

The Online Nurtured Heart Approach to Parenting: A Randomized Study to Improve ADHD Behaviors in Children Ages 6–8

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Objectives. To evaluate the efficacy of the Nurtured Heart Approach (NHA) to improve attention deficit hyperactivity disorder (ADHD) behaviors in children. **Methods.** In 2017, we conducted a trial among parents ($n = 104$) with children ages 6–8 years diagnosed with ADHD/at risk for a diagnosis. Participants were randomly selected, but not blinded, to the immediate (NHA) or delayed (control) group. The NHA training was held online over 6 weeks. **Results.** The NHA group (-7.0 ± 8.1), but not the control group (0.2 ± 6.6), reported a decrease in inattention ($p < .001$). The NHA group (-7.9 ± 9.3), but not the control group (-0.5 ± 7.3), reported a decrease in hyperactivity/impulsivity ($p < .001$). **Conclusions.** The study provides preliminary data of the NHA's potential to improve ADHD related behaviors.

Keywords: ADHD; parenting; children; behavior

The prevalence of attention deficit hyperactivity disorder (ADHD) is 6%–7% among children and adolescents (Willcutt, 2012). At present, diagnostic criteria are based on observable behaviors (inattention, hyperactivity, and impulsivity) that are perceived as disruptive to functioning in settings such as home and school (American Psychiatric Association, 2013). Indeed, 64% of family members and 30% of school personnel voiced concerns about ADHD-type behaviors that prompted help-seeking (Visser et al., 2015).

Diagnoses related to attention deficit disorder (ADD) and ADHD first appeared in the *Diagnostic and Statistical Manual (DSM-II)* in 1968 as Minimal Brain Damage and Hyperkinetic Reaction of Childhood (American Psychiatric Association). Subsequent DSM editions modified the behaviors needed for each diagnosis, but have kept observable behaviors as the basis for diagnosis.

ADD and ADHD are thus collections of observable behaviors, with no specific underlying central nervous system disorder identified. All proposed ADD and ADHD treatments are thus aimed at modifying observable behaviors rather than in treating their underlying causes. Our study presents an approach to working with children with ADD and ADHD (from here forward referred to as ADHD) behaviors which focuses on modifying behaviors through a parenting approach.

In a 2014 national survey, 53% of initial diagnoses of ADHD were from primary care physicians (Visser et al., 2015). A physician's guide to ADHD treatment is provided by the American Academy of Pediatrics (AAP). For children ages 6–12 years diagnosed with ADHD, the AAP recommends: (a) ADHD medication that is approved by the Food and Drug Administration, (b) parent training in behavioral management and/or, (c) behavioral classroom intervention, (d) supportive educational interventions, and (e) behavioral supports (Wolraich et al., 2019).

While there is a cluster of interventions recommended, medication is the most frequently used (62%) intervention in children (Danielson et al., 2018). Concerns about the safety of stimulant medications persist despite their long history of use in children with ADHD-type behaviors. A review of safety data published in 2014 found that adverse effects are reported in 58%–78% of children taking these medications and resulted in discontinuation of use in 8%–25% of these children (Clavenna & Bonati, 2014). The most common side effects noted were decreased appetite, sleep disturbances, headaches, and abdominal pain. Given the potential adverse effects of medications, it is imperative to adopt parenting approaches that can transform behaviors typically falling under this diagnostic label.

Parents who raise children with an ADHD diagnosis report having high levels of parental stress, maladaptive coping, and negative reactions toward the child (DuPaul et al., 2001). In one study, researchers assessed parents' reaction to children trained to mimic behaviors falling under the diagnosis of ADHD, conduct disorder (CD), or oppositional defiant disorder (ODD) (Pelham et al., 1997). Parents of children with ADHD, CD, or ODD behaviors were significantly more distressed (i.e., worse ratings of pleasantness, success, and effectiveness) than parents of children without these behaviors. Further, these parents reacted by questioning their adequacy and reported greater levels of anxiety, depression, and hostility.

STUDY INTERVENTION

The Nurtured Heart Approach (NHA) is a parent training program that addresses challenging behaviors in children such as inattention, hyperactivity, and impulsivity, irrespective of the cause. Traditional approaches to parenting can unintentionally promote undesired behavior, particularly in children who may have a greater tendency toward intensity. In evaluating the NHA's theoretical underpinnings, Hektner et al. (2013) cite family coercion theory to explain a training process that occurs through negativity exchanged between the parent and child, where the child's disruptive behavior is reinforced through negative family interactions (Patterson, 2002; Patterson et al., 1989). Similarly, the social-interactional perspective describes parents as inadvertently training the child to misbehave (Forehand et al., 1975; Patterson et al., 1989; Snyder, 1977). Glasser and Easley (2013) refer to this as upside-down energy where children read their parent's behavior using cues such as one-to-one attentiveness, voice, and proximity. They discover they get more connection through negative behaviors in contrast to parent's response to desirable behavior, which is relatively flat (mild expression, normal tone) and disengaged (less face-to-face and undivided attention). In essence, challenging children who crave intense relationship discover that they get relative crumbs ("good job" and "thank you") for the majority of cooperative choices they make while they get greater gifts of relationship when things go awry in the form of lectures, reprimands, and other extended attempts to reason and verbally wrangle the child into doing the right thing. The child begins to understand that they get more love and closeness through adversity. This simply becomes unintentionally habitual over time, and if all a parent has is conventional approaches to discipline, which adhere to the belief that lessons are best taught in the midst of the problems, then chances are that attempts to intervene will only inadvertently make the problems worse. The NHA reverses this interactional "upside-down-ness" and guides parents into an intentionally and energetically aligned way of uplifting the child for the good choices made, and deliberately conveys the beauty of the poor choices not made. NHA attempts to train parents to see and speak appreciatively from their heart to the heart of the child in recognition of the greatness those cooperative choices reveal.

