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Development and feasibility of a virtual, synchronous mind-body resiliency intervention for fathers of children and youth with special healthcare needs*

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Abstract

Background: Fathers of children and youth with special healthcare needs (FCYSHCN) are an overlooked population at risk for chronic stress. Mind-body practices offer a patient-centered approach to foster coping and resiliency, yet low engagement from fathers in existing programs suggests adaptation is needed. This multiphase study examines the feasibility of a synchronous, virtual mind-body intervention adapted for FCYSHCN.

Methods: 31 FCYSHCN were recruited online via community partners and recruitment portals in an academic medical center in Boston, MA. Phase 1 consisted of individual interviews (N = 17) to determine fathers' stressors, coping strategies, program needs, and suggested adaptations to the intervention protocol. The Phase 2 single arm pilot feasibility trial (N = 14) consisted of eight weekly 60-minute group sessions delivered virtually. Primary feasibility metrics were attendance (benchmark: mean=6 sessions) and electronic survey completion at baseline and post-intervention. Acceptability was assessed using post-session ratings of program satisfaction (4-point Likert scale; scores ≥ 3 coded as helpful) and helpfulness (e.g., group structure). Exploratory outcomes included validated measures of stress coping, resiliency, parental stress, depression, anxiety, which were analyzed using paired-samples t-tests ($\alpha=.05$) to generate effect sizes (η^2).

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.bbii.2024.100052.

Results: In Phase 1, FCYSHCN discussed primary stressors (e.g., perceived inadequacy as a father) and multifaceted impacts of these stressors on physical, cognitive, emotional, and social wellbeing. Fathers also described coping strategies deemed helpful (e.g., humor) and unhelpful (e.g., “shutting down” from others). Qualitative findings informed intervention modifications. In Phase 2, most FCYSHCN (79%) attended 6 intervention sessions (mean=7). Follow-up survey completion was high (86%). Session satisfaction was high, with 7/8 sessions rated as helpful by most fathers. Program components deemed most helpful were the group structure, virtual delivery, exposure to a variety of relaxation and meditation skills, and the length of sessions. Although we were not powered to observe pre-post change, stress coping improved ($p = .02$, $\eta^2 = 0.42$) and confidence increased in applying relaxation ($p = .04$, $\eta^2 = 0.34$) and assertiveness techniques ($p = .05$, $\eta^2 = 0.31$).

Conclusions: The first mind-body resiliency program for FCYSHCN is feasible and acceptable. Further testing is warranted in randomized trials with diverse samples of fathers, an appropriate comparison arm, and longitudinal assessments of psychosocial and biobehavioral outcomes.

Keywords

Resiliency; Mind-Body; Virtual Intervention; Fathers; Caregiving; Children with Special Health Care Needs

1. Background

Parenting children and youth with special health care needs (CYSHCN) can involve navigating a variety of life demands and is associated with an increased risk for numerous chronic physical and mental health conditions. Common stressors for parents of CYSHCN include managing health insurance, controlling finances, and organizing a variety of needed health services and appointments (Doig et al., 2009; Graaf et al., 2022). In the absence of stress management, these stressors often result in parental stress, distress, and even physical health outcomes, which in turn may have negative impacts for their children (Darling et al., 2012; Oelofsen and Richardson, 2006; Smith and Grzywacz, 2014).

To date, most research on parenting has been conducted with mothers, limiting our understanding of the unique demands and impact of these challenges on fathers (Oelofsen and Richardson, 2006; Hastings and Beck, 2004). Although mothers serve as the primary caregiver in many Western cultures, fathers have been increasing their involvement in caregiving activities (Kotelchuck, 2022). Fathers of CYSHCN (FCYSHCN) experience high levels of stress (61%), depression (58%), and anxiety (37%) (Bourke-Taylor et al., 2022), rates that are far higher than for fathers whose children do not have special health care needs (Darling et al., 2012; Oelofsen and Richardson, 2006; Seymour et al., 2017). Collectively, FCYSHCN stand to benefit from learning skills for managing stress associated with both fatherhood and parenting CYSHCN (Woodgate et al., 2012).

Despite these challenges, few programs exist to support FCYSHCN. A recent systemic review found only six stress management interventions that targeted FCYSHCN; two interventions targeted in-home delivery of behavioral parent training to improve stress management, and the remaining four explored the influence of coping skills interventions

in clinical environments (Lindo et al., 2016). However, parental training may not lead to an increase in fathers' self-efficacy in managing their child (Sofronoff and Farbotko, 2002). Preliminary evidence suggests that support groups can increase fathers' sense of self-efficacy in managing their own emotions (Elfert and Mirenda, 2015). In a waitlist control trial with 12 fathers of children with Autism Spectrum Disorder, eight weeks of support groups enhanced fathers' paternal self-control coping, although there were no changes in measures of depression, optimism, marital satisfaction, or coping skills. In a parallel literature of parenting interventions with fathers of children with Autism Spectrum Disorder, Rankin et al. (2019) found that most trials reporting on fathers' outcomes (60%) were dyadic interventions with a co-parent, not specifically for fathers. The same systematic review identified only one intervention tested using remote delivery (Rankin et al., 2019). Heitzman-Powell et al. (2014) enrolled 10 parents of a children with Autism Spectrum Disorder to assess acceptability of parent training principles delivered via a hybrid of asynchronous web-based modules (60 min/week) and supervised hands-on training (90–120 min/week); however, fathers' outcomes were not assessed separately, and participants were required to travel to a local telemedicine site (Heitzman-Powell et al., 2014). Collectively, large gaps in the literature persist regarding interventions targeted towards the specific needs associated with being a FCYSHCN.

Mind-body interventions offer a promising approach to mitigate the impacts of these stressors on fathers. Skills in mind-body interventions focus on enhancing the mind's ability to affect bodily function and symptoms, holistically focusing on the interaction between the brain, the mind, and the body, as well as acquiring skills to address cognitions, emotions, behaviors, and physiological symptoms. Moreover, incorporating mind-body practices together with health behavior information may appeal to fathers more than traditional counseling or psychotherapy. In general, men seek mental health support less often than women (Addis and Mahalik, 2003; Wang et al. (2007)). Structural (i.e., cost of psychotherapy) and attitudinal (underlying beliefs of what is masculine) barriers contribute to treatment avoidance and resource underuse (Seidler), resulting in consequences across all life domains: personal, relational, physical, mental, and economic costs (World Health Organization, 2002; Parent et al., 2018).

