach with 13 years' experience in a specialist ADHD private practice. Intervention was supervised by a British Association for Counselling and Psychotherapy (BACP) accredited psychotherapist to review

case work and measure progress. Figure 1 summarises the flow of participants through the intervention.

Figure 1: Overview of ADAPT Framework pilot study assessment time and frequency of intervention sessions



Waitlist Control Group

Nine participants who fulfilled the same inclusion criteria and assessed with the same methodology were also enrolled in the therapeutic self-development intervention following a 12-week wait.

Ethical and Governance Considerations

The ethical process for this project was reviewed by the University of Huddersfield School of Human and Health Sciences – School Research Ethics and Integrity Committee (SREIC) and received Health Research Authority (HRA) and Care Research Wales (HCRW) approval (See S3). All sessions with participants were held in adherence with the Ethical Framework for Good Practice set by the UK Council for Psychotherapy (UKCP)(2019). The REC reference for the study is 21/SC/0143. The IRAS project ID is 291103. The trial protocol can be accessed at www.clinicaltrials.gov under project ID: NCT04832737.

The ethical implications for this study were considered in the following contexts:

Confidentiality and Anonymity

To protect identity of individual participants, all personally identifiable data (PID) was anonymised and will not be released. Information on confidentiality policy and anonymisation of PID was included in the consent form. Participants in the pilot study were offered a counselling agreement confirming that all details and discussions within the therapeutic relationship are confidential, unless they or anyone else is at risk of serious harm as per UKCP Ethical Guidelines (2019) (See S3).

Data Protection and Data Storage

The researcher complied with the General Data Protection Regulation (GDPR), the NHS Confidentiality Code of Practice, the Computer Misuse Act (covering information security), and all Local Trust Policy with regards to the collection, storage, processing and disclosure of personal information. All participant case records were kept in electronic form (consent forms, agreements, interviews), and participants' home addresses (including postcodes) and telephone numbers were

kept on a secure database and spreadsheet on NHS/University computers held in accordance with the Data Protection Act [76].

Coercion and Consent

Participants received an initial interview invitation to discuss study participation. An information sheet detailing the purpose, activities, outcomes, and results of was provided, including the researcher contact details (name, phone number, email address) (See S3). Participants were encouraged to read the information sheet and ask questions on assessment day prior to signing the consent form (See S3). The voluntary nature of participation and the ability to withdraw an individual's consent at any time was emphasised during the study. All participants were offered the intervention as compensation for their time and participation.

Potential emotional stress to the participant

The researcher recognised some participants might be recently diagnosed with ADHD. Incorporating this information into their identity and self-concept initiates entry into a process of acceptance which may include elements of anger and grief. The researcher was a qualified psychotherapist with 10 years of experience, and a distress policy was created as part of the research protocol. Participants were in current clinical care of the NHS Adult ADHD Service at the South West Yorkshire Partnership NHS Foundation Trust who were made aware of any additional support requirements should they be required.

Length of time data will be stored

In accordance with the Data Protection Act (1998) personal data will not be retained for longer than is necessary. All Participant personal data, transcripts, recordings, memos and process notes were retained for the duration of the project and were accessible by the researcher only. To submit for publication, participant data was retained to obtain permission for the study results to be published, in accordance with ethical approval. Anonymised electronic data were retained in a secure password protected spreadsheet and database. Hard copy data including process notes were stored in a locked cabinet. Videos of the intervention sessions were recorded for random review by university supervisors to ensure intervention fidelity and destroyed on review completion.

Procedure

The design selected was a randomized, controlled study, with a 1:1 allocation ratio to two small independent groups (Control and Intervention), a longitudinal design (Before and After), and repeated online measures or surveys. Participants randomly assigned to Intervention group and waitlist Control group were assessed at pre-treatment and post-treatment, and within treatment

measures were assessed during the intervention only. Measures for assessments moments at intervention initiation and completion were one before and one after for both groups, and the within session measure increased the assessment moments to ten for each session. Due to COVID-19 restrictions for research that required in-person contact, all interviews, screening, data collection and treatment sessions were conducted online on an NHS approved video platform.

Clinical measures

EQ-5D-5L

The EQ-5D questionnaire [47] is a self-rated scale measuring health-related quality of life (QoL) in adults used to assess treatment effect before and after treatment by measuring gains or losses in reported health status. It produces a 5-digit health state profile representing the level of reported problems on 5 dimensions of health, and lower ratings indicate better health states. This generates a health state profile and each health state can be assigned a summary index score based on societal preference weights, or "utilities", for that health state.

Clinical Outcomes in Routine Evaluation - Outcome Measure (CORE-OM)

Participants' self-reported awareness of psychological distress was measured with the CORE-OM [78]. This is a 34-item scale assessing four subscales: wellbeing (W), problems (P), functioning (F) and risk (R) within a 7-day timeframe. Items are rated on a 6-point Likert-type sale (1 = *not at all*, 6 = *most or all the time*) with higher ratings indicating worse outcomes and greater psychological distress.

Attention Deficit Hyperactivity Disorder Rating Scale, Investigator-Administered (ADHDRS-IV-Inv)

The Conners Adult ADHD Rating Scales (CAARS) was developed by Conners, Erhardt, and Sparrow [79], to assess symptoms of ADHD in adolescents. The ADHDRS-IV-Inv is an 18-item measure extracted from CAARS-O:S assessing severity of ADHD inattentive (I) and hyperactive-impulsive (H) symptoms corresponding to the 18 items in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR) providing a combined rating for severity and frequency of symptoms [80], [81]. Participants are assessed on a 4-point scale (0 = *not at all, never*; 3 = *very much, frequently*) with severity indicated by higher ratings. The scale demonstrates good reliability, consistency, relative validity and concurrent validity (α =.74 to .95).

Attention Deficit Hyperactivity Disorder Quality of Life Scale (AAQoL)

The AAQoL is a 29-item measure assessing five ADHD-related quality-of-life areas of impact in four dimensions: Productivity, Mental health, Life outlook and Relationships [82]. Participants

evaluate the degree of frequency the issue is problematic using a 5-point Likert-like scale (1 = *not at all/never*, 5 = *extremely/very often*) with higher ratings indicating problem frequency. Higher score ratings indicate poorer quality of life.

Self-Reflection and Insight Scale (SR&I)

SDT highlights self-awareness as key in development of a strong AIC and ability to identify basic psychological need frustration. The SR & I measure was used to assess individual differences in self-awareness [54]. This self-report 20-item scale consists of three subscales: an 8-item for experience of self-reflection (EoSR); an 8-item for need for self-reflection (NfSR); and an 8-item for insight (I). Participants reviewed their current state against a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*) with high ratings indicating better and frequent use of reflection skills.

Index of Autonomous Functioning (IAF)

In SDT, autonomous behaviour is experienced as self-congruous and integrated, however continual regulation of behaviour can vary from highly autonomous, or truly self-regulated, to regularly experiencing external regulation from controlling influences [56]. Participants completed a 15-item, 5-point Likert-type scale (1 = *not at all true*, 5 = *completely true*) aiming to measure individual differences in autonomy in three dimensions: Authorship; Control; and Interest. Higher ratings in any of these dimensions by inversion signifies greater autonomy.

Personal Questionnaire (PQ)

An RCT for an intervention must demonstrate statistical significance of effectiveness for treatment to be recommended. Practice based evidence approaches in psychotherapy have experienced challenges in this area due to the generic nature of measures, which can lack specificity and sensitivity in identifying subtle shifts in an individual's functioning, therefore the use of a personalised outcome measure is recommended [85]. For this study, within treatment measures consisted of the Personal Questionnaire (PQ)[86], an individualised outcome measure which compared the efficacy of the intervention in two different groups of participants. It is generated by the participant identifying up to a maximum of ten issues they would like to address in the intervention. These are identified in the assessment session and a 7-point within session rating of distress (1 = n*ot at all*; 7 = *maximum possible*) is completed at the start of each session for the duration of the treatment..

Qualitative measure

Thematic analysis

Thematic analysis is a popular method of qualitative research analysis emphasising identifying, analysing, and interpreting patterns of meaning in data. Participants were offered the opportunity to answer a single question regarding their experience within the final session of the 11-session intervention.

Statistical Analysis

With only 20 participants, tests suitable for analysis of small samples were used throughout. Demographic and clinical characteristics were also tested for significant differences between Intervention and waitlist Control. In some cells, expected frequencies were below 5 participants, therefore Fisher exact tests (2α) were used to test independence of experimental groups and nominal or ordinal demographics with two levels or categories. Cramer's V was used to test the independence of experimental groups and nominal or ordinal variables with more than two groups. A Mann-Whitney U test determined the independence of experimental groups on scale variables (See Table 2).