The NHA describes parents as agents of change in the family (Glasser & Easley, 1999). Parents find that they can interrupt the negative cyclical exchange within the family system by using the NHA's core methodology based on the "Three Stands" (Glasser & Easley, 2013). Stand One is "Absolutely No"—This is a refusal to fall into the trap of negative interaction—no negativity toward the child and a simultaneous resetting of one's own reactivity. The NHA teaches a philosophy and methodology of shifting a child's intensity to successfulness, and the parent is taught how to transform their own intensities to positivity and greatness. It strives to go beyond the extinction techniques that aim to reduce the incidence of minor disruptive behavior in children, by actively being poised to respond to the truth of the moments when problems are not happening and rules are not being broken. Children are not always misbehaving. These movements often go unnoticed.

Stand Two is "Absolutely Yes" and teaches parents to better respond to those moments of success by training them to see an expansive frame of opportunity of what is truly successful. Stand Two also teaches an expansive range of ways to express appreciation and energize

the positive. It includes ways of capturing and recognizing this wider window of favorable behavior and neutral behavior, with an intensity which they had formerly reserved primarily for misbehavior. Parents are taught to acknowledge with a depth that attempts to inspire the child's heart by revealing to the child the character and the qualities of greatness they used in their actions, thoughts, and choices. The child then moves in a positive direction with cooperation in following the rules.

Within Stand Two are four Recognition Techniques. The Recognition Techniques teach parents to incrementally recognize the child in everyday moments, with the final technique offering the greatest level of depth. With each layer of depth comes a greater sense of being seen for the greatness the child truly is. Through the use of (a) active recognition, (b) experiential recognition, (c) proactive recognition, and (d) creative recognition, it is believed that children develop Inner Wealth, a strength and resilience that involves self-appreciation and an inner realm of recognition (Glasser & Lowenstein, 2016).

Stand Three is "Absolutely Clear" and brings into effect clarity in relation to the rules and consequences when rules are broken. It introduces the concept of "resetting" (similar to resetting a computer). It teaches parents to adhere to the truth of the moment; to both applaud when a child who appears to be headed to breaking a rule uses restraint in choosing not to, and how to adhere to not accidentally rewarding rule breaking by way of warnings and verbal attempts to talk the child either out of making bad choices or accidentally energizing negativity in relation to the rule break. Stand Three emphasizes that rules are clear, and consequences are delivered without negativity (similar to a video game's neutrality when children lose their turn).

NHA is unique from other ADHD interventions in its delivery. It moves parents away from a conventional approach and opens them to this novel thinking that is based on the "energies of interaction," by striving to produce "a-ha" experiences through metaphor. Hektner et al. (2013) described it as storytelling. The storytelling makes the material accessible and engaging thereby delivering a more interactional approach to teaching parents.

ADHD Behavioral Interventions

Kazdin and Blasé (2011) recognized the need to go beyond face-to-face therapy to improve accessibility. The subsequent paragraphs describe non-face-to-face interventions followed by face-to-face interventions. We reviewed randomized controlled trials (RCTs) of non-face-to-face interventions and face-to-face interventions designed to address behaviors associated with ADHD. Challenges these interventions encountered included efficacy, sustained efficacy, or scalability.

Non-Face-to-Face Interventions. One study tested a behavioral versus a nonbehavioral self-help intervention with parents of children ages 4–11 years with ADHD who received either booklets or coaching (Hautman et al., 2018). Results of this study indicated reliable within-group improvements in ADHD, but no between-group differences.

The Triple P program offers interventions to address different degrees of ADHD severity and age ranges including children, preteens, and teenagers. In a study of the online version of the Triple P program, parents of children ages 3–4 years with ADHD participated in a series of eight lessons plus two supportive phone calls (Franke et al., 2016). Investigators found reductions in hyperactivity/inattention and restlessness/impulsivity, though results were not sustained at the 6-month follow-up.

In a separate RCT, parents of children ages 3–5 years at risk for ADHD were assigned to a waitlist control or behavioral parent training over 10 sessions that were face-to-face or online (DuPaul et al., 2018). Parents indicated more acceptance for the face-to-face intervention, although both the face-to-face and the online delivery showed improvements in inattention/overactivity and restless/impulsive behavior compared to the control.