Previously, we conducted two pilot studies of a mind body resiliency intervention (Stress Management and Resiliency Training - Relaxation Response Resiliency Program; SMART-3RP) with parents of CYSHCN, one with parents of children with autism and the other of parents of children with learning and attentional disabilities (Kuhlthau et al., 2020; Park et al., 2020). The SMART-3RP is a protocolized comprehensive, multimodal treatment designed to promote adaptation to chronic stress and resiliency (Park et al., 2013). Grounded upon decades of relaxation response clinical research, the SMART-3RP has three core components: 1) Relaxation Response Elicitation Strategies; 2) Stress Appraisal and Coping; and 3) Growth Enhancement. The intervention consists of eight 1.5-hour sessions delivered via a remote video-based platform; each session focuses on a different relaxation response technique (e.g., meditation) together with other stress management tools pulling from cognitive behavioral and positive psychology theory. Findings from our prior trials suggest the SMART-3RP is feasible and acceptable for parents of CYSHCN (Kuhlthau et al., 2020; Park et al., 2020). Consistent with other parent-level interventions, in these

trials, participants were disproportionately mothers (>90%), with relatively few fathers represented.

To overcome these limitations and address significant gaps in the care of fathers of CYSHCN, this study aimed to develop and test an adapted mind body resilience program to meet their unique needs. Using a two-phase process and mixed methods, our study team adapted the SMART-3RP to address the specific challenges facing FCYSHCN. In Phase 2, we conducted a single arm pilot feasibility trial consisting of two groups to test the adapted mind-body resiliency intervention delivered in synchronous, virtual group sessions.

2. Methods

2.1. Overall study design

All study procedures for this two-phase study were conducted at an academic medical center in Boston, MA. The Phase 2 pilot feasibility trial was preregistered on [ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT05535348) (NCT05535348). All procedures were approved and monitored by the MassGeneralBrigham Institutional Review Board and conformed to Declaration of Helsinki ethical standards. We obtained informed consent from all participants prior to participation.

2.1.1. Participants—Eligible fathers for both phases were required to (1) self-identify as a father or male guardian of at least one child with special health care needs, (2) be at least 18 years old, and 3) have the ability to participate in videoconferencing. Fathers who were unable to speak or read English or who were considered medically or otherwise unable to participate were ineligible to participate. We included fathers whose children were older than 18 years old, to enhance the generalizability of this program to FCYSHCN. Phase 1 participants were ineligible to participate in Phase 2.

2.1.2. Recruitment and Enrollment—To enhance generalizability and facilitate recruitment of this understudied population, we engaged with community stakeholders and utilized a variety of recruitment methods. We employed a multimodal approach to recruitment that included advertisements (e.g., electronic flyers) shared through online support groups for parents and families of CYSHCN (i.e., Family Voices, clinics affiliated with the Children and Youth with Special Healthcare Needs Network); use of a public research recruitment portal (MassGeneralBrigham Rally); and study dissemination via local stakeholders (i.e., fathers-related email listservs and podcasts), psychologists, and medical physicians. Interested fathers contacted the study directly and completed a phone screen to determine eligibility; those who remained eligible completed an electronic informed consent. Recruitment for Phase 1 (N = 17) and Phase 2 (N = 14) occurred sequentially.

2.2. Phase 1: Qualitative Study

2.2.1. Phase 1 Data collection procedures—Fathers (N = 17) were interviewed individually to identify their stressors, coping strategies, program needs, and suggested adaptations to the SMART-3RP intervention protocol for a virtual, mind-body resiliency program. The SMART-3RP framework targets relaxation in addition to two simultaneous processes to promote resiliency: Stress Management and Growth Enhancement (Park et

al., 2013). Aligning with these processes, we used a semi-structured interview guide (Supplement) asking fathers to describe their stressors, current helpful and unhelpful coping strategies, sources of joy, and views on intervention design considerations.

2.2.2. Phase 1 Data analyses—Interviews were audio recorded, professionally transcribed using a HIPAA-compliant transcription service, and analyzed in an iterative process. An expert in qualitative methodology oversaw the qualitative analysis (GKP). Transcriptions underwent content analysis using hybrid inductive and deductive coding to synthesize fathers' feedback into final themes. Codes were derived independently by two coders (YS and AC), who first reviewed each transcript for quality and consistency, developing an initial coding framework inductively using open coding. Codes were guided by the raw data and interview guide. Transcripts were read and re-read, providing flexibility to test the codes and clarify the coding framework as the reviews progressed. Discrepancies were discussed and resolved with GKP.

2.2.3. Program Adaptation—The SMART-3RP intervention was adapted by integrating feedback from Phase 1 Qualitative Interviews with stakeholder feedback (CC) and iterative review from four investigators with prior experience adapting the SMART-3RP (KAK, ERP, GKP, DLH). Adapted treatment manual and procedures were finalized for Phase 2 testing.

2.3. Phase 2: Pilot Trial

2.3.1. Phase 2 Data collection procedures—Fathers (N = 14 total; 2 cohorts of n = 5 and n = 9) participated in the adapted intervention. The virtual SMART-3RP groups were planned for eight, weekly 60-minute sessions covering the adapted session content (Fig. 1). Study measures were completed electronically via Research Electronic Data Capture (REDCap) at two timepoints: baseline (T₀) and immediately post-intervention (T₁). In addition to these surveys, fathers completed a REDCap 5-item acceptability questionnaire following each session. Intervention groups were led by a male, PhD-level clinical psychologist who had previously completed certification in the SMART-3RP (DLH).

2.4. Phase 2 Measures

2.4.1. Socio-demographic characteristics—Age, sex, race, ethnicity, education, employment status, income, insurance status, marital status, number of children, and special healthcare needs of children were collected at baseline.

2.4.2. Feasibility—Primary feasibility metrics included session attendance [benchmark: 75% fathers attending 75% (6/8) treatment sessions] and rates of survey completion [benchmark: 70% at T₁]. Exploratory feasibility metrics included interventionist adherence to planned session durations (approximately 60 min) and content coverage (number of sessions fully covered) from post-session fidelity logs recorded by the interventionist, as well as fathers' reported frequency of independent relaxation practice at T₁ (dichotomized as 3 + days per week vs. less).