To determine if the two groups differed between assessment moments over time a non-parametric Wilcoxon signed-rank test comparing pre- and post- data was used for all measures apart from the within session measure, the Personal Questionnaire (PQ). A Friedman's test was used to analyse the data collected across ten assessment moments (T1 to T10) of the PQ in association with Bonferonni-corrected multiple comparisons.

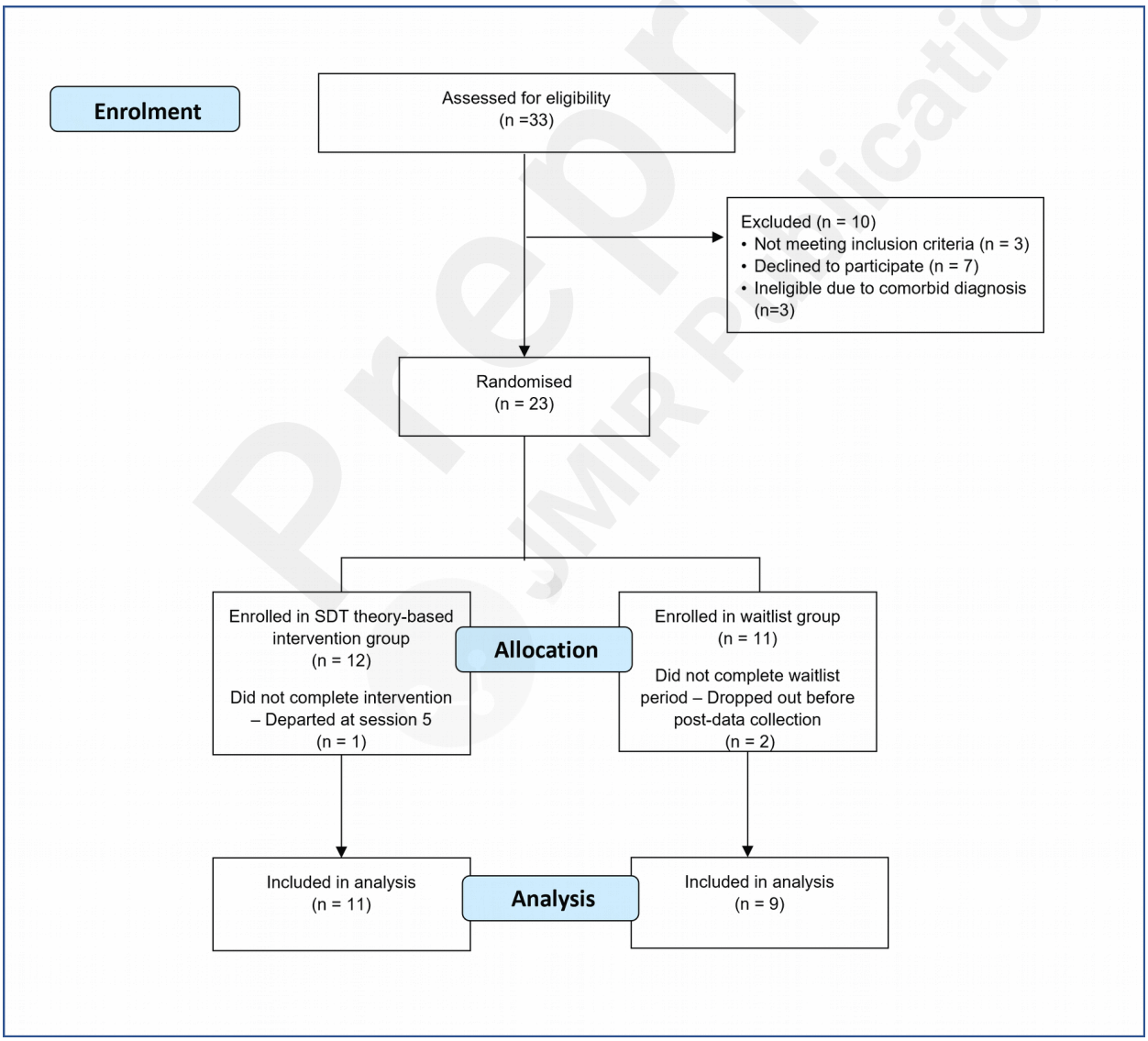
Comparing pre- and post-test results of all measures was considered in terms of reporting on possible efficacy of the intervention. However, due the use of multiple measures in this study, a single general score identified as "Total" was calculated by adding up every rating to provide an indicator of the performance of participants in each one of the six repeated measures. After establishing pre-test values for every Total variable, and MedT1, the normality of the distribution of these scores was tested using the Shapiro-Wilk normality test. The independence of Total scores from group assignment procedures was tested with a Mann-Whitney U to clarify if groups were potentially biased in terms of pre-test values. Finally, correlations between these variables were tested with Spearman's correlations, along with Fieller, Hartley, and Pearson confidence intervals for correlations. All analysis was conducted with SPSS version 29.

Results

Recruitment and retention

Eligibility criteria consisted of age 18+ with a confirmed diagnosis of ADHD and access to a computer or smartphone with an internet connection. Participants with comorbid diagnosis (e.g. Autism, Bi-polar, Intellectual Disabilities, Learning Difficulties, Traumatic Brain Injury, Psychosis or Tourette's), diagnosis of substance abuse or personality disorders, or other mental health disorders (e.g. PTSD, Oppositional Defiant Disorder) were not eligible for the study. Medication was not listed in exclusion criteria as participants were under current NHS treatment. Additionally, research indicates multi-modal treatment is recommended for ADHD adults [13], [10]. Figure 2 outlines the participant recruitment process.

Figure 2: ADAPT Framework pilot study recruitment and participation flowchart



Participants were recruited by staff from the Adult ADHD Clinic at the South West Yorkshire

Partnership NHS Foundation Trust, which proved challenging due to high rates of ADHD comorbidity (58.4%) [87]. Recruited and randomised participants in this study consisted of 23 adult NHS patients between May 2022 and September 2022, 76% of the original target of 30 participants. Reasons for non-recruitment included those who declined (n = 7) and those who were discovered to be ineligible due to comorbid diagnosis of dyslexia and dyspraxia, dyslexia only and general anxiety disorder (n = 3). The researcher contacted and allocated a rolling entry of participants using 4 block randomisation to the intervention or waitlist control over a 12-week period. The randomisation was not blinded as the researcher also delivered the intervention.

Attendance analysis showed an average of 15 weeks for participants to complete the 11-session program. Attrition rate for the full study was 13.04% of 23 participants (See Figure 2). One intervention participant left at Session 5 and two waitlist control group participants dropped out before post- measure data collection without continuing on to the intervention. Correlations between demographic and clinical indicators show that fewer dropout participants were medicated (rs=-0.422; *P*=0.045). Therefore, dropout rates suggest there may be a small risk of bias. However the confidence interval for this estimate was large, varying between -0.711 and -0.01 (See S5, Tables 10 and 11).

Measures acceptability

This study aimed to evaluate the acceptability and accessibility of measures by participants with adult ADHD. Two participants did not complete the pre- or post- ADHD Quality of Life measure, which left 10 participants in the intervention group for this measure. In the sense of autonomy measure (IAF), two participants had missing answers at pretest, which were resolved through imputation strategies based on the response pattern of each participant.

In the PQ, participants selected up to a maximum of 10 issues to evaluate through the intervention. Absent ratings for any issue were also absent for the total timeframe of the intervention, indicating that an issue had not been identified to evaluate. Therefore, in both groups the sample size decreased as the number of issues identified increased (See Table 1).

Table 1: ADAPT Framework pilot study PQ measure of distribution of missing values and valid sample size

	Intervention		Control	
Indicator	**Missing values**	**Sample size**	**Missing values**	**Sample size**
Variable				
P1 to P6	0	11	≈0 (1 problem lacked ratings)	8
P7	0	11	1	8

P8	1	10	3	6
P9	2	9	6	3
P10	6	5	6	3

One control participant only completed 9 of 10 measures of the PQ, and therefore an imputation strategy was used based on the response pattern of the participant (See S4).

