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RESEARCH ARTICLE

Delivering Take Root to Military Families with a Child 0-to 3-Years-Old: Examining Feasibility and Proof-of-Concept

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ABSTRACT

Parents influence their child's positive development, and this is especially true during early childhood. In military families, the largest percentage of children are between 0 and 5 years old, and there is growing interest in developing and disseminating parent-focused interventions that target this age range for military parents. The present study examines the feasibility and proof-of-concept of the universal, web-based, Take Root parenting program, which was designed to empower military and civilian parents with a 0- to 3-year-old child in their parenting role and support positive child development. Seventy-nine participants were recruited from two Armed Services YMCA locations in fall 2019 and summer 2020. Results indicate that executing the research protocol and implementing the program among military families with young children were feasible. Further, significant pre- to post-changes in self-reports of parenting efficacy, mindful relaxation, and family functioning were found; however, when a Bonferroni-Holm correction was applied to account for multiple testing, only parenting efficacy remained significant. Collectively, the favorable results indicate the potential usefulness of Take Root for military families with young children and support the need for further, more rigorous evaluations of the program.

KEYWORDS

parent-focused interventions; universal prevention; health promotion; positive parenting; stress management; web-based delivery; infants and toddlers; feasibility; proof-of-concept; military

The effect of parenting quality on child development is well established. Multiple empirical studies and review articles have demonstrated that the manner in which parents interact with their children has important impacts on children's current and future functioning (Grossman et al., 2005; National Academies of Sciences, Engineering, and Medicine (NASEM), 2016; Shonkoff et al., 2012; Sroufe et al., 2005; Waylen et al., 2008). While the influence of parenting quality on children's health and functioning is significant at multiple developmental periods (Worthman et al., 2016), the first 3 years of life is a period that has garnered considerable research attention. This period is marked by rapid brain development, which helps promote future physiological, social/relational, emotional, and cognitive development (Mustard, 2006; Sameroff, 2010).

Given the indispensable role parents play in shaping children's development across the first 3 years (Schore, 2016), parents have been repeatedly identified as the primary target of preventive and clinical interventions that are designed to promote healthy child development (Briesmeister & Schaefer, 2007; Prinz, 2016; Sanders, 2019). These parent-focused interventions (PFIs), also referred to as evidence-based parenting support (Sanders & Prinz, 2018), vary with respect to their theoretical underpinnings (e.g., social learning, attachment), delivery modality (e.g., individual therapy, group-based sessions, online content), targeted child age range (e.g., infancy, preschool, adolescence), intensity (e.g., brief, light-touch programs; multi-year, home-visiting programs), and level of professional support (e.g., self-directed, therapist-guided) (Prinz, 2016; Salari & Enebrink, 2018). Despite this variability, PFIs have the same overarching goals of enhancing parents' efficacy and satisfaction, cultivating parents' competencies and skills, and strengthening the parent-child relationship (Prinz, 2016).

PFIs exist across the continuum of care. Within a prevention framework, PFIs can operate at a universal, selective, or indicated level (NASEM, 2016; National Research Council and Institute of Medicine, 2009). Universal PFIs are designed for the broad population of parents whereas selective and indicated PFIs are developed for parents with risk factors known to contribute to dysfunction and parents or children

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experiencing sub-clinical levels of problematic behaviors, respectively. Treatment-oriented PFIs are intended for parents who are experiencing or have children experiencing clinical impairments affecting individual, interpersonal, and familial functioning. Historically, PFIs have predominately been delivered through in-person means (Corralejo & Domenech Rodríguez, 2018; McGoron & Ondersma, 2015), and have operated at the selective level or higher on the continuum of care (Salari & Enebrink, 2018). The evidence base for these programs indicate they can be an effective means for improving young children's behavioral and emotional health (Barlow et al., 2016a, 2016b; Gardner et al., 2019; Mihelic et al., 2017).

Despite the strength of the evidence base, only a small percentage of parents have access to and participate in, in-person PFIs (Prinz & Sanders, 2007; Sanders, 2019). Several factors have been identified as contributors to the low uptake, including high cost, logistical burdens (e.g., space considerations, child care, transportation, family schedules, relocations), stigma, and service disruption during major health crises (e.g., COVID-19; MacDonell & Prinz, 2017; Prinz & Sanders, 2007; Yoshikawa et al., 2020). Consequently, increased attention has been paid to making PFIs available through technology-based delivery platforms (e.g., websites, mobile apps, videoconferencing software). Further, there is growing interest in applying a public health approach to parenting support (Prinz, 2019; Salari & Enebrink, 2018; Sanders & Burke, 2018), and technology-based PFIs are considered an integral part of such an approach (Baker et al., 2017). A public health approach to parenting support employs a stepped care model operating under the principle of minimal-sufficiency (i.e., providing parents with just enough assistance to meet their needs; Sanders & Burke, 2018). This approach also embraces a philosophy made popular by Rose (1981) known as the prevention paradox. In essence, this states that wide-scale, community-level change cannot be achieved by solely treating problems; rather, efforts also need to target low and moderate risk populations to maximize impact. Perhaps the most well-known PFI that embraces the public health approach to parenting support is the Triple P system, which offers a series of low- and high-intensity programming, that can be either self-directed (i.e., no professional support) or therapist-assisted, across a variety of delivery platforms (Sanders, 2019).