Face-to-Face Interventions. The New Forest Parent Program (NFPP) is an 8-week series conducted in the home for 1–1.5 hours by clinicians (Abikoff et al., 2015). Parents of 3–4 year-old children with ADHD were assigned to the clinic-based training with the NFPP intervention, with the Helping the Non-compliant Child (HNC) intervention, or the waitlist group. The results showed NFPP was not superior to HNC, but superior to the waitlist group in inattention and hyperactivity/impulsivity. At follow-up, inattention sustained improvement, while hyperactivity/impulsivity worsened. In another study, parents with children ages 4–6 years participated in group sessions to test the efficacy of the Incredible Years (Webster-Stratton et al., 2011). Investigators found improvements in several outcomes including inattention and hyperactivity. Lastly, a three-arm RCT among parents with children ages 2–4 years with ADHD assigned parents to the NFPP delivered over 12 weeks individually at home, the Incredible Years delivered in a group format, or usual treatment (Sonuga-Barke et al., 2018). NFPP and the Incredible Years had similar improvements on ADHD symptoms, however authors noted the NFPP cost less. Overall, these interventions had success in treating children, mostly preschool age. Some are not scalable because they cannot be delivered in such a way that increases availability and access.

Previous Research on the NHA

Previous research on the NHA is limited, but promising. A quasi-experimental study in 1997 evaluated the NHA using one treatment ($n = 22$) and one comparison ($n = 15$) group of mothers of 5- to 12-year-old children (Ward, 1997). The intervention was delivered in-person over six to eight group sessions lasting 1–1.5 hours. Mothers reported significant improvements in their depressive symptoms and stress, as well as gains in parenting skills and parenting satisfaction. Mothers reported improvements in their child's behavior severity plus a drop in their child's anxiety. In 2013, researchers reviewed the theoretical and empirical foundations of the NHA, demonstrating alignment with developmental theory and application to clinical practice (Hektner et al., 2013). In 2015, investigators implemented a quasi-experimental study to evaluate 41, 5-week, 7.5-hour NHA courses involving 326 parents (Brennan et al., 2016). NHA parents were compared to 94 control parents recruited from the same community. In both groups participants were mostly mothers with sons, and the majority of children were ages 4–10 years. Investigators found NHA parents significantly increased in positive attention to their child and decreased in yelling and scolding, whereas control parents showed no change. In 2018, a secondary data analysis of 219 NHA parents who had a child ages 5–8 years, showed differences in parent confidence, appropriate use of verbal discipline, and perception of the child's strengths (Roth, 2018). Furthermore, NHA parents ($n = 31$) reported significantly more use of appropriate verbal discipline than the control group ($n = 31$). Change in parent confidence and the perception of the child's strengths did not differ between groups.

Building on past NHA research, this study is the first RCT of the NHA. The hypotheses are that NHA group parents, compared to control, would report (a) reduced

inattention and hyperactivity/impulsivity in their children, (b) reduced parenting stress, and (c) improved parent's sense of competency.

METHODS

The research design was a RCT whereby parents were randomly assigned, but not blinded, into the NHA group or delayed intervention control. Both groups completed the presurvey. The NHA group participated in the parent training while the control concurrently participated in their usual daily activities. Both groups then completed the postsurvey. After pre-post data collection, the control group participated in the parent training. A postsurvey was collected after the control group completed the parent training. The study was approved by the (University of Arizona) Human Subjects Protections Program. A detailed description of the protocol has been published (Nuño *et al.*, 2019).

Participants

Parents or guardians were eligible to participate if they had a child ages 6, 7, or 8 years that had a diagnosis of ADHD or were suspected of having ADHD. For children lacking a formal diagnosis but suspected of ADHD, eligibility was met if the participant indicated another significant adult observed ADHD-type behaviors that disrupted day-to-day functioning or interfered with positive relationships. Recruitment was from August 2017 to January 2018. It began in Pima County, Arizona then extended to the state of Arizona and finished across the United States (U.S.) and its territories.

Parents completed the Centers for Disease Control and Prevention's (CDC) ADHD symptom checklist (CDC, n.d.). All enrolled participants' children had at least six of nine behaviors listed for inattention, and/or six of nine behaviors listed for hyperactivity/impulsivity, in accordance with CDC guidelines (CDC, n.d.). Children with a diagnosis of autism were not included in the study. Additional eligibility criteria required participants to have access to a computer with Internet and agree to participate in the intervention.

The study received 177 inquiries during the 6-month recruitment period (Figure 1; CONSORT Transparent Reporting of Trials, n.d.). Of these, 30 individuals did not complete a telephone screening due to difficulty with scheduling. Among those screened, participants were ineligible because of the child's age ($n = 12$), autism diagnosis ($n = 10$), or living outside the United States. ($n = 3$). Due to screening process inconsistencies, four participants who reported extensive NHA experience were excluded while two similar participants were enrolled. Extensive NHA experience was defined as previously completed an online or in-person training, or certified as a trainer.