Demographics and clinical characteristics

Participant age range varied between 20 and 56 years, with a mean of 33.35 (SD=10.1). In total, 13 participants identified as male, 8 participants identified as female, and 2 identified as transgender. Most participants (20) identified as White British citizens. Clinically, 14 participants received a combined diagnosis of ADHD, 15 participants had been diagnosed after 2020, and 18 (78.26%) were actively taking prescribed medication at the time of the study. There was no bias in terms of the distribution of assessed demographic and clinical attributes as the group assignment was observed to be independent from Gender (Cramer's V=0.038; P=0.983); Age (Mann Whitney's U=85.5; $P(2\alpha)$=0.235); Race-Nationality (Fisher's Exact test $P(2\alpha)$=0.093); Diagnosis (Cramer's V=0.13; P=0.825); Date of diagnosis (Mann Whitney's U=64.5; $P(2\alpha)$=0.928); and Medication (Fisher's Exact test $P(2\alpha)$=0.640) (See Table 2).

Correlations between post-test Totals and demographics were also inspected to identify any participants who might be more susceptible to the intervention. The date of the diagnosis correlated to: EQ-5D-5L Total (rs=0.573; $P(2\alpha)$=0.08); SRI Total (rs=-0.543; $P(2\alpha)$=0.013); and ADHDRS (rs=0.553; $P(2\alpha)$=0.011). This indicates the more recently participants had been diagnosed the stronger were their symptoms of ADHD, and the poorer were their reflection abilities and their health state.

Quantitative analysis for measure effectiveness

Table 3 summarizes the Means (M) and Standard-Deviations (SD) for each of the measures used at pre-test and at post-test, namely: EQ-5D-5L; CORE-OM; ADHDRS-IV-Inv; AAQoL; SR & I; and IAF. Results are also unpacked one by one, for each scale in the following subsections.

Health-related Quality of Life (EQ-5D-5L)

An EQ-5D-5L profile for each participant rating was generated from the data, and frequencies of every profile were determined by assessment moment and group. Only one waitlist Control group profile showed a frequency higher than one, profile 11112, which was detected in three participants at both pre-test and post-test and no reported health state change. Findings suggest participants self-assessed their health as generally good, with slight problems in one or another single area. Wilcoxon

Signed Rank test results for the Intervention group (W=14.0, with a two-tailed significance of 0.3.) for the subscales of Mobility (W=1.5; *P*(2α)=1.0), Self-Care (W=1.5; *P*(2α)=1.0), Activities (W=7.0; *P*(2α)=0.11), Pain/Discomfort (W=5.0; P(2α)=1.0) and Anxiety/Depression (W=7.7; *P*(2α)=1.0); and the Control group (W=4.5, with a two-tailed significance of 0.85) for the subscales of Mobility (W=0.0; *P*(2α)=1.0), Self-Care (W=1.0; *P*(2α)=.32), Activities (W=3.5; *P*(2α)=.79), Pain/Discomfort (W=2.5; *P*(2α)=.16) and Anxiety/Depression (W=5.0; *P*(2α)=1.0) showed no significant differences in either group between pre- and post-test results.

Psychological distress (CORE-OM)

Wellbeing, problems, functioning and risk as assessed by the CORE-OM showed most participants experienced low levels of distress in every measure, and mean scores decreased overall in both groups at post-test. A single exception was the Total score measure for the Control group, which showed a small increase at post-test suggesting interference in longitudinal outcomes by confounding factors. Subscales showing the highest averages representing the greatest difficulties were Wellbeing and Problems, and lowest averages were in items assessing Risk. In the Intervention group, significant differences were identified in four subscales: Wellbeing (Z=6.0; *P*(2α)=.03); Problems (Z=0.0, *P*(2α)=.01); Functions (Z=5.0; *P*(2α)=.02); and Non-Risk (Z=2.0; *P*(2α)=.01); but not in Risk (Z=4.0; *P*(2α)=.71); Risk to Self (Z=1.0; *P*(2α)=.66); or Risk to Others (Z=6.0; *P*(2α)=.66). In the Control group, only Non-Risk showed significant differences across assessment moments (Z=3.0; *P*(2α)=.04) with none shown in Wellbeing (Z=12.0; *P*(2α)=.39); Problems (Z=5.0; *P*(2α)=.13); Functions (Z=7.0; *P*(2α)=.07); Risk (Z=1.0; *P*(2α)=.66); Risk to Self (Z=1.0; *P*(2α)=.66) or Risk to Others (Z=1.5; *P*(2α)=1.0).

Table 2: ADAPT Framework pilot study frequency of demographic attributes per participant group, and overall

Group Characteristic	**Intervention** N (%)	**Control** N (%)	**Total** N (%)
Size	12 (52.2%)	11 (47.8%)	23 (100%)
Gender			
Male	7 (30.4%)	6 (26.1%)	13 (56.5%)
Female	4 (17.4%)	4 (17.4%)	8 (34.8%)
Transgender	1 (4.4%)	1 (4.4%)	2 (8.7%)
Total	12 (52.2%)	11 (47.8%)	23 (100%)
Age			
33 or less	9 (39.1%)	7 (30.4%	16 (69.6%)
More than 33	3 (13%)	4 (17.4%)	7 (30.4%
Total	12 (52.2%)	11 (47.8%)	23 (100%)
Race			
White British	12 (52.2%)	8 (34.8%)	20(87%)
Not White British	0 (0%)	3 (13%	3 (13%
Total	12 (52.2%)	11 (47.8%)	23 (100%)

ADHD subtype			
Inattentive	3 (13%)	4 (17.4%)	7 (30.4%
Hyperactive	1 (4.4%)	1 (4.4%)	2 (8.7%)
Combined	8 (34.8%)	6 (26.1%)	14 (60.1%)
Total	12 (52.2%)	11 (47.8%)	23 (100%)
Date of Diagnosis			
Before 2020	4 (17.4%)	4 (17.4%)	8 (34.8%)
During or after 2020	8 (34.8%)	7 (30.4%)	15 (65.2%)
Total	12 (52.2%)	11 (47.8%)	23 (100%)
Medication			
None	2 (8.7%)	3 (13%)	5 (21.7%)
Prescribed	10 (43.5%)	8 (34.8%)	18 (78.3%)
Total	12 (52.2%)	11 (47.8%)	23 (100%)

ADHD symptom severity (ADHDRS-IV-Inv)

As assessed by the ADHDRS-IV-Inv scale, the Control group reported slightly greater symptom severity at pretest than the Intervention group. However, a decrease was registered from pre- to post-test in both groups across the scales of this measure. Wilcoxon signed-rank test confirms that while both groups registered improvements at post-test, significant differences in favour of the Intervention group were seen with most improvements registered in the Inattention scale (Z=3.0; $P(2\alpha)\leq.01$), versus Hyperactivity (Z=2.5; $p(2\alpha)\leq.05$) and Total scale (Z=3.0; $P(2\alpha)\leq.01$) against Control group Inattention (Z=3.0; $P(2\alpha)\leq.05$), Hyperactivity (Z=0.0; $P(2\alpha)\leq.05$) and Total (Z=0.0; $P(2\alpha)\leq.05$) scores.

ADHD Quality of Life (AAQoL)

The AAQoL is a self-report of the impact of ADHD symptoms on quality of life. Analysis of Intervention participants is limited to 10 as one participant did not complete the measure (ID =5). Means and standard deviations observed for both groups show mid-scale replies for both assessment moments, demonstrating neither very positive nor very negative quality-of-life. Subscale analysis indicates the Intervention group increased in Productivity and decreased in Mental Health and Relationships, while Outlook showed no change; while Control group also increased in Productivity, averages were lower, and quality-of-life decreased in Mental Health, Relationships, and Outlook. Wilcoxon signed-rank test showed significant differences were observed in both groups on every scale between assessment moments except for Total score. Positive changes, indicative of increased distress, were reported in the Intervention group for in Mental Health (Z=28.0; $P(2\alpha)=.02$), Outlook (Z=21; $P(2\alpha)=.67$), Relationships (Z=32.5; $P(2\alpha)=.04$), and in Total scores (Z=31.0; $P(2\alpha)=.72$) but not in Productivity (Z=7.0; $P(2\alpha)=.04$). Negative changes, and therefore less distress, were reported in the Control group for Productivity (Z=3.0; $P(2\alpha)=.02$), but more distress reported in Outlook

(Z=26.0; *P*(2α)=.04), in Mental Health (Z=34.0; *P*(2α)=.02), in Relationships (Z=23.0; *P*(2α)=.48) and in Total scores (Z=21.5; *P*(2α)=.62).