2.4.3. Acceptability—Acceptability was primarily assessed quantitatively using fathers' post-session ratings of satisfaction with each session using a 4-point Likert scale (4 =Very Helpful, 3 =Somewhat Helpful, 2 =Neutral, 1 =Not very helpful). We dichotomized scores of 3 or higher into Helpful (yes vs. no). Exploratory acceptability metrics included T₁ survey items assessing helpfulness of various components of the program (e.g., group structure, between-session practices) using a 5-point Likert scale (5 =Very Helpful, 4 =Helpful, 3 =Neutral, 2 =Not Helpful, 1 =Not at All Helpful) dichotomized into Helpful/Very Helpful (yes vs. no). Acceptability was assessed qualitatively using T₁ open-ended survey items assessing aspects of the program that were most and least helpful.

2.4.4. Exploratory outcomes: Stress Coping—Stress coping was assessed using the MOCS-A (Carver, 2006), comprised of a total score and four domains. *Coping using relaxation*. The ability to elicit the relaxation response was measured using two-item relaxation subscale. *Coping confidence*. Confidence in one's ability to cope was measured using the using the coping confidence subscale. *Assertiveness*. Confidence in one's ability to advocate for their needs. *Tension awareness*. The ability to notice signs of tension in oneself was measured using the tension awareness subscale. *Resiliency*. Resiliency was assessed using the 23-item Current Experiences Scale (Groves et al., 2022). Total scores range from 0–115, with higher scores indicating higher resiliency. The Parental Stress Scale (Berry and Jones, 1995) comprised of 18 items rated on a 5-point scale from 1 =Strongly Disagree to 5 =Strongly agree, including 7 items that are reverse scored to create a total sum score. Higher total scores reflect higher levels of perceived parenting stress. *Depression and Anxiety*. The Patient Health Questionnaire-4 (PHQ-4) (Kroenke et al., 2009) is comprised of 2 items assessing depression and 2 items from assessing anxiety on a 4-point scale from 1 =Not at all to 4 =Nearly every day. Scores ≥ 3 on each subscale indicate elevate symptoms warranting further screening for major depressive disorder or generalized anxiety disorder, respectively). *Distress*. A visual analog scale assessed current distress levels from 0 (none) to 10 (high distress).

2.4.5. Data analyses—Quantitative analyses were conducted with SPSS software version 24. Feasibility and acceptability measures were summarized using descriptive statistics (means, medians, frequencies, and observed ranges). Open-ended T₁ survey items assessing helpfulness were analyzed using deductive qualitative coding to identify aspects of the intervention that fathers reflect as most and least helpful. Pre-post intervention changes in means for exploratory outcomes were analyzed via general linear models to estimate the statistical significance ($\alpha=.05$) and magnitude of any observed pre-post intervention changes (partial eta squared; $\eta^2 = 0.01$ indicates a small effect, $\eta^2 = 0.06$ a medium effect, and $\eta^2 = 0.14$ a large effect).

3. Results

3.1. Phase 1: Qualitative Interviews

As summarized in Table 1, fathers in Phase 1 were predominantly young ($M=44.8$ years; $SD=8.1$ years), married ($n = 16, 94.1\%$), college-educated ($n = 16, 94.1\%$), fully employed ($n = 13, 76.4\%$), and identified predominantly as heterosexual ($n = 14, 82.4\%$) and white

(n = 14, 82.4%). Three fathers identified as Black (17.7%), two as Latino (11.8%), and one as multiracial (5.9%). Fathers had children who were on average 10 years old (SD=5.5 years). Special healthcare needs of children (n = 28) were variable, most commonly Autism Spectrum Disorder (n = 11, 39.3%), followed by ADHD (n = 3, 10.7%), cerebral palsy (n = 3, 10.7%), Deaf/hearing loss (n = 3, 10.7%), Dyslexia (n = 2, 7.1%), Cri du Chat (n = 1, 3.6%), a chromosome disorder (n = 1, 3.6%), Down Syndrome (n = 1, 3.6%), glioblastoma (n = 1, 3.6%), neurofibromatosis (n = 1, 3.6%), and Tourette Syndrome (n = 1, 3.6%).

3.1.1. Qualitative Themes—Fathers identified a number of stressors related to managing multiple family demands together with their child’s behavioral challenges, nurturing their relationship with their partner and other unaffected children, managing their finances, as well as caring for their own health. These stressors were further enhanced by perceptions of inadequacy when demands were unmet.

The impact of these stressors was multifaceted. Fathers described experiencing a number of physical (e.g., insomnia, fatigue, physical collapse, “full-body tension”), cognitive (e.g., burnout, unable to think clearly in stressful situations and problem-solve), emotional (e.g., anxiety, depression, loneliness, bitterness, anger), and social effects of stress (e.g., feeling isolated, challenges sustaining social friendships, exerting excessive social energy when with child, cannot relate to other fathers/families). One father told us, “*It affects me personally, about the community, the neighbor, the friends. they think of what type of child I have.*”

To cope with these stressors, fathers reported using a variety of skills. Helpful strategies included humor (e.g., making light of stressful situations) as well as seeking social (e.g., family, friends, social media groups) and other forms of support (e.g., medication, counseling). However, fathers also identified several unhelpful and potentially harmful behaviors. Most commonly, fathers disclosed engaging in avoidance (e.g., substance use, “shutting down” and distancing from family and friends to focus on childcare responsibilities). Other coping behaviors identified as unhelpful, “intensive”, and potentially “triggering” included searching the internet for information about their child’s condition, ruminating about insensitive comments (e.g., apologizing for their child, mislabeling child’s abilities), and being with other fathers whose children did not share similar healthcare needs. Some fathers also shared skepticism about the motives of some advocacy organizations and people offering to help, limiting their engagement with these resources.

When asked about their sources of joy, fathers primarily described joys related to their child or children (e.g., observing their child’s natural traits and skills develop, playing with their child, observing their child’s accomplishments). Fathers described feeling gratitude for receiving tangible/instrumental social support from organizational care (e.g., school, medical care staff). One father of a daughter elaborated, “*connecting with her OT (occupational therapists)... her teachers at her childcare center... the early interventionist who led the playgroup... seeing how caring they are for young children who have all different kinds of special needs and how great they were at partnering with us*”. Fathers noted that formal care allows them to shift their attention to other life events (“*providing me a little bit of space so I can do other things*”). Some fathers also shared feeling emotionally inspired by their

child's support care providers (e.g., "*seeing that they care, and they have smiles, there's some goodness in human spirit*").