Staff identified 116 eligible participants, of whom two gave verbal consent but did not complete the electronic consent form, yielding 114 enrolled participants. After enrollment, two participants withdrew and eight did not complete the baseline survey. Thus, 104 participants were block randomized (block size = 6) to the NHA group: $n = 52$ or control group: $n = 52$. Participants received \$20 for each completed survey. Participants who completed the pre and postsurvey were considered evaluable, allowing a pre and post-survey comparison. The study had evaluable surveys for 87 participants, with 38 in the NHA group and 49 in the control group.

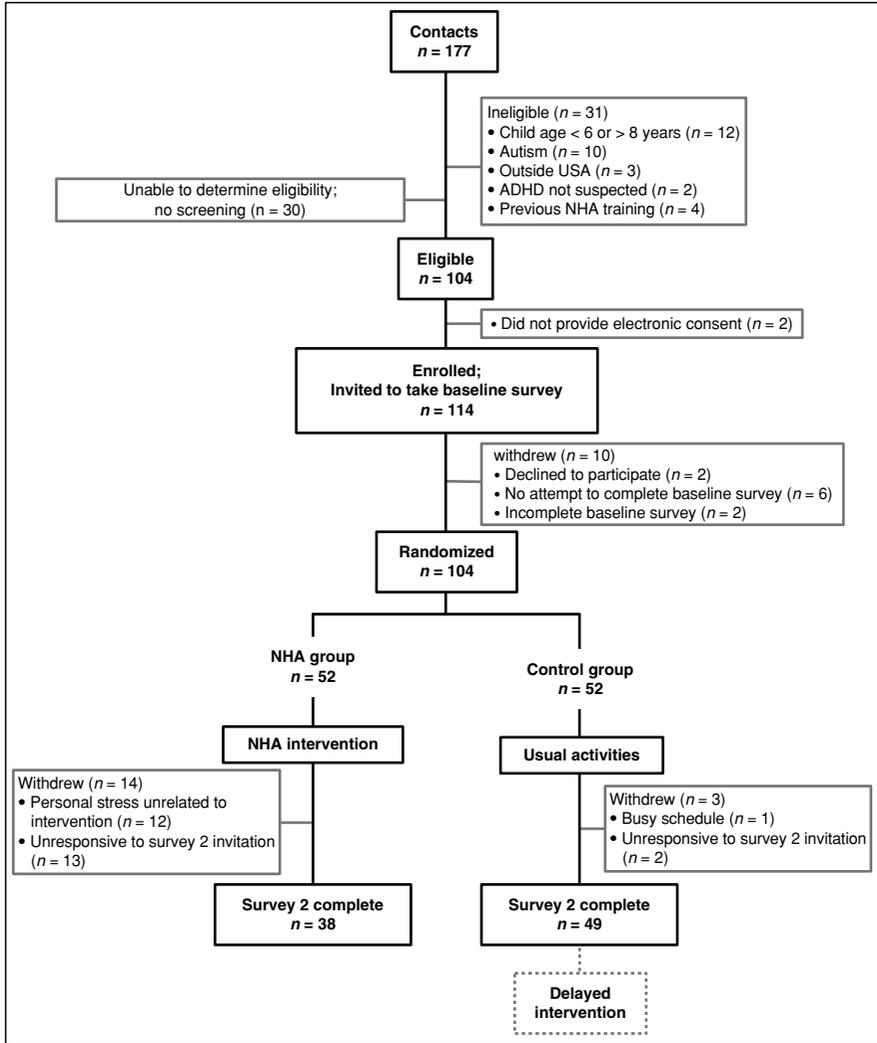


Figure 1. CONSORT diagram.

Note. ADHD = attention-deficit/hyperactivity disorder; NHA = Nurtured Heart Approach.

Intervention Methods

Table 1 presents the teaching modalities for the 6-week NHA online parent training. Topics included the Three Stands along with Recognition Techniques. Each week built on the previous week and followed the same schedule: a slide presentation narrated by the developer, reading excerpts from the NHA workbook (Glasser & Lowenstein, 2016), and skills practice on their own with a report back via online post. Advanced Trainers responded to each parent post. Weekly posts were synthesized by Advanced Trainers to generate topics for discussion during the 1.25-hour live session held at the end of the week. Live sessions were led by Advanced Trainers with teaching and discussion by the developer of the NHA. An archive of the live session was available the following day.