Self-awareness (SR & I)

The SR & I is an SDT-based self-report self-awareness measure, with increases in scoring indicating positive change. Rankings were higher at Intervention post-test across all measures indicating improvement overall, however higher rankings were observed in Need Reflection in both assessment moments with slightly higher at post-test, while lowest rankings highlight weakness in the Insight scale. Both Self-Reflection and Need Reflection subscales show higher results at Control group baseline indicating a decrease in self-reflection skills post-test. Wilcoxon signed-rank test showed no significant differences for the Intervention group in subscales for Self-Reflection (Z=20; *P*(2α)=.78); Need for Self-Reflection (Z=13.5; *P*(2α)=.93); Insight (Z=47.5; *P*(2α)=.2); or Total (Z=42.5; *P*(2α)=.4). Results for the Control group showed no significant differences in subscales for Self-Reflection (Z=10.0; *P*(2α)=.5); Insight (Z=35.5; *P*(2α)=.12); or Total (Z=26.0; *P*(2α)=.67), but significant differences in the Need for Self-Reflection subscale (Z=1.0; *P*(2α)=.05), indicating worse results.

Sense of autonomy (IAF)

The IAF is an SDT-based self-report measure of experiences of a sense of autonomy, with increases in scoring indicating positive change. Means indicate most participants reporting moderately satisfactory levels of autonomy, with an average distribution of 12.5 for each scale and 37.5 for Total score. Intervention group post-test means were higher for every measure, with the highest being Total score in both assessment moments. Conversely, highest averages of each pair of subscales were not always observed post-test in the Control group, with only the Control scale demonstrating high averages. The highest averages were observed for Interest, then Authorship, then Control in both groups. Wilcoxon signed-rank text showed there were no significant differences in Authorship (Z=50.0; *P*(2α)=.13), Control (Z=39.0; *P*(2α)=.24) or Interest (Z=35.5; *P*(2α)=.41), the closest being Total (Z=52.5; *P*(2α)=.08) for the Intervention group; or Authorship (Z=20.5; *P*(2α)=.81), Control (Z=23.5; *P*(2α)=.91),Interest (Z=10.0; *P*(2α)=.25), or Total (Z=13.0; *P*(2α)=.48) for the Control group.

	Intervention group				Control group			
Variable	Pre *M*	(*SD*)	Post *M*	(*SD*)	Pre *M*	(*SD*)	Post *M*	(*SD*)
EQ-5D-5L								
Index Value	0.70	(0.23)	0.73	(0.16)	0.78	(0.16)	0.8	(0.12)
Total	8.91	(2.98)	8.36	(2.20)	7.89	(2.71)	7.67	(2.24)
CORE-OM								
Wellbeing	1.82	(0.51)	1.34	(0.36)	1.47	(0.81)	1.31	(0.89)
Problems	1.73	(0.53)	1.11	(0.35)	1.47	(0.62)	1.25	(0.67)
Functioning	1.57	(0.75)	1.12	(0.42)	1.57	(0.68)	1.19	(0.60)
Risk	0.08	(0.16)	0.05	(0.08)	0.13	(0.23)	0.11	(0.17)
Non-Risk	1.67	(0.53)	1.15	(0.27)	1.52	(0.63)	1.23	(0.63)
Risk to Self	0.05	(0.15)	0.02	(0.08)	0.17	(0.33)	0.14	(0.22)
Risk to Others	0.14	(0.23)	0.09	(0.20)	0.06	(0.17)	0.06	(0.17)
Total	1.39	(0.44)	1.21	(0.23)	1.27	(0.55)	1.32	(0.33)
ADHDRS-IV-Inv								
Inattention	17.45	(5.17)	13.55	(4.12)	19.0	(4.98)	17.22	(4.82)
Hyperactivity	16.0	(5.6)	12.36	(5.4)	17.67	(5.1)	15.22	(5.63)
Total	33.45	(9.94)	25.91	(9.32)	36.67	(8.4)	32.44	(8.58)
AAQoL								
Productivity	52.96	(15.27)	46.59	(13.77)	58.59	(13.72)	50.50	(8.71)
Mental Health	40.42	(19.75)	47.08	(17.9)	39.82	(19.22)	49.54	(16.6)
Outlook	61.43	(16.74)	61.43	(13.66)	50.0	(11.85)	55.95	(12.11)
Relationships	44.50	(20.0)	54.0	(19.65)	41.67	(11.99)	45.0	(22.08)
Total	50.95	(9.12)	51.55	(6.52)	40.71	(4.76)	50.67	(7.43)
SR & I								
Self-Reflection	4.17	(1.49)	4.24	(1.32)	4.50	(0.89)	4.37	(1.24)
Need for Self-Reflection	4.91	(0.94)	4.97	(0.80)	5.57	(0.32)	5.09	(0.61)
Insight	3.35	(1.01)	3.71	(0.82)	3.01	(1.12)	3.61	(1.21)
Total	4.06	(1.04)	4.25	(0.82)	4.23	(0.55)	4.28	(0.78)
IAF								
Authorship	16.04	(2.78)	17.55	(3.11)	16.89	(4.31)	16.33	(3.87)
Control	14.41	(4.82)	16.00	(5.48)	14.78	(3.80)	14.89	(3.85)
Interest	18.73	(3.74)	20.45	(4.08)	19.22	(2.91)	18.22	(4.71)
Total	49.18	(8.12)	54.00	(7.39)	50.89	(8.01)	49.44	(9.46)

Table 3: ADAPT Framework pilot study results of Primary Outcome Measures

Note: CORE-OM = Clinical Outcomes in Routine Evaluation – Outcome Measure; ADHDRS-IV-Inv = Attention Deficit Hyperactivity Disorder Rating Scale, Investigator-Administered; AAQoL = Attention Deficit Hyperactivity Disorder Quality of Life Scale; SR & I = Self Reflection and Insight Scale; IAF = Index of Autonomous Functioning.

Within session individual outcome measure (PQ)

The individual outcome measure analysis was performed on both groups independently, with the control group serving as a replication group undergoing the intervention. Two approaches were used for PQ data analysis. In an item-based approach comparing each problem, session

by session in each group, the widest and narrowest range of the scale selected by participants were compared (See Table 4). This measure was useful as participants used the full range of the scale. In terms of levels of distress, examination of the range of medians indicates higher levels of distress in the intervention group then in the control group.

Table 4: ADAPT Framework pilot study PQ measure of range and median comparison of individual outcomes

	Intervention	**Control**
Largest range	7 (P1T1; P8T5; P9T2)	6 (P8T7)
Narrowest range	2 (P1T8)	1 (P1T4; P4T6 to P6T10; P5T2, P5T4, and P5T6 to P5T10)
Highest median	6 (P2T1; P5T3 and P5T6; P7T2; P9T1)	6 (P6T1)
Lowest median	3 (P10T9)	2 (P9T8; P10T8)

In a time-related median based approach medians for the ten moments (T1 to T10), were determined for every participant and used to compare groups. T6 functioned as the latest assessment moment where all participants identified an issue, however, comparisons up to T10 are included. Greater levels of distress in the Intervention group were indicated, however a larger range of the intensity of distress was observed in the Control group in both means and standard deviations (See Table 5). These findings remain consistent when analysis of missing data is included despite only 5 of 11 (45%) participants contributing ratings from the Intervention group, and 3 of 9 (33%) from the Control group. There is a small observable decrease in distress in the Control group (See Figure 3).

A Friedman's test compared item-based ratings problem by problem (See Table 6). Statistically significant differences were detected in the Control group for every problem except T9 and T10, where the sample size was small (n=3). Multiple comparisons were performed to identify which pair contributed to notable differences, with significance values adjusted by the Bonferroni correction for multiple tests. The only problems which remained significant were: P1, between T1 and T10 ($P(2\alpha)=.037$); P2, between T2 and T9 ($P(2\alpha)=.024$); for P4, between T2 and T10 ($P(2\alpha)=.043$); P5, between T1 and T4 ($P(2\alpha)=.017$), T1 and T9 ($P(2\alpha)=.003$), and T1 and T10 ($P(2\alpha)=.017$); and, for P7, between T1 and T10 ($P(2\alpha)=.002$), and T2 and T10 ($P(2\alpha)=.008$).