Fathers identified an interest in receiving support to manage their stress while also acknowledging general reluctance due to time demands and previous experiences feeling disappointed by formal support (e.g., group support, psychotherapy). Nonetheless, when probed about their interest in mind-body didactic programs, the response was largely inviting. A majority reported an interest and curiosity in learning relaxation and meditation skills. Fathers identified specific language in relaxation exercises that would require adaptation to overcome gender barriers (e.g., terminology perceived as "feminine"). Virtual, synchronous delivery via Zoom was overall highly appealing, although a few fathers shared this modality would heighten feeling self-conscious. As one father described, "*practicing deep breathing while people are watching me on a video camera. Something about that camera, it can add stress.*" Given their position of vulnerability, participants highlighted the importance of emphasizing rapport before initiating group discussions about sensitive topics. Given time demands, fathers requested shorter sessions (from 90 to 60 min) that could be completed during the workday to avoid impact family afternoon and evening events.

3.1.2. Program Adaptation—The SMART-3RP intervention was adapted based on these findings. Briefly, adaptations included: shorter time period (60 minutes rather than 90), a very practical focus on skill building, rephrasing language in exercises perceived by fathers as "feminine" (e.g., chair yoga became "relaxing stretching"), incorporating examples using fathers and stereotypical father activities (e.g., sports). The final protocol consisted of eight weekly, synchronous group virtual sessions and adapted content (Fig. 1). Fathers who were not familiar with telehealth were given the opportunity to complete a brief test call with study staff before starting the intervention.

3.2. Phase 2: Pilot Trial

Fathers in Phase 2 had similar sociodemographic characteristics as fathers in Phase 1, although there were differences in terms of race and age of children. Fathers in Phase 2 identified as white (100%) and one father also identified as Asian (7%) and had children who were on average 14 years old (SD=10.4 years), as shown in Table 1. Special healthcare needs of children (n = 33) were variable, most commonly Autism Spectrum Disorder (n = 8, 24.2%), followed by epilepsy (n = 5, 15.2%), ADHD (n = 4, 12.1%), a chromosome disorder (n = 4, 12.1%), an anxiety/mood disorder (n = 2, 6.1%), 3-PGDH L-Serine deficiency (n = 2, 6.1%), binocular vision (n = 1, 3.0%), broncho pulmonary dysplasia (n = 1, 3.0%), cataracts (n = 1, 3.0%), cerebral palsy (n = 1, 3.0%), cystic fibrosis (n = 1, 3.0%), glaucoma (n = 1, 3.0%), kidney disease (n = 1, 3.0%), learning disabilities (n = 1, 3.0%), Lowe Syndrome (n = 1, 3.0%), and stroke (n = 1, 3.0%).

Feasibility.—A total of 14 fathers out of the 14 enrolled (100%) started the resiliency program. Most fathers (79%) attended six or more sessions (mean=7, median=8, mode=8 sessions), surpassing our benchmark for attendance (75% attending six or more sessions). Two fathers attended five sessions, and one father attended three sessions. Reasons for missed sessions were diffuse but most commonly due to unplanned scheduling conflicts.

Survey completion also surpassed our a priori benchmark (70%): 86% (12/14) at T₁. Thus, the trial's primary feasibility benchmarks were exceeded.

Additionally, across both cohorts and all 8 sessions, sessions were on average delivered within the allotted timeframe (M=61 min, SD=1.6). Of the 16 sessions, 14 sessions were fully covered in all content areas. Cohort 1, session 7 had partial content coverage on an empathy exercise and cohort 2, session 5 had partial content coverage on nutrition and acceptance. As illustrated in Fig. 2, it was feasible for fathers to learn relaxation skills and practice them independently. The rate of practicing relaxation at least 3 days per week nearly tripled over the course of the 8-week program, from 29% to 83%.

Acceptability.—As illustrated in Fig. 3, fathers were highly satisfied across sessions. The highest rated sessions were Sessions 1 (Breath Awareness, Body Awareness, Single-Pointed Focus Meditation, Energy Battery), 2 (Sleep, MINI RR, Body Scan), and 6 (Physical Activity, Contemplation, Optimism and Pessimism, Good/Bad/Routine). By contrast, Session 4 (Awareness of movement, Negative automatic thoughts, Relaxing Stretching, Coping Log, Part 1) was the least acceptable (50% of fathers rated the session as helpful). The most helpful components of the program pertained to the group structure (100%), followed by practicing relaxation independently (75%), and the length (60-minutes) of sessions (75%). No domains were rated below 65%.

Qualitative feedback obtained from 11 fathers confirmed quantitative findings. Fathers identified (a) virtual delivery, (b) seeing/ "hearing from" other FCYSHCN, and (c) learning relaxation and meditation techniques as being amongst the most helpful programmatic features. Specifically, virtual delivery was described by one father as *"an easy way to connect with others and hear others' stories"* and by another as helpful because it *"allowed me to fit the sessions into my schedule which is otherwise very busy"*. Meeting other fathers who were facing similar caregiving challenges was also validating, allowing them to *"hear different perspectives"* about coping and parenting. As one father added, *"I found hearing stories that were similar to my own or opinions that were the same or different than my own to be the most rewarding part."* Additionally, learning the relaxation response and non-judgmental awareness (e.g., mindfulness) was cited as helpful for fostering self-care. One father described these benefits as, *"I really like the guided meditation exercises as sometimes it is hard for me to stay focused when attempting to do these types of activities on my own."* Another father commented, *"I found myself thinking about myself more than I ever do. It caused some significant reflection that I haven't done in many years."*

Fathers identified several ways the program could be improved by increasing the diversity among participating fathers. Some wished for greater group diversity related to participant age, child's diagnosis, and marital status (i.e., married/partnered vs. single father). Fathers noted when they felt that they had a unique background. One father noted *"Some parts showed a strong lack of understanding of what fathers in particular experience. Especially those with more severely disabled children, but all fathers."* And *"As a divorced parent who does not have my child full time I felt like I was very a minority in the group."* Others wished for more personalized and individualized attention. As one father noted, *"It was nice*

to have at least an hour a week when I knew I was going to be able to work on ‘me’. I doubt I will be able to maintain that amount of time now the sessions have ended.”