TABLE 1. Baseline Characteristics of Participants and Their Children: *n* (%)^a

Characteristic ^b	Randomized (<i>n</i> = 104)		Evaluable (<i>n</i> = 87)	
	NHA <i>n</i> = 52	Control <i>n</i> = 52	NHA <i>n</i> = 38	Control <i>n</i> = 49
Child				
Male	38 (74.1)	38 (74.1)	29 (76.3)	36 (73.5)
Age (years)				
6	16 (30.8)	17 (32.7)	13 (34.2)	16 (32.7)
7	21 (40.4)	16 (30.8)	13 (34.2)	15 (30.6)
8	14 (26.9)	18 (34.6)	11 (29.0)	17 (34.7)
9	1 (1.9)	1 (1.9)	1 (2.6)	1 (2.0)
School type				
Public school	37 (71.2)	37 (71.2)	27 (71.5)	37 (75.5)
Private school	11 (21.2)	11 (21.2)	7 (18.4)	8 (16.3)
Home school	4 (7.7)	4 (7.7)	4 (10.5)	4 (8.2)
ADHD diagnosis	37 (71.2)	35 (67.3)	27 (71.1)	33 (67.4)
ADHD medication	29 (56.9)	18 (34.6)	20 (54.1)	16 (32.7)
Participant (parent)				
Age (years), mean (<i>SD</i>)	39.4 (6.5)	39.2 (6.5)	40.0 (6.5)	39.3 (6.6)
Female	50 (96.2)	50 (96.2)	38 (100.)	47 (95.9)
Hispanic/Latino(a)	12 (23.1)	9 (18.8)	7 (18.4)	8 (17.4)
Number of children in household, median (IQR)	2 (2–3)	2 (2–3)	2 (2–3)	2 (2–3)
Relationship to child				
Biological parent	42 (80.8)	45 (88.2)	30 (79.0)	43 (87.8)
Adoptive parent	6 (11.5)	6 (11.8)	4 (10.5)	6 (12.2)
Other ^c	4 (7.7)	0 (0.0)	4 (10.5)	0 (0.0)
Education				
≤ High school diploma	2 (3.8)	3 (5.9)	0 (0.0)	2 (4.2)
Some college	13 (25.0)	10 (19.6)	8 (21.1)	8 (16.7)
Baccalaureate degree	10 (19.2)	15 (29.4)	8 (21.1)	15 (31.3)
Some postgraduate education	4 (7.7)	2 (3.9)	2 (5.3)	2 (4.2)
Master's degree	19 (36.5)	15 (29.4)	18 (48.4)	15 (31.3)
Doctoral degree	4 (7.7)	6 (11.8)	2 (5.3)	6 (12.5)
Married or marriage-like relationship	40 (76.9)	48 (92.3)	30 (79.0)	45 (91.8)

Note. ADHD = attention deficit hyperactivity disorder; IQR = interquartile range; NHA = Nurtured Heart Approach; *SD* = standard deviation.

^aAll variables presented as *n* (%) unless otherwise specified.

^bMissing data: ADHD medication (*n* = 1), Hispanic/Latino(a) (*n* = 4), relationship to child (*n* = 1), education (*n* = 1).

^cIncludes stepparent (*n* = 1), foster parent (*n* = 1), great aunt (*n* = 1), grandmother (*n* = 1).

Advanced Trainers complete 1 one weeklong, 40-hour, Certified Training Intensive (CTI) taught by the developer of the NHA first. Then they complete a second CTI, but this time as a coach to a small group of students. Three Advanced Trainers participated in the NHA delivery. Their education ranged from some college to a master's degree in special education or counseling. All had 9–10 years of experience as Advanced Trainers.

Data Collection

Survey self-administration was through Research Electronic Data Capture (REDCap) (Harris et al., 2009). Before randomization, participants in both groups completed a presurvey to provide demographic information on themselves and their child, and other characteristics of the child (e.g., co-occurring conditions; type of school). Participants without a completed survey ($n = 8$; Figure 1) were not randomized. After the NHA group completed the NHA training, the NHA and control groups were administered a postsurvey. Next, the control group completed the NHA training. After their training, the control completed a postsurvey. All data collection was complete by June 2018.

ADHD Measure

The Conners 3-Parent Short Form (Conners 3-P SF) is an established instrument to measure ADHD with six subscales: inattention, hyperactivity/impulsivity, learning problems, executive functioning, defiance/aggression, and peer relations (Conners, 2009). The mean Cronbach's alpha is .89 (range .85 to .92). The 45-item instrument asks parents to rate the child's behaviors in the last month. Answer options range from 0 (*Not true at all, Never, Seldom*) to 3 (*Very much true, Very often, Very frequently*). Age- and sex-specific T-scores were calculated according to Conners' instructions with a possible range of > 40 to < 90 for T-scores. Only one missing question per subscale is allowable. Although the Conners instrument is typically scored using truncated age, rounded age was used for the baseline score if the child had a birthday between the presurvey and the postsurvey (Garofola, 2018), which was the case for 18 (21%) of 87 children. This decision was made that the age used for scoring was the same for both time points, particularly because the time between these two measurements was relatively short (mean and median = 62 days). Higher values are considered worse, so a decrease in a score is considered a beneficial change.