Table 5: ADAPT Framework pilot study PQ measure of Means and Standard Deviations (SD) of' medians (T1 to T10) of individual outcomes

	Intervention	**Control**

Moments	N	Mean	SD	N	Mean	SD
Median T1	11	4.82	1.65	9	5.39	0.78
Median T2	11	4.55	1.49	9	4.67	0.56
Median T3	11	4.59	1.51	9	4.00	0.56
Median T4	11	4.41	1.02	9	4.06	0.64
Median T5	11	4.41	1.72	9	3.89	0.55
Median T6	11	4.36	1.19	9	3.89	1.45
Median T7	11	4.18	1.10	9	3.33	1.23
Median T8	11	4.36	1.42	9	3.67	1.44
Median T9	11	4.50	1.16	9	3.39	1.22
Median T10	11	4.55	1.21	8	3.19	1.13

Figure 3: ADAPT Framework pilot study PQ summary of median variables of within session assessment moments (T1-T10)

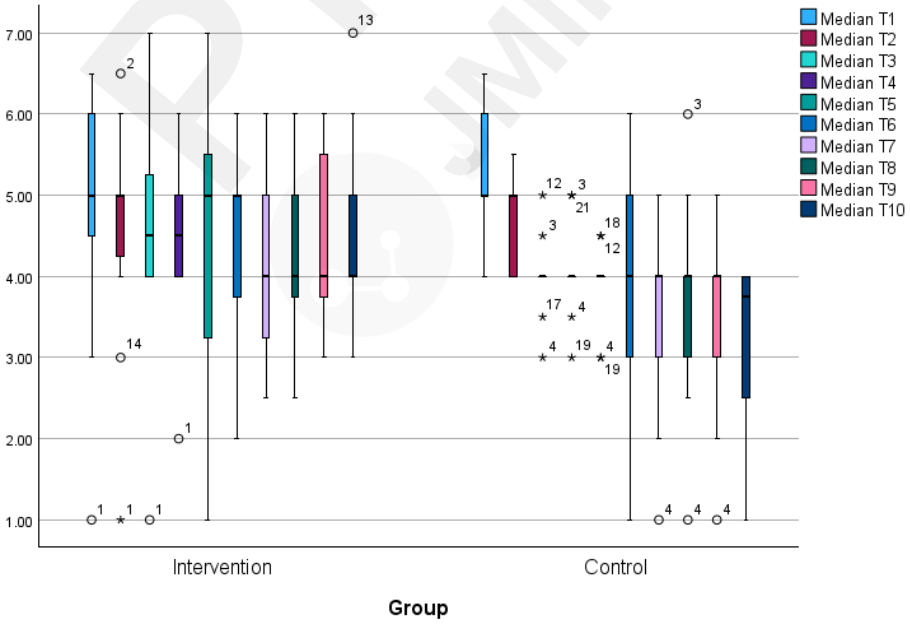


Table 6: ADAPT Framework pilot study PQ Friedman's test for T1 to T10 across individual outcomes

Problem	Intervention	Control
P1 T1-T10	Fr(9)=14.24; p(2α)=0.11	Fr(9)=29.33; p(2α)≤0.01
P2 T1-T10	Fr(9)=5.96; p(2α)=0.74	Fr(9)=29.92; p(2α)≤0.001
P3 T1-T10	Fr(9)=7.24; p(2α)=0.61	Fr(9)=24.25; p(2α)=0.04
P4 T1-T10	Fr(9)=10.66; p(2α)=0.30	Fr(9)=29.97; p(2α)≤0.001
P5 T1-T10	Fr(9)=13.51; p(2α)=0.14	Fr(9)=41.27; p(2α)≤0.001
P6 T1-T10	Fr(9)=7.07; p(2α)=0.63	Fr(9)=35.93; p(2α)≤0.001
P7 T1-T10	Fr(9)=3.26; p(2α)=0.95	Fr(9)=32.4; p(2α)≤0.001
P8 T1-T10	Fr(9)=0.36; p(2α)=10.19	Fr(9)=20.84; p(2α)=0.01
P9 T1-T10	Fr(9)=0.35; p(2α)=9.99	Fr(9)=13.69; p(2α)=0.13
P10 T1-T10	Fr(9)=7.23; p(2α)=0.61	Fr(9)=14.31; p(2α)=0.11

Differences associated with assessment moments were examined with the help of the set of time-related, median-based variables, Median T1 to Median T10. Significant differences were detected in the Control group, but not in the Intervention group, and comparisons further apart from each other yielded stronger results. In multiple comparison analysis (Figures 4, 5 and 6) significant differences detected in the Control group are identified by the blue lines. Overall, these results show that, when comparing T1 to T6, T1 differed significantly from T3 (Fr(5)=2.93; *P* (2α)=.13), T5 (Fr(5)=2.94 *P* (2α)=.13), and T6 (Fr(5)=2.72; *P* (2α)=.03). When comparing T1 to T8, these significant differences are T1 to T7 (Fr(7)=5.0; *P* (2α)≤.001) and to T8 (Fr(7)=4.17; *P* (2α)=.009). When comparing T1 to T10, significant differences are found between T1 and T7 (Fr(9)=5.75; *P* (2α))=.007), T8 (Fr(9)=5.125; *P* (2α))=.032), T9 (Fr(9)=5.5; *P* (2α))=.013), and T10 (Fr(9)=6.0; *P* (2α))=.03).

Figure 4: ADAPT Framework pilot study PQ measure of multiple comparisons for T1 to T6 within session assessment moments for Control group

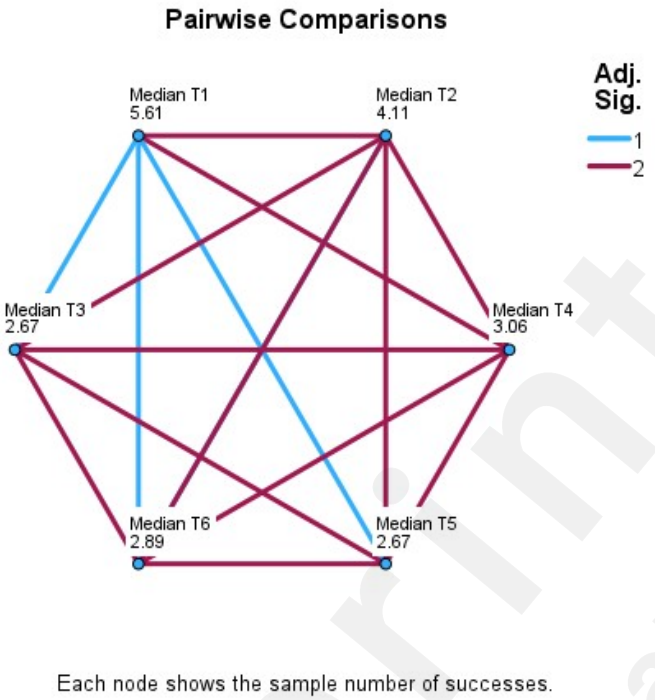


Figure 5: ADAPT Framework pilot study PQ measure of multiple comparisons for T1 to T8 within session assessment moments for Control group

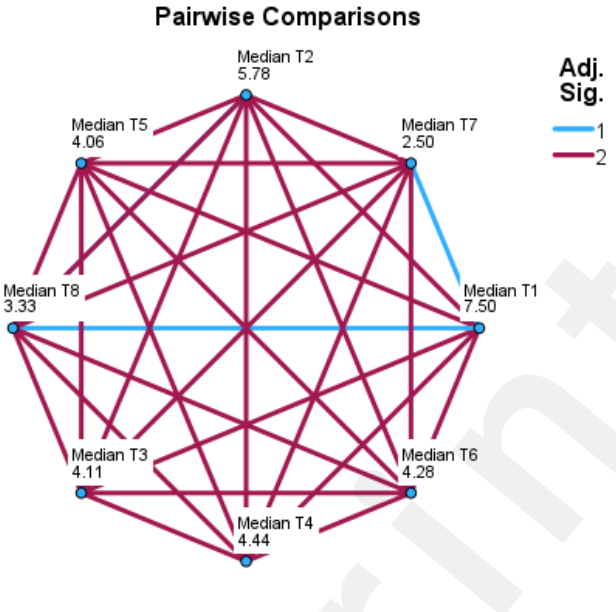
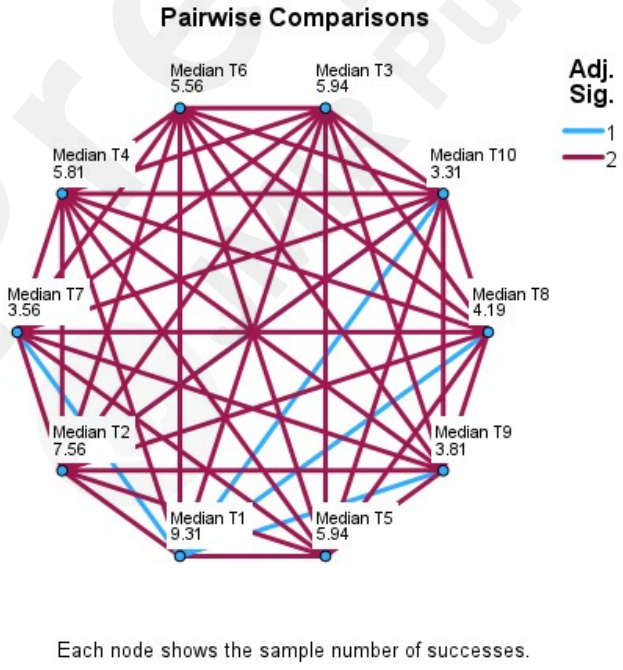