Within a public health approach to PFIs, technology can be used to augment the delivery of programs, or it can be the sole delivery modality. The innovativeness and flexibility of technology make it an appealing tool for maximizing the reach of and engagement with programming (Jones, 2014). In particular, utilizing technology as the sole delivery mechanism for brief, self-directed, low-intensity PFIs at multiple levels of prevention is appealing because it provides a cost-efficient means of implementing the minimal sufficiency principle and the prevention paradox philosophy (Baker et al., 2017). Moreover, offering PFIs universally can have important public health benefits, such as decreasing prevalence rates of child mental health issues (Doyle et al., 2018; Sanders & Burke, 2018). Thus, there is increased interest in developing and implementing universal PFIs (Lindsay & Totsika, 2017).

A number of systematic reviews and meta-analyses have found technology-based PFIs to be an effective means for promoting parent and child functioning (Baumel et al., 2017; Corralejo & Domenech Rodríguez, 2018; Florean et al., 2020; Spencer et al., 2020; Thongseiratch et al., 2020). Several of the meta-analytic studies (Florean et al., 2020; Spencer et al., 2020; Thongseiratch et al., 2020) concluded that self-directed programs were as effective as therapist-assisted programs in improving child behavior, parent mental health, parenting confidence and stress, and discipline practices; though the evidence for this is not unequivocal (Day & Sanders, 2018). Spencer and colleagues (2020) also examined the moderating role of level of prevention and found no difference in the effect sizes for universal PFIs and selective and indicated PFIs with respect to children's problematic behaviors and parents' confidence, depression, and stress. Collectively, the evidence indicates providing universal, self-directed PFIs to parents can be beneficial; however, much less is known about the feasibility and effectiveness of using this approach with military families, especially those with young children.

PFIs for military families with young children

Military families experience the same stressors as civilian families (e.g., parent-child conflict, bedtime/sleep routines), but they also experience distinct, military-service lifestyle-related stressors (e.g., deployments, frequent relocations; DiNallo et al., 2016; National Academies of Sciences, Engineering, and Medicine (NASEM), 2019), and report a high degree of help-seeking stigma and fear that help seeking negatively impacts military careers (Michalopoulou et al., 2017). In general, military families are resilient; however, the cumulative nature of the stressors associated with military service may place military families at heightened risk for experiencing poor parenting (e.g.,

increased negativity, harsh discipline, love withdrawal) and poor child adjustment (e.g., poor self-regulation, internalizing problems, aggressive social behavior; NASEM, 2019; Stepka & Callahan, 2016). Of the over 1.6 million children whose parents are active duty or Reserve or Guard Service members, 38% are between 0 and 5 years old (Department of Defense (DoD), 2018). This represents the largest group of military children in today's Armed Forces, and there is growing interest in developing and delivering PFIs that include or specifically target children in this age group for military families (Creech et al., 2014; Louie et al., 2021).

Consistent with the broader PFI landscape, services available to military families are most commonly delivered via in-person methods (DiNallo et al., 2016); however, technology-based programs are becoming more frequent (NASEM, 2019). For instance, the After Deployment, Adaptive Parenting Tools (ADAPT) program, an adaptation of the Parent Management Training – Oregon Model program for families with a child 5- to 12-years-old (Gewirtz & Davis, 2014), has technology-augmented components for the in-person program (Doty et al., 2016) and a fully online, self-directed version of the program (Gewirtz, 2020). As another example, Families Overcoming Under Stress (FOCUS; Lester et al., 2011), a program for military families with a child 3- to 17-years-old, has telehealth options, as well as a mobile app (focusproject.org). Further, a recently developed parent coaching program for military families with a child 0–5-years-old who also have an upcoming deployment utilizes telehealth services (Louie et al., 2021).

The growth in technology-based PFIs for military families is encouraging; however PFIs for military families with young children tend to be selective, rather than universal, programs. In particular, PFIs for military families with young children often target families who have experienced at least one deployment (Devoe et al., 2017; Flittner O'Grady et al., 2016; Julian et al., 2018; Louie et al., 2021), and some target families with an injured parent (Walker et al., 2014) and families transitioning out of the military (Sherman et al., 2018). Even the DoD's most institutionalized PFI for military families with young children, The New Parent Support Program (NPSP), is categorized as a secondary (i.e., selective or indicated) prevention program (Lyle, 2015). NPSP provides in-home visitation programs for new parents at high risk for child maltreatment. All new parents in the military complete the Family Needs Screener (Kantor & Straus, 1999) for risks related to maltreatment, and those determined to be at highest risk are strongly encouraged to participate in NPSP services. These programs provide military parents with valuable benefits and are an important part of a public health approach to supporting military families. As previously indicated, so too are universal programs.

A few universal PFIs, with promising preliminary results, do exist, and they include Family Foundations (Feinberg et al., 2020) and Families Overcoming Under Stress – Early Childhood (FOCUS-EC; Mogil et al., 2015). Both programs incorporate technology; however, Family Foundations is a transition to parenthood program that focuses on promoting healthy co-parenting, and FOCUS-EC is designed for families with preschool-age children. Thus, universal, web-based PFIs that are self-directed (i.e., offer no professional support) and that target military families with a child 3 years old and under are uncommon. Considering the tempo of military life and that all parents can benefit from receiving child-rearing support (Long, 2007; Rodrigo et al., 2012), implementing such programming with military parents is warranted (DiNallo et al., 2016; NASEM, 2019). Further, as previously described, implementing a universal, fully online and self-directed PFI with military parents of 0- to 3-year-old children may have the additional benefits of greater sustainability and cost effectiveness.

The Take Root program

The Take Root parenting program (Take Root) was developed by researchers at the Clearinghouse for Military Family Readiness at Penn State at the request of the DoD's Office of the Deputy Assistant Secretary of Defense for Military Community and Family Policy (DoD MC&FP). It is part of the Thrive initiative, which consists of a continuum of developmentally graded, evidence-informed and theoretically grounded PFIs operating at all three levels of prevention. In essence, Thrive embraces a stepped care model of parenting support that