Parenting Stress

The Parenting Stress Index-4 Short Form (PSI-4 SF) includes a total score and three subscales: parental distress, parent-child dysfunctional interaction, and difficult child (Abidin, 2012). The Cronbach's alpha of the total scale is .95 (subscales range from .88 to .90). PSI-4 SF raw scores were calculated according to PSI instructions, which indicate that only one missing question per subscale is allowable. The total possible score is 36–180 with higher values considered worse, so a decrease in a score is considered a beneficial change.

Competency

The Parenting Sense of Competence (PSOC) includes 17 items with a 6-point Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*) (Johnston & Mash, 1989). We discovered at end-of-study that more than one version of the PSOC answer options exists.

The version we used listed the answer options as Strongly Disagree, Disagree, Somewhat Disagree, Somewhat Agree, Agree and Strong Agree (Ohan et al., 2000). This incorrect order of response options created some confusion, but the same version was used for all participants at each time point. The PSOC has a total score (16 items) and two subscales: satisfaction (9 items) and efficacy (7 items). Internal consistency is 0.80 for mothers (both scales) and 0.88 for satisfaction and 0.77 for efficacy for fathers (Ohan et al., 2000). No instructions were found regarding the number of allowable missing questions for scoring, so complete data were required. The total possible range for raw scores was 16–96, with higher values considered better.

Statistical Analyses

To determine if randomization produced balanced groups, baseline characteristics were compared using chi-squared tests or Fisher's exact tests for categorical variables, two-sample *t*-tests for continuous variables, and Wilcoxon rank-sum tests for ordinal variables. All randomized participants were compared as well as the subset of those who were evaluable. Similar tests compared the subset of evaluable participants to those who withdrew.

Change in each outcome measure (Conners, PSI, PSOC) was tested using paired *t*-tests within each group. Linear mixed-effects models included an interaction term between time and group to determine whether change in each measure differed between the two groups. By chance, whether or not the child was taking ADHD medication was significantly different between the randomized groups (higher in NHA group than control group). We therefore adjusted for ADHD medication in a sensitivity analysis and observed no appreciable effect on the results (data not shown). No imputation was performed for missing data.

To investigate potential effect modification by child sex, age, or ADHD medication, stratified analyses were conducted for the two primary endpoints: change in inattention and change in hyperactivity/impulsivity. Potential interactions were tested using a three-way interaction term in a linear mixed-effects model (time, arm, interaction).

All statistical analyses were conducted using Stata 15.1 for Macintosh Operating System (StataCorp, College Station, TX). Because this is an initial efficacy study, no adjustments were made for multiple comparisons.

RESULTS

Demographics

Of the 104 parents randomized, the vast majority were women (96%); 21% self-identified as Hispanic and 85% as White (Table 1). Most were biological parents (81%), with a smaller proportion of adoptive parents (12%), and 85% were married or in a marriage-like relationship. The median number of children in the household was 2 (86% had 1–3 children; range 1–10). The education level of participants was relatively high, with 73% having a college degree or more. Half of the participants (49%) were from Arizona, 10% were from California, and the remainder were from 24 other states and U.S. territories.

The majority of children were boys (73%); 28% were Hispanic and 83% were White (Table 2). Around a third were each age (6, 7, 8 years old). Most (71%) attended public school, 21% private school, and 8% were home schooled. Most (69%) had been diagnosed with ADHD, and nearly half (46%) regularly took ADHD medication.

TABLE 2. Change in ADHD Behaviors, Parenting Stress, and Parenting Sense of Competence After Nurtured Heart Approach Intervention (n = 87): mean (SD)

Instrument and Subscale	NHA (n = 38)				Control (n = 49)				<i>p</i> ^b
	Pre	Post	Change	<i>P</i> ^a	Pre	Post	Change	<i>P</i> ^a	
Conners 3-P SF									
Inattention	77.2 (10.3)	70.2 (11.4)	-7.0 (8.1)	< .001	76.6 (11.2)	76.8 (10.0)	0.2 (6.6)	.863	< .001
Hyperactivity/impulsivity	83.2 (8.5)	75.3 (10.2)	-7.9 (9.3)	< .001	81.6 (11.0)	81.1 (10.3)	-0.5 (7.3)	.639	< .001
Learning problems	61.2 (15.3)	56.6 (11.9)	-4.6 (9.4)	.005	64.4 (14.0)	64.3 (14.2)	-0.1 (7.2)	.937	.006
Executive functioning	71.6 (10.7)	65.2 (9.3)	-6.4 (7.5)	< .001	73.4 (11.9)	73.7 (10.3)	0.3 (7.5)	.792	< .001
Defiance/aggression	70.9 (17.5)	66.5 (18.8)	-4.5 (10.7)	.014	71.3 (16.9)	70.6 (16.3)	-0.8 (12.2)	.659	.123
Peer relations	71.8 (18.4)	69.9 (18.1)	-1.9 (9.5)	.235	74.9 (16.0)	72.8 (17.2)	-2.0 (11.4)	.218	.906
Parenting Stress Index 4-SF									
Parental distress ^c	34.4 (9.0)	31.3 (8.1)	-3.1 (7.6)	.018	35.7 (11.0)	34.1 (11.4)	-1.6 (8.5)	.202	.479