Exploratory Outcomes.—At T_0 , on average fathers had moderate levels of stress coping and non-elevated levels of depression and anxiety (i.e., <3). Table 2 summarizes the observed changes from baseline (T_0) to post-intervention (T_1) in patient reported outcomes. From T_0 to T_1 , there were large, statistically significant improvements in stress coping ($\eta^2 = 0.42$), driven by increased confidence in applying relaxation techniques ($\eta^2 = 0.34$) and assertiveness skills ($p = .05$, $\eta^2 = 0.31$). Across all coping-related variables, there were medium to large sized increases from pre-post intervention ($\eta^2 = .12-.42$). There were more modest changes in depression and anxiety ($\eta^2 = .13$ and $\eta^2 = .14$, respectively), with largest effects seen among fathers whose T_0 scores were elevated (i.e., >3). Measures of resiliency, parental stress, and distress yielded the smallest effects changes over time.

4. Discussion

Using a two-phase process, we successfully adapted and pilot-tested the first mind-body intervention for FCYSHCN. The intervention was successfully delivered using a virtual, synchronous group platform, which was designed to increase scalability and impact. Feasibility and acceptability benchmarks were met, with preliminary evidence of medium-to-large effects in coping but no change in resiliency. We also gained valuable insights into potential optimization features for future testing. Overall, these findings suggest that this mind-body resiliency intervention is appealing, feasible to deliver, and seemingly beneficial for FCYSHCN.

By developing the first stress management and resiliency intervention for FCYSHN and testing the intervention preliminary effects via remote delivery, our findings have several implications to advance mind-body research and clinical care in this vulnerable population. Consistent with the sparse literature on stress, fatherhood, and parenting CYSHCN, FCYSHCN across both phases identified numerous daily life challenges, including feeling isolated, navigating multiple, often competing roles and demands in the context of having limited coping skills. Based on the multidimensional nature of these stressors, fathers endorsed the value of learning coping strategies that focus on observing and intervening on interactions between the brain, mind, body and behavior, which aligns with the approach of mind-body practices. Previously, we found it is feasible to deliver these skills in synchronous, virtual telehealth with high fidelity in other populations (Park et al., 2020; Hall et al., 2020a). Specifically, fathers were motivated to learn techniques for relaxing their physical tension (i.e., stress reduction) and for promoting their mental and physical energy and mood (i.e., growth enhancement). Fathers also had a preference for language that emphasized masculine adjectives (e.g., strong), consistent with prior literature on strategies to optimize uptake of healthcare among men (Addis and Mahalik, 2003).

In Phase 2, these content modifications were acceptable and feasible to deliver. As evidenced by fathers' high levels of engagement with the program, the trial's a priori feasibility benchmarks for attendance and survey completion were exceeded. Similar to findings from our previous studies with parents of children with learning and attention

difficulties (Kuhlthau et al., 2020; Park et al., 2020), fathers in this study found delivery via synchronous, virtual sessions (i.e., Zoom) and a group format was highly appealing. Indeed, the rates for attendance and survey completion in Phase 2 surpassed rates we previously observed in a SMART-3RP trial testing delivery in-person (Hall et al., 2020b). The intervention was also acceptable. Overall, fathers were satisfied with the sessions, in particular the sessions incorporating stress awareness, deep breathing and “mini” relaxation practices, and sleep hygiene education and tips. In contrast, Session 4 was rated relatively less helpful across both cohorts. Notably, this session’s relaxation practice involved fathers stretching their hands, necks, and shoulders in various poses, and some fathers from Phase 1 had raised concerns that being on camera might make fathers feel self-conscious. Although we allowed fathers to turn off their camera if needed, they were encouraged to leave video cameras on to enhance engagement. Additionally, this session introduces negative automatic thoughts, and Session 5 introduces skills for addressing these thoughts. It is possible that combining both topics would have enhanced the helpfulness of Session 4.

Fathers appreciated the ability to connect interpersonally with other FCYSHCN, offering validation for stressors and rewards associated with fatherhood and/or parenting a CYSHCN. Fathers also described learning from other fathers whose experiences were different from their own. It is possible that the targeted session content (e.g., terminology, “dad jokes” in humor section) enhanced engagement in sessions and among group members. Moreover, timing considerations from the Phase 1 study (i.e., 60-minute sessions, delivery during lunch break hours and after work hours) were validated as appealing in Phase 2 (Kuhlthau et al., 2020; Park et al., 2020).

Fathers did not just report to us that these features were helpful; their stress coping behaviors appeared to change as a result. Fathers had large effect size improvements in their self-perceived stress coping confidence, including large increases in their perceived ability to apply relaxation techniques and to communicate their needs to others. Indeed, prior to enrolling in our study, approximately one in four fathers were practicing relaxation regularly (i.e., at least 3 days per week). After being given an opportunity to learn and practice these skills in synchronous, virtual group sessions, approximately four in five fathers were practicing relaxation regularly. These changes are similar to those we observed in a previous SMART-3RP trial delivered in-person (Hall et al., 2020b). In contrast to psychotherapy approaches that focus exclusively on modifying thoughts and emotions, the SMART-3RP’s mind-body approach encourages changes in behaviors, including relaxation practice. Practicing relaxation independently has numerous benefits on mood akin to behavioral activation and mitigating the stress response via increased vagal tone (Luberto et al., 2020). When navigating chronic stress, it may be easier to modify one’s own actions rather than circumstances or even emotional responses. Fathers in Phases 1 and 2 explained to us that relaxation practice offered them a concrete tool that was (a) objectively measurable and (b) associated with an immediate reduction in their stress response. In Phase 2, pre-post surveys and exit interviews demonstrated that fathers increased their stress coping confidence by increasing their relaxation skills practice and confidence in their ability to identify and communicate their needs.