Figure 6: ADAPT Framework pilot study PQ measure of multiple comparisons for T1 to T10 within session assessment moments for Control group



Qualitative analysis for acceptability

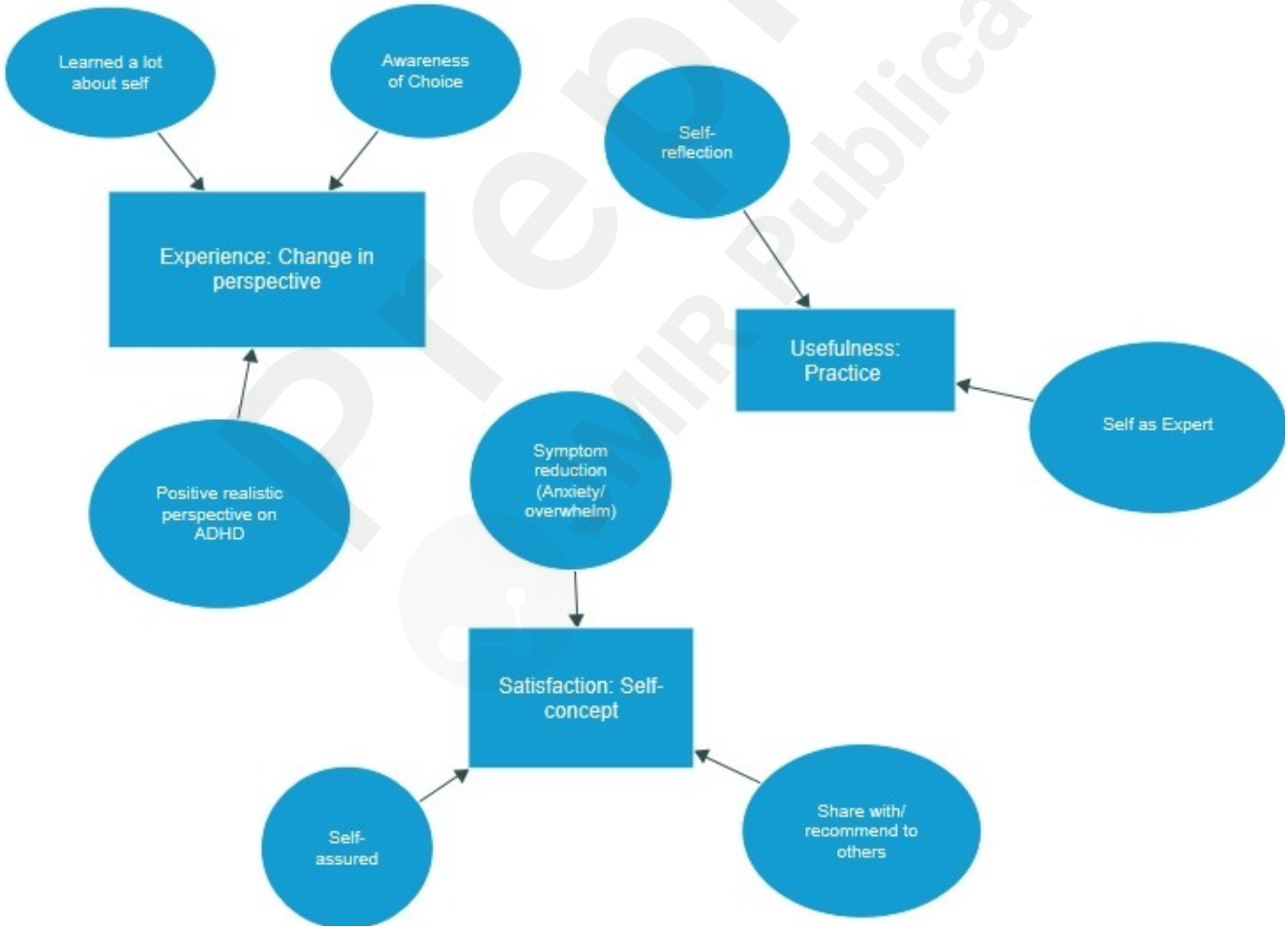
During the final session, all participants were asked a question to provide intervention

acceptability data for each participant: “How did you find the experience? Was it useful?” All participants who completed the intervention agreed (See S6 for excerpts). Data analysis was conducted using thematic analysis principles outlined by Braun & Clark [58].

Data analysis

Audio recordings of all 20 final sessions were transcribed verbatim and uploaded into NVivo. Line by line coding focused on sections of the transcript referring to the experience, usefulness and satisfaction with the intervention. A theme was identified for each aim that was explored in the analysis. Review and reflection was conducted midway through the data (Participant 12) and again at the ¾ stage (Participant 18) to identify initial themes. The initial phase produced 55 codes from 20 interviews, which were grouped into 3 themes and 8 subthemes (See Figure 7).

Figure 7: ADAPT Framework pilot study qualitative analysis themes and subthemes



Results

Experience

The emergent theme for intervention experience was a *Change in Perspective*. The subthemes were *learning about self*, *positive perspective on ADHD*, and *awareness of choice*. Participants found working the framework easy to integrate and provided new insights on their behaviours, new perspectives on options and a sense of self-awareness around actions that altered their understanding.

> Participant 7: “Actually it's something - it's a problem I had … around the I think you call it like the disorder model of this. It was that like having an idea of the neurobiology. My first reaction to that, as a result of learning those was to be like, ‘OK well, my brain works differently and that's my excuse. I guess that's just … how things are.’ And then, ‘OK, well, I guess just things are worse for me. And I'll just have to just make peace with the fact that this is where things are.’ Whereas in the sessions we've had here, it's been more about - OK, cool. Well, let's look at that, let's actually look at overcoming some things or using the gifts that you have. I mean - It's also not the same as, like, ‘People with ADHD are able to use hyper focus’ - it's not like seeing ADHD as superpowers either. It feels like a more accurate model to me in a way. And not trying to like you know, just blow smoke at you here, but it just felt a bit more real.”

This new perspective also supported participant’s exploration and experimentation with approaches to meet their needs, including changes in internal processes and in seeking external support through self-advocacy.

> Participant 23: “This… whole process has just been amazing because I feel like I've just understand so much and I can see what areas, maybe not need improvement, but where I need help or where I need to learn more or just do some more work and things that can get put in place, like in the workplace, which is really good…And just learning more about why I am with the way to do things, the way I need to plan things out beforehand, is just amazing. And I've learned so much about myself and it just makes things so much easier, which is really nice and like when let's say RSD [Rejection Sensitivity Dysphoria] kicks in, I know what that is and you can rationalise it so much easier than despair, which is really nice.”

Usefulness

The emergent theme for intervention usefulness was *Practice*. Subthemes were *self-expertise* and *self-reflection*. The program was described as “useful” and/or “helpful” by 18 of 20

participants (90%). Participants commented on tool development or skills learning with focus on need satisfaction through tool adaptation, facilitating ongoing use and supporting improved functioning. Many participants highlighted self-reflection as a key factor in developing a supportive practice. Two participants found the process difficult due to extenuating circumstances, highlighting the impact of environmental support on task engagement. However, both participants identified impact factors and felt the intervention was useful despite external challenges.

> Participant 15: “No, it is going well. It's going really well. I can definitely see a change, just like I said the last time, just to thinking about it, the thought of it, you know, me sitting there and thinking about those tools that for me is really because that then gives me an option. You know, it gives me a good option and I feel like I'm not, My love, I'm being honest. I'm not overstretching myself anymore. Oh, I haven't been. For the last, oh, several weeks, I've not overstretched myself, you know.”

Satisfaction

The emergent theme for intervention satisfaction was *Self-concept*. Subthemes that emerged were *self-assured*, *symptom reduction*, and *share with/recommend to others*. Participants expressed surprise when reflecting back on the experience, and satisfaction with feeling a positive sense of self and perspective on their capabilities. Some participants commented specifically on changes in managing anxiety and overwhelm and recommended the program to other ADHD adults. Participants considered passing on their learned experience and helping others with similar challenges a benefit.