(Continued)

TABLE 2. Change in ADHD Behaviors, Parenting Stress, and Parenting Sense of Competence After Nurtured Heart Approach Intervention ($n = 87$): mean (SD) (Continued)

Instrument and Subscale	NHA ($n = 38$)				Control ($n = 49$)				p^b
	Pre	Post	Change	P^a	Pre	Post	Change	P^a	
Parent-child dysfunctional interaction	31.0 (8.3)	28.6 (7.1)	-2.4 (6.6)	.031	33.1 (9.5)	32 (9.4)	-1.0 (5.3)	.185	.323
Difficult child	40.4 (7.7)	36.4 (7.2)	-4.0 (5.9)	< .001	40.3 (9.4)	40.7 (8.8)	0.4 (5.6)	.628	< .001
Total score ^c	105.7 (20.4)	96.3 (19.2)	-9.4 (16.5)	.001	109.6 (25.1)	107.7 (25.3)	-1.8 (15.0)	.408	.037
Parenting Sense of Competence									
Satisfaction ^d	34.1 (5.8)	34.6 (4.9)	0.6 (7.1)	.616	31.9 (6.2)	31.3 (6.4)	-0.6 (4.9)	.430	.381
Efficacy ^e	26.7 (5.8)	27.6 (5.0)	1.0 (5.2)	.257	25.0 (5.4)	25.2 (6.3)	0.2 (4.4)	.740	.476
Total score ^f	60.7 (10.0)	62.3 (9.0)	1.6 (10.4)	.361	57.0 (9.8)	56.4 (11.6)	-0.6 (7.9)	.615	.297

Note. ADHD = attention deficient hyperactivity disorder; Conners 3-P SF = Conners 3-Parent Short Form; NHA = Nurtured Heart Approach; Parenting Stress Index 4-SF = Parenting Stress Index 4-Short Form; Pre = preintervention; Post = postintervention. For the Conners 3-P SF and Parenting Stress Index 4-SF, higher scores indicate greater symptoms/problems. For the Parenting Sense of Competence, higher scores indicate greater sense of competence.

^aPaired t -test for difference in preintervention versus postintervention scores.

^bLinear mixed-effects model p -value for interaction between time and arm using entire study sample ($n = 104$).

^cControl group $n = 47$ for Parenting Stress Index 4-SF Parental Distress subscale and total score.

^dControl group $n = 47$ for Parenting Sense of Competence Satisfaction subscale.

^eControl group $n = 46$ for Parenting Sense of Competence Efficacy subscale.

^fControl group $n = 45$ for Parenting Sense of Competence total score.

The characteristics of participants and their children were well balanced between the two groups with one exception. The NHA group had a higher proportion of participants with children taking ADHD medication than the control group (chi-squared test, $p = .023$ for all randomized participants; $p = .046$ for evaluable participants).

Participants who did not complete the second survey (not evaluable) were different from those who completed the second survey (evaluable) in a few characteristics. Participants with more children in the household, those with a lower level of education, Arizona residents, and participants randomized to the NHA group were less likely to complete the second survey. With regard to severity, just one of the six Conners subscales (executive functioning) was significantly worse at baseline among those who did not complete the second survey versus those who did ($p < .042$).

Outcomes

Among the NHA group, inattention and hyperactivity/impulsivity T-scores dropped by 7.0 and 7.9 points, respectively (paired t -tests, both $p < .001$) whereas no significant change was detected in the control group. In addition, two other Conners subscales showed significant improvements for the NHA group compared to the control group: learning problems (4.6 points) and executive functioning (6.4 points) (Table 2). A fifth Conners subscale (defiance/aggression) improved in the NHA group (4.5 points), but not enough to be significantly different from the control group. There was no significant change in the sixth Conners' subscale (peer relations).

These T-scores can be interpreted according to guidelines provided in the Conners manual: ≥ 70 very elevated; 65–69 elevated; 60–64 high average; 40–59 average; and < 40 low score (Conners, 2008/2009). These cut points provide guidance for dichotomization, such that scores ≥ 65 are elevated and those < 65 are not elevated. At baseline, 85% of evaluable participants had children with elevated (≥ 65) T-scores for inattention. Of the 85%, 31% in the NHA group versus 2% in the control group dropped to nonelevated (< 65) T-scores at the second survey (Fisher's exact test, $p < .001$). Likewise, at baseline, 91% of evaluable participants had children with elevated T-scores for hyperactivity/impulsivity. Of the 91%, 11% in the NHA group versus 2% in the control group dropped to nonelevated (< 65) T-scores at the second survey (Fisher's exact test, $p = .172$).

Among the PSI subscales, all three showed improvement in the NHA group, though only difficult child was significantly different from the control group ($p < .001$). For the PSOC scores, no significant change was detected.

Delayed Intervention Control

Although not the primary comparison for these analyses, the delayed intervention group also reported a decrease in inattention ($p < .001$) and hyperactivity/impulsivity ($p < .001$) after participation in the 6-week intervention (data not shown).