Effect size changes in anxiety and depression reductions were moderate-to-large, and resiliency, parenting stress, and distress changes were small, although none of these outcomes were statistically significant. There may be several reasons for this finding. First, baseline levels of coping and resiliency were moderate, while levels of anxiety, depression, parental stress, and distress were all low (i.e., not elevated). This may have created a floor effect, obscuring our ability to capture larger changes among fathers with more severe anxiety, depression, stress, and distress at baseline. Potentially, enrolling FCYSHCN with high levels of emotional concerns would have increased our power to detect pre-post changes. With regard to resiliency, it is possible the assessment window in Phase 2 was too brief to capture changes in this holistic construct, which includes factors that may require additional time to adopt, such as healthy lifestyle behaviors, social support enhancements, and developing attitudes that are more balanced and fairer to themselves. As evidenced in other SMART-3RP trials, these variables may not change acutely (i.e., within 8 weeks) but instead may improve gradually or in a quadratic fashion, requiring a more distal assessment (e.g., +3 months) to assess downstream impacts on resiliency and emotional outcomes (Hall et al., 2020b).

This study had important limitations that can be addressed in future research. Phase 2 was designed as a feasibility and acceptability trial. As such, it had a relatively small sample size that precluded our ability to observe statistically significant changes in our exploratory outcomes. We also recruited through a community partner, which precluded our ability to formally assess the number of fathers who enrolled among those who were eligible. Phase 2 also lacked a control arm, which precludes our ability to determine causality about the pre-post intervention changes we observed. Future trials should include randomized designs with adequate sample size and appropriate control groups and consider stratification by previous exposure to mind-body skills. The samples in both phases had low diversity with respect to race and ethnicity. Further revisions will be necessary to assure that the intervention is generalizable for all FCYSHCN, particularly among racial and ethnic minoritized groups for whom navigating caregiving demands in the United States may be particularly challenging.

Some fathers from Phase 2 were parenting children with multiple functional limitations challenges and identified having unmet support needs. These fathers felt that their experience was unique, and at least one father felt that the intervention did not address the circumstance of his life with a child who has many functional limitations. We recognize that it will be critical to develop interventions for fathers whose children are adults or not living with them, as well as for other family members with unique caregiving demands, including siblings, mothers, extended family, and formal care providers. CYSHCN include an estimated 18.8% of the US child population with chronic physical, developmental, behavioral, or emotional conditions that require health and related services of a type or amount beyond that required of children generally (Ghandour et al., 2022). To maximize public health significance and impact, mind-body resiliency interventions for fathers should aim to maximize heterogeneity with respect to child diagnoses, while striving to be sensitive to population-specific preferences and needs (Kuhlthau et al., 2011). The most prevalent healthcare need of children among fathers in Phase 1 and Phase 2 was an Autism Spectrum Disorder (24–39%), potentially limiting generalizability to fathers of children of other healthcare needs.

For the Phase 2 study, the group facilitator's gender was male. Given Phase 1 preferences for gender-targeted content, we felt this consideration was appropriate; however, some literature suggests that men in general may prefer a female therapist (Liddon et al., 2018). It is possible that a gender-matched facilitator contributed to participants' high levels of engagement in sessions and rates of survey completion; however, we did not directly assess gender matching preferences in surveys or exit interviews. Relatedly, we were not sure if a separate group for fathers only would be feasible and acceptable, which led us to develop and pilot test the fathers-only design in this study. It is possible that a mixed role group would be ideal for some parents, while a father/mother only group will appeal to others, and future trials can consider how homogenous or heterogenous the groups should be. This adaptation builds on a theoretically grounded intervention platform that has shown promising results in other populations, though notably, populations that are largely female (Hall et al., 2020b; Psaros et al., 2015; Denninger et al., 2017; Vranceanu et al., 2014). Finally, given promising effects on coping, future trials with FCYSHCN should include objective assessments of chronic stress or allostatic load (e.g., elevated cortisol awakening response, pro-inflammatory cytokines, glucocorticoid receptor sensitivity on peripheral blood mononuclear cells).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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| SMART-3RP Core Content | Adapted Content Targeting FCYSHCN |
|--|--|
| <p>Session 1: Stress Management and Resiliency Training The science of mind-body medicine, breath awareness, practice note, tips for developing a consistent practice, body awareness, single-pointed focus meditation, energy battery</p> | <ul style="list-style-type: none"> •Revised opening quotes to FCYSHCN* •Revised introduction to summarize findings from Phase 1 study •Added Letter to self, Appreciations •Removed intake, instead email Fathers a brief introduction before Session 1 •Removed breath awareness, body awareness, and single-pointed focus meditation |
| <p>Session 2: Relaxation Response (RR) Recuperative sleep, MINI RR, body scan, assessing your sleep, identifying positive emotions and sensations, sleep diary</p> | <ul style="list-style-type: none"> •Added Sleep: Stimulus control (brief evidence-based skill) •Removed Sleep: Education and assessment |
| <p>Session 3: Stress Awareness Mindful awareness, social support, mindful eating, stress warning signals, social support diagram, mindful body awareness, mindful awareness in daily living</p> | <ul style="list-style-type: none"> •Revised Social Support Diagram (providing/meeting needs as a FCYSHCN) •Revised Mindful Awareness in Daily Living (add examples of cultivating mindful awareness during exercise) •Added description about anger as a common sign of stress |
| <p>Session 4: Mending Mind and Body Awareness of movement, negative automatic thoughts, thought distortions, yoga, walking meditation, coping log part 1, pleasant behaviors</p> | <ul style="list-style-type: none"> •Revised NATs (guilt, parenting uncertainty, pride, relationship expectations) •Revised Coping Log, Part 1: option to add fatigue •Revised List of Pleasant Behaviors •Revised Yoga name to "relaxing stretching" |
| <p>Session 5: Creating an Adaptive Perspective Creating an adaptive perspective, healthy eating, insight imagery, coping log part 2, achieving acceptance, problem-solving versus acceptance, joyful place imagery, stop/breathe/reflect/choose, food pyramid</p> | <ul style="list-style-type: none"> •Revised language in Problem Solving vs. Acceptance |
| <p>Session 6: Promoting Positivity Promoting physical activity, contemplation, optimism and pessimism, relaxation signals, good/bad/routine</p> | <ul style="list-style-type: none"> •Revised Optimism and pessimism (examples of fathers) •Revised Relaxation signals (suggest removing "reaching out to call another parent," to include dad-specific example (e.g., go out with a friend, invite a friend on a bike ride)) •Revised Promoting Physical Activity examples |
| <p>Session 7: Healing States of Mind Creative expression, empathy, loving kindness, root fear, poetry, empathy/mindful awareness of another, I am...at peace, creativity practice, letter to self</p> | <ul style="list-style-type: none"> •Revised loving-kindness to partners, children, self •Revised root fear example (remove parents' book club example, replace with example (e.g., scouting trip, attending sports game, participating on a sports team)) •Removed poetry |
| <p>Session 8: Humor and Staying Resilient Humor and coping, staying resilient, idealized self, energy battery part 2, finding humor in your life, laughter, program review</p> | <ul style="list-style-type: none"> •Targeted humorous storytelling exercise to FCYSHCN stress, added "dad jokes" |
| * Applied throughout Sessions 1-8. | |

Fig. 1.
Session Content of the Mind-Body Resiliency Intervention for Fathers of Children and Youth with Special Healthcare Needs (FCYSHCN).