> Participant 19: “Honestly, I think that in itself, it just helps to keep spirits up I suppose. Instead of going into that instant self-blame. I'm kind of like, ‘Just stop right there. Let me think about this.’ I'm not just absorbing like a sponge …Like, going back and thinking of things and forgiving myself…I think there's so many things and so many times over years that I've just taken the blame or I've been doing the one in the wrong and it's me. Me, me, me and never been me in a positive light. It's always been me that is the problem. So I think one thing that I have realized is now I'm on a much better track and I'm in a much better place, and I've got all these skills for me to utilize. And this still a lot of forgiveness. Past me needs to just to be able to let go and move on and … now that I've got the knowledge, give myself the recognition that I always needed, but I wasn't able to do before.”

Discussion

This research is the first assessment of the ADAPT framework for adults with ADHD. The primary objectives of this study were to evaluate the feasibility and acceptability of an SDT-based therapeutic coaching intervention relative to a waitlist control group. Positive participation rates, low attrition rates, and highly positive qualitative feedback on the intervention indicates the ADAPT Framework is both feasible and acceptable to participants, including the use of multiple measures with an adult ADHD population. Regarding appropriateness of measures, ADHD Quality of Life was the most sensitive for analysis of the intervention, however individual outcome, psychological distress, and ADHD symptom severity all contributed valuable information regarding participant experience in the study. Five of seven measures showed statistical significance indicating potential effectiveness of the intervention, but surprisingly not all for the intervention group. This is attributed to the impact of COVID-19 on improved results over time in participants during the duration of the study. An interesting additional finding was the correlation of recent diagnosis date to stronger ADHD symptoms and poorer self-reflection and health state when comparing pre- and post-test data, suggesting better self-understanding leads to improved functioning. The following sections will examine these results in more detail. Potential effectiveness of the intervention will also be discussed, however in the absence of a formal power calculation these results will be treated with caution.

Feasibility and acceptability

Participation rates fell within the accepted range at 76.67% and attrition rates were low with 91.6% of participants completing the Intervention and 81.8% in the Control group completing the study indicating the study is acceptable to participants. The significant correlation of medication to fewer dropouts is consistent with current research and recommendations for treatment of adult ADHD which demonstrate psychological interventions result in better outcomes in multi-modal treatment in combination with medication [13], [10]. In terms of missing values, across all measures the amount was insignificant and there were fewer missing values in the Control group than the Intervention group, indicating that both inputting of responses through online forms and the number of measures required was not fatiguing and accessible to participants. Possible reasons for missing variables are: 1) known challenges with ADHD inattention on the part of the participant – each form had to be selected from a series of online links to complete the set of forms within a live session; and 2) technical issues where participants were able to complete the online form and exit or close

the form without saving the data. Future studies should include steps in the protocol for the researcher to check with the participant within the session and confirm all measures have been completed correctly, especially when delivered remotely.

Qualitative feedback from 90% of participants indicated the intervention as “useful” or “helpful”. Participants described a new positive perspective on ADHD and increase in self-awareness and self-understanding. The core themes of *Change in Perspective*, *Practice* and *Self-Concept* support participant acceptability via learning and engagement with the intervention. Subthemes such as *self-expertise*, *self-assured* and *awareness of choice* indicate that participants felt more confident in their ability to identify and support their own needs. This is further supported by subthemes of *share with/recommend to others*, indicating participants not only found it useful for themselves, but were naturally sharing their experiences of the intervention with others in similar circumstances. Participant expression of increased self-awareness and understanding may be accounted for somewhat by the placebo effect of the therapeutic alliance [89], [90], [91]. Validation of experience and recognition of struggle for individuals who have experienced a history of stigma and rejection for differences in presentation can have a positive effect, and could facilitate positive change and growth by creating a supportive environment for participant inherent motivation toward actualisation [92].

Measure appropriateness

Analysis of clinical distress measures showed individual outcome, psychological distress and ADHD symptom severity were the most effective at capturing participant experience. Of the self-development measures, ADHD Quality of Life was the most effective at detecting impact aimed at enhancing wellbeing, and self-awareness provided a unique and unexpected perspective that was very beneficial to the analysis. As multiple measures were shown to be agreeable to participants, future research should consider additional measures focusing on self-development to evaluate effectiveness of the intervention.

Potential effectiveness of the intervention

Out of the seven measures, health-related Quality of Life and sense of autonomy did not show any statistically significant differences between assessment moments. All the remaining scales did show statistically significant differences, but not all for the Intervention group.

Of the remaining scales measuring clinical distress, both the psychological distress and ADHD symptom severity showed positive change toward reducing clinical distress in both

groups. However, psychological distress showed significant improvement for the Intervention group in the subscales of Wellbeing, Problems and Functions and in the ADHD symptom severity measure the improvement was slightly greater for the Intervention group. These findings are particularly interesting as the ADAPT Framework does not target specific ADHD symptoms but instead centralises autonomy-support and satisfaction of the basic psychological needs of autonomy, competence and relatedness. This is consistent with research demonstrating basic psychological needs satisfaction improves wellness, meaning and vitality, as well as increasing internalisation and intrinsic motivation [93]. Satisfaction of basic psychological needs, particularly autonomy, is seen as a vehicle for organisation of the personality [22] supporting the formation of intrinsic preferences and therefore providing a foundation for the AIC [65].

The final measure of clinical distress, the individual outcome measure, showed higher levels of distress in the Intervention group overall, and significant change toward reducing clinical distress in the Control group while participating in the intervention. This is an interesting finding, suggesting the confounding variable in this analysis is related to COVID-19. In the UK, government COVID safety restrictions were completely lifted on 24th February, 2022 [94]. The first session for the first participant for the Intervention was 27th May, 2022 – only 2 months following restrictions. The first session for the first participant of the Control group was 17th October, 2022 – a full 8 months following restrictions. Recent research on the impact of COVID-19 on individuals with ADHD showed negative impacts on mental health, sleep and wellbeing outcomes as well as treatment access [95]. Analysis results in this study also indicate that time was a factor in improved results in the intervention, as individual outcome measure assessment moment comparisons distanced further apart for both groups yielded stronger results. Findings demonstrating statistically significant changes generally and specifically in problems identified by participants in the individual outcome measure as outcomes for change may be a result of the ADAPT Framework semi-structured focus on client-led session design and application of model elements. Traditional treatment models and recommendations are structured to focus on symptom reduction and skills development [4], [25], [96], [97], [98], [99], [100] rather than autonomy-supportive client-led problem identification, application of context oriented strategy development and support for basic psychological needs. Therefore, it is suggested that the differences seen in the efficacy of the intervention between the two groups was due to COVID -19 impacting negatively on the Intervention group, and further investigation of the intervention is warranted.

In the remaining scales for self-development, ADHD Quality of Life showed changes in both

groups, suggesting this is also reflective of the impact of COVID-19 on quality of life during the intervention vs control waitlist comparison. However, the Intervention group showed an improved outlook over that of the Control group, suggesting this was the result of the intervention. This finding was interesting as most interventions for adults with ADHD showing positive results in quality of life are offered for up to 15 weeks or include additional booster sessions beyond 12 weeks [101], [102], [103], [104] whereas this intervention was offered for 11 sessions and delivered just after COVID-19 restrictions were lifted. It is recommended that future studies should incorporate awareness into the circumstances and environment of participants into treatment protocols and outcomes.

The final measure, self-awareness, only showed significant differences in the Control group, but in the Need for Self-Reflection subscale. This finding indicates that, conversely, the Intervention group recognised the value and importance of self-reflection, even if they did not significantly recognise they were actively engaging in self-reflection. It is important to mention self-reflection was highlighted as a subtheme by participants in the qualitative analysis. Indicators of this self-awareness may be attributable to treatment components focused on self-reflection including integrative emotion regulation (IER), reflective AIC facilitation, and reflection on barriers to task engagement. Research shows IER relates positively to openness to experience, authenticity, reflection [105] and wellbeing [106], [107] and like mindfulness, indicates active emotional exploration of experiences to determine their meaning and value to make informed choices about subsequent actions [108]. AIC facilitation research shows a firm sense of the AIC contributes to a sense of self-coherence and continuity, and may reduce the need for dependency on external approval for self-esteem and the susceptibility to introjected internalisation of goals or behaviours to maintain positive relationships [65], [109]. Change process research highlights reflection as a principle vehicle of change, and the potential for application of active interest and reflection to low motivation leading to movement towards health [81], [82], [83], [84]. Elements in the model that prioritise autonomy support alongside increase in self-awareness could assist with reducing discrepancies in self-concept, facilitating positive change [83], [85], [86]. One final finding of interest was reported in the overall pre-test and post-test comparisons which showed a correlation of the date of recent diagnosis to stronger ADHD symptoms and poorer self-reflection and health state. This suggests that as participants understand themselves better, they do learn how to cope with their difficulties over the long term and can potentially benefit from treatments which support them to do so. It is suggested this finding is of significant importance both to this study and to ADHD research overall, and further

investigation into this finding is recommended.