Subgroup Analysis

Analyses for the two primary endpoints (inattention and hyperactivity/impulsivity) were stratified by child's sex, age, and ADHD medication use. Results were similar across all subgroups whereby NHA parent's perception of their children improved over that of control group parent's perception of their children irrespective of child's sex, age, and medication

use. No significant interactions between NHA intervention and child sex, age, or ADHD medication were detected (all $p \geq .2$).

DISCUSSION

This is the first RCT testing the NHA. Inattention, hyperactivity, and impulsivity are the primary reasons parents and educators refer children for evaluations and the resultant ADHD diagnosis. Our study found significant improvements in ADHD behaviors as reported by parents. Other parent trainings and behavioral interventions have also shown success in improving inattention and/or hyperactivity/impulsivity (Hautmann et al., 2018; Franke et al., 2016; Webster-Stratton et al., 2011; Loren et al., 2015).

The study results went beyond the targeted primary outcomes of inattention and hyperactivity/impulsivity, to improve learning problems and executive functioning. The findings are promising particularly because there are limited online parent trainings addressing ADHD-type behaviors. The NHA has the potential to fill some of this gap thereby expanding the accessibility of interventions. Further, the NHA is delivered through the use of metaphors and analogies (storytelling) coupled with real-life examples, which may increase accessibility of the material and relatability (Hekner et al., 2013). Lastly, the NHA creates an opportunity for support among parents experiencing similar challenges thereby potentially reducing isolation.

Results also showed improvements in parental stress. With ADHD behaviors reduced, there may be less need to manage misbehavior which may lead to lower levels of parental stress. Cunningham and Barkley (1979) found the added demand of disruptive behavior increased stress in parents. Understandably, ADHD-type behaviors are not the sole contributing factor to parental stress (Anastopoulos et al., 1992).

The parental competency measure did not show improvement overall or within subscales. We considered two possible explanations. First was the brevity of the study period. Specifically, there were 62 days (mean) between the baseline and second surveys, which may not be sufficient time for parents to recognize positive changes related to their parenting ability. Second was the instrument. The PSOC is in the public domain, with multiple versions. At the start of the study we used a version with the incorrect labeling in the answer options (Johnston, 2018). At least one parent asked a question about the order of answer options. Because the same version was utilized throughout the study and the errors are in parallel on both sides of the scale, they did not likely lead to any systematic bias in results. However, they could have reduced precision in the measurement of PSOC change.

Limitations and Strengths

The generalizability of the study is limited by place, children's age group, race/ethnicity, and parent education. Although our study involved participants from across the United States, nearly half were from Arizona. The study focused on a specific age group of 6–8 years, and while the specificity was needed to restrict variability in developmental changes, it limits generalizability. Most of the participants were of the White race, with a meaningful percent of Hispanic parents and children, however more racial and ethnic diversity would inform the Approach's applicability to different cultures. Finally, 81% of our participants had at least some college education. College education is generally seen as an advantage,

however, it can be a disadvantage in that when we read posts from parents they seem to communicate shame. While they reported having success in their professional lives with other families, at home they were struggling. This seem to lead to feelings of inadequacy. We speculate that college educated parents may actually be more impervious to change than less educated parents because their loyalties are divided by more input from having been in more classes or read more books and articles on ADHD.

Parents were the sole source of data. They assessed their child's ADHD behavior as well as their level of parental stress and competency. It is generally recommended to have more than one source of data, and for sources to be objective. Masking participants and those delivering the intervention is a strategy used to increase objectivity and reduce the likelihood of bias. This is an initial study of the NHA's efficacy. Subsequent studies may want to consider masking and additional sources of data.

A strength of the study is attrition rates were low in the NHA group (27%) and control (6%) which suggests the study design was useful for identifying reliable changes without substantial attrition, and may advance the notion that participants can and will wait for interventions. Significant among the findings is that the control group did not change as a result of time alone. Those in the control group had no discernable changes in the waiting period until they too received the study intervention, at which point they also had significant, positive changes in inattention and hyperactivity/impulsivity in response to the NHA intervention. Another strength was that a collaborative multidisciplinary team developed and implemented the study, that included behavioral health, social work, epidemiology, biostatistics, and medicine. Last, this research builds on previous investigations of the NHA by adding a randomized study with a control group thereby building the evidence of the efficacy of the NHA to transform children's behaviors.

Clinical Implications

Our study demonstrates initial efficacy of the NHA parenting approach to treat ADHD-type behaviors. Parents who prefer greater availability of services during evening, nights, and weekends from home, or parents facing transportation barriers, may respond well to this intervention which is offered online. In light of the COVID-19 pandemic, parents and practitioners may be looking for ways to learn new approaches while keeping their families safe and healthy. The NHA showed improvement by training parents, rather than a direct child-focused treatment approach, and thus could be diffused throughout the family, potentially yielding benefits for other children within the household.

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