Fathers' Rate of Practicing Relaxation Three or More Days Per Week

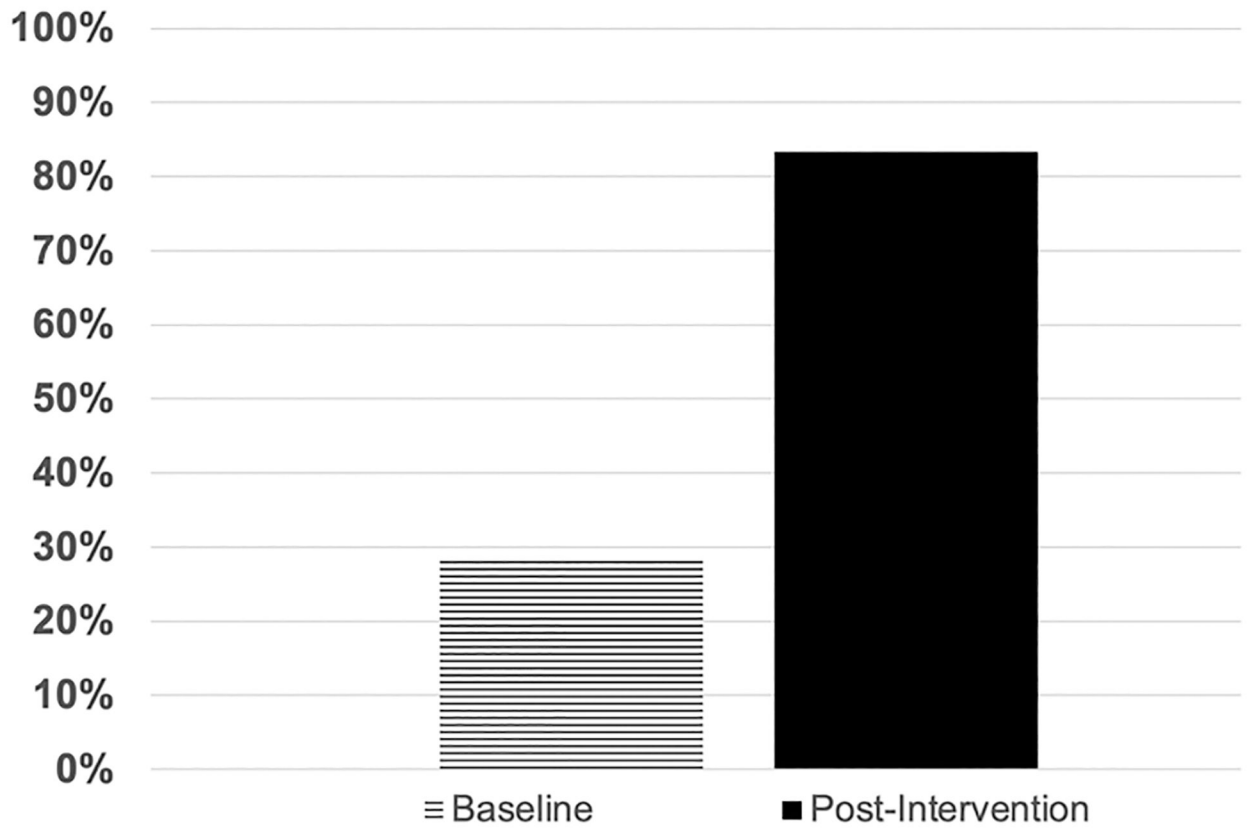


Fig. 2.
Frequency of Independent Relaxation Practice.