Limitations and Recommendations

Generalisability

Recruitment aims for this study were to ensure demographics included a wide age range and gender inclusion. However, small sample size and narrow geographic location of recruitment limits generalisability to a wide population of adults with ADHD. A formal sample size was not recommended, therefore future studies should calculate the required sample size for a definitive randomised trial. Small sample size also influenced the choice not to perform a demographic data comparison for effectiveness of the intervention, therefore this is also recommended for future studies.

Design

Results of the study show that additional self-development measures would be both acceptable to participants and beneficial for data capture. Future investigations should address the impact of potential factors such as the therapeutic alliance and include more specific measures to identify change factors such as the emotion regulation scale [116], [117], AIC measures [35], the life crafting scale [38], emotion crafting scale [29] and need crafting scale [118], some of which were not available when this study was designed and received ethical approval.

Additionally, the ADAPT Framework is a novel treatment intervention which has only been applied in this study in an individual therapeutic context. The model has potential to be useful in other contexts, such as group interventions, in a coaching/mentoring context, and with other client groups such as students, parents, and partners. Future research should include investigations into alternative formats, group delivery and different client groups experiencing the impact of ADHD.

Data collection and reporting

The study was limited by the number of staff and researchers who were available to collect data and trained to deliver the intervention. This study has some risk of bias concerns due to the lead researcher’s role in both recruitment and assessment. Treatment outcomes were also primarily general self-report measures, and although one observer measure was used, it was taken by the primary researcher. Future studies should be blinded for assessment and analysis, and possibly also for intervention delivery to reduce bias risk.

Finally, missing data impacted data analysis procedures in ways that can be improved.

Adjusting the protocol to include confirmed measure completion and submission by the researcher would help reduce data collection issues. Also, adding a requirement for participants to identify a specific number of issues to evaluate in the PQ would reduce complexity and facilitate clarity in data analysis. Both these changes are recommended for future studies.

Conclusion

Treatment approaches for ADHD primarily focus on compensation for EF deficit impact on impairment of functioning and self-regulation, and provide techniques for environmental scaffolding and skills development to promote personal strengths [4], [7], [25], [96], [119]. Heterogeneity and high rates of comorbidity alongside ADHD creates challenges for design of effective non-pharmacological treatment approaches [3], [16], [120], and EF remains heavily debated as a core feature of ADHD aetiology particularly as EF deficits are not unique to ADHD [10], [11], [12]. SDT provides an alternative transdiagnostic approach to psychopathology that shifts the focus from EF deficits to examine support of basic psychological needs as a foundation for identity development and self-regulation [23], [24], [29]. This study has demonstrated that the ADAPT Framework is a feasible and acceptable neuroaffirmative intervention to develop naturally occurring approaches and skills in identity construction, intrinsic motivation, and self-regulation for adults with ADHD. Results indicate that the intervention is not only acceptable and accessible to participants, but they also described the capability of passing information on to others in similar circumstances as beneficial. As the intervention does not target symptom reduction outcomes, this study suggests that outcomes of wellbeing and self-development have a beneficial impact on symptoms in this client group. This study also suggests that context and environment have a significant impact on the self-development of this client group, due to the impact of COVID-19 on improved results over time, as results indicated the 11-session intervention was beneficial to participants during circumstances that increased distress, and at a shorter duration than other interventions for ADHD adults with quality-of-life outcomes. A key finding of the study was participant awareness of self-reflection, demonstrated in both quantitative and qualitative results. Some increases in self-awareness and the need for self-reflection may be attributable to the therapeutic alliance, however findings highlight both self-awareness and self-reflection as promising variables for future research in this client group. Supported by the unusual pre-test and post-test comparison finding of a correlation between recent diagnosis date and stronger ADHD symptoms, poorer self-reflection and

poorer health, it is suggested that diagnosis provides an alternative perspective of self and understanding of behaviours that improves outcomes naturally over time, which should be supported by interventions. Further research in randomised trials with greater statistical power is recommended to fully measure mediators and moderators of treatment effectiveness. These encouraging results may have significant practical implications for alternative approaches to treatment of ADHD transdiagnostic presentations of psychopathology.

Statements and Declarations

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Supplementary Files

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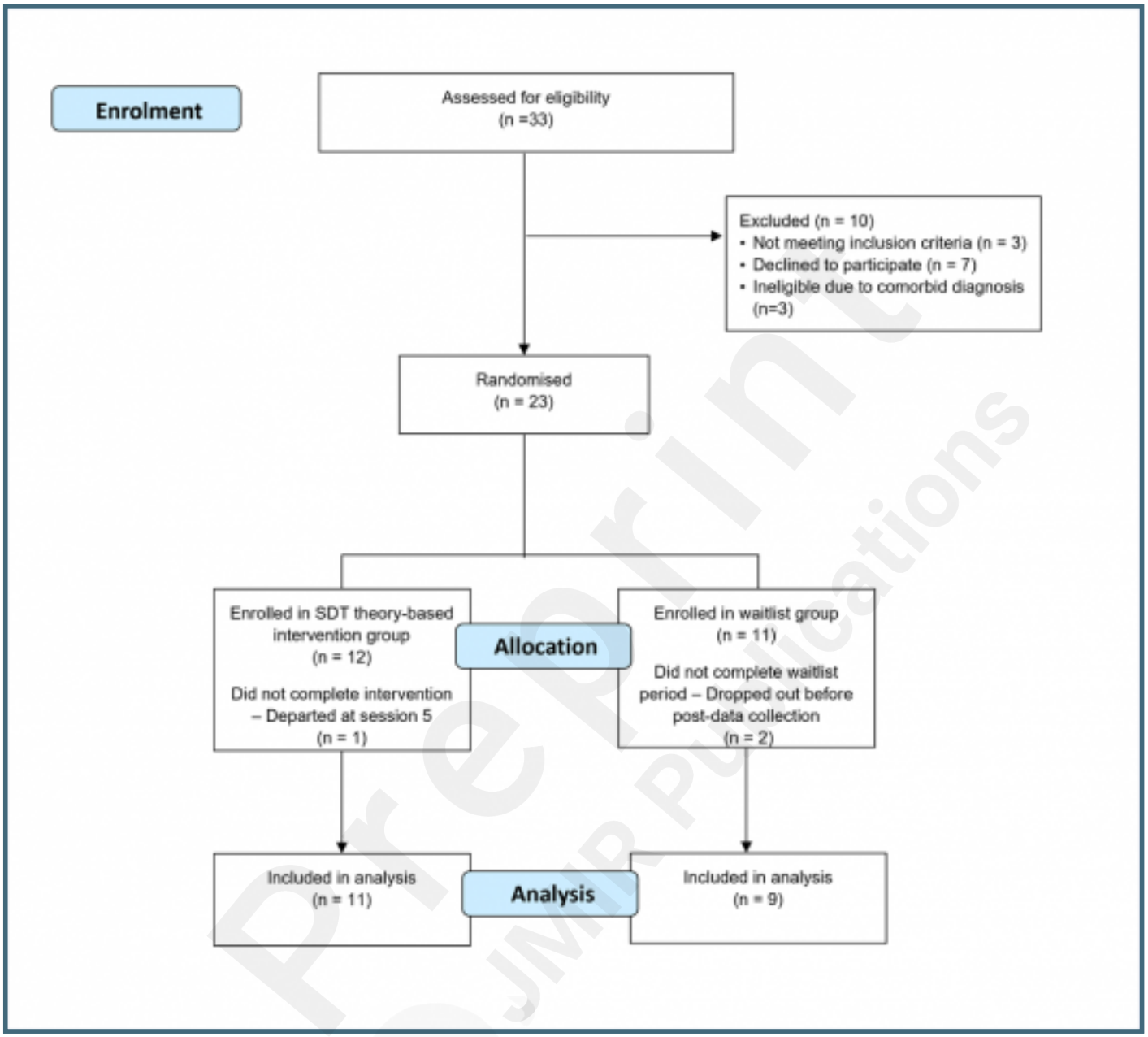
URL: http://asset.jmir.pub/assets/19964ddd527d30d1769c77e7fc05eb8a.docx

Figures

Recruitment diagram in CONSORT format.



CONSORT (or other) checklists

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