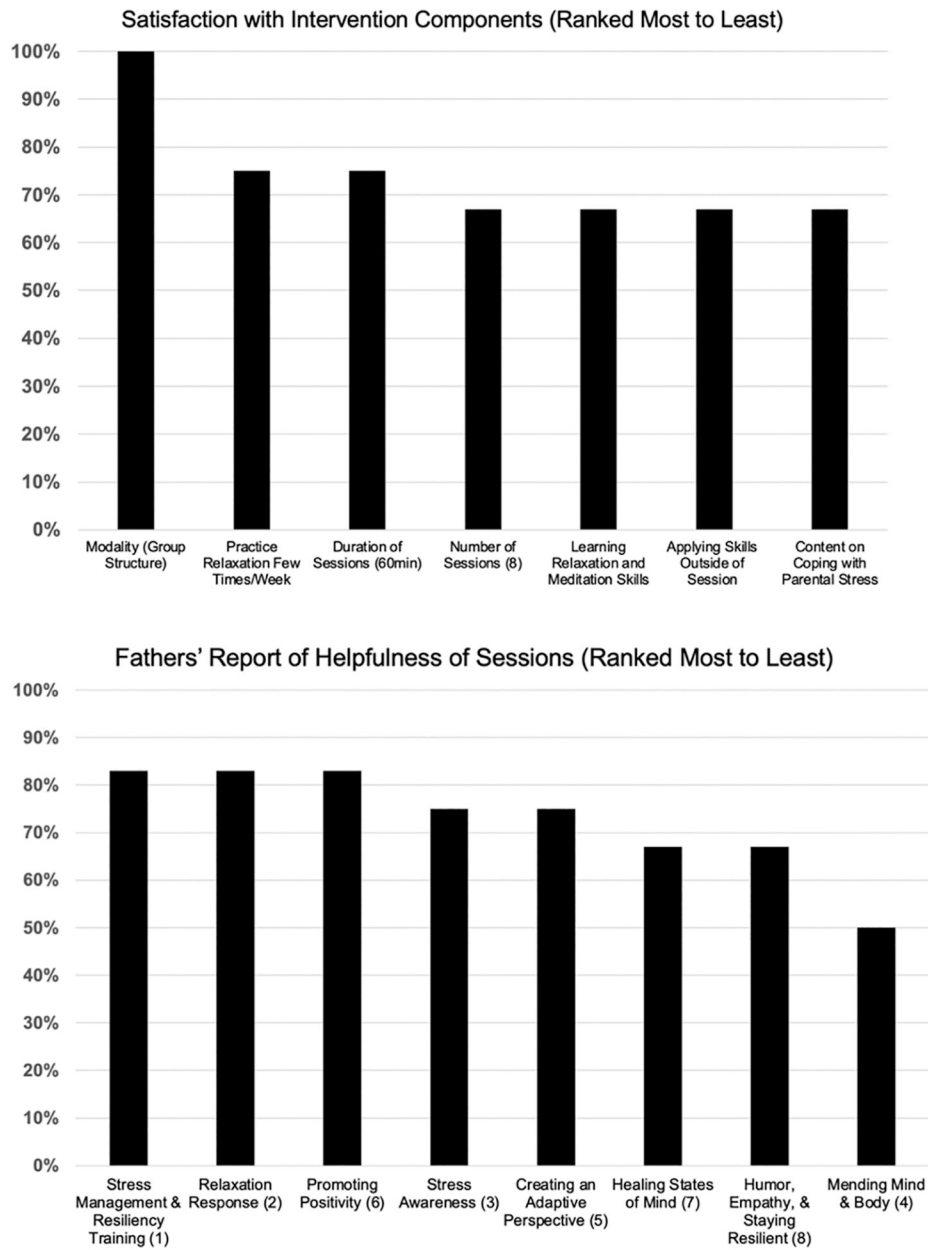


Fig. 3. Acceptability of Synchronous, Virtual Mind-Body Intervention Components and Session Content.

Table 1

Fathers in Phase 1 (Qualitative) and Phase 2 (Pilot trial).

| Variable | Phase 1 (N = 17) | | Phase 2 (N = 14) | |
|---|------------------|------|------------------|------|
| | n/M | %/SD | n/M | %/SD |
| Marital status | | | | |
| Married | 16 | 94.1 | 12 | 85.7 |
| Divorced/separated | 1 | 5.9 | 1 | 7.1 |
| Widowed | 0 | 0 | 1 | 7.1 |
| Insurance* | | | | |
| Employer-sponsored | 12 | 70.6 | 9 | 64.3 |
| Individual insurance | 2 | 11.8 | 2 | 14.3 |
| Medicare | 4 | 2.4 | 2 | 14.3 |
| Medicaid/State/Public | 3 | 17.7 | 2 | 14.3 |
| Military provided | 0 | 0 | 1 | 7.1 |
| Other | 0 | 0 | 1 | 7.1 |
| Sexual orientation | | | | |
| Heterosexual/straight | 14 | 82.4 | 14 | 100 |
| Other | 3 | 17.7 | 0 | 0 |
| Single parent | 1 | 5.9 | 2 | 14.3 |
| Race* | | | | |
| Asian | 0 | 0 | 1 | 7.1 |
| White | 14 | 82.4 | 12 | 100 |
| Black | 3 | 17.7 | 0 | 0 |
| Multiple Races | 1 | 5.9 | 0 | 0 |
| Latino | 2 | 11.8 | 0 | 0 |
| Employment | | | | |
| Employed full/part-time | 13 | 76.4 | 11 | 78.6 |
| Retired | 1 | 5.9 | 3 | 21.4 |
| College graduate Child schooling** | | | | |
| Homeschooled/online schooling | 1 | 5.9 | 1 | 7.1 |
| Schooled in-person | 14 | 82.4 | 11 | 78.6 |
| Avg. Percent of parenting tasks | | | | |
| < 50% | 4 | 23.5 | 3 | 21.4 |
| = 50% | 7 | 41.2 | 8 | 57.1 |
| > 50% | 6 | 35.3 | 2 | 14.3 |
| Father Mean Age (range=30–69) | 44.8 | 8.1 | 46.6 | 12.0 |
| Number of Children (range=1–3) | 2.2 | 1.1 | 2.1 | 0.8 |
| Child Mean Age (range=1–36) | 9.61 | 5.5 | 13.7 | 10.4 |

Note:

* More than one response allowed.

** Among fathers with children in school.

Table 2

Coping, Resiliency, and Emotional Distress Outcomes in Phase 2 Pilot Trial (N = 14).

| Outcome | Baseline | Post-Intervention | Test Statistic | P | Observed effect (η^2) |
|-------------------------------|--------------------|-------------------|---------------------------------|------------|------------------------------|
| Stress Coping (MOCS-A) | | | | | |
| Overall Coping (total) | 24.0 (8.97) | 28.9 (6.6) | $F(1,11)=7.9$ | .02 | 0.42 |
| Relaxation | 2.0 (1.76) | 3.5 (1.5) | $F(1,11)=5.6$ | .04 | 0.34 |
| Coping Confidence | 10.5 (4.23) | 12.1 (3.5) | $F(1,11)=4.5$ | .06 | 0.29 |
| Assertiveness | 4.8 (2.80) | 5.7 (1.6) | $F(1,11)=4.8$ | .05 | 0.31 |
| Tension Awareness | 6.8 (3.62) | 7.7 (2.4) | $F(1,11)=1.6$ | .24 | 0.12 |
| Resiliency (CES) | 76.6 (14.9) | 77.5 (13.2) | $F(1,11)=0.2$ | .68 | 0.02 |
| Parenting Stress (PSS) | 40.6 (7.8) | 41.0 (9.9) | $F(1,11)=0.05$ | .83 | 0.004 |
| Depression (PHQ-4) | 0.83 (0.83) | 0.5 (0.7) | $F(1,11)=1.7$ | .22 | 0.13 |
| Anxiety (PHQ-4) | 2.25 (1.60) | 1.9 (1.3) | $F(1,11)=1.8$ | .21 | 0.14 |
| Distress (VAS) | 4.92 (2.75) | 5.3 (2.1) | $F(1,11)=0.1$ | .71 | 0.01 |

Note: Partial eta squared values of $\eta^2 = 0.01$ indicate a small effect, $\eta^2 = 0.06$ a medium effect, and $\eta^2 = 0.14$ a large effect. Bolded indicates a statistically significant change ($\alpha = .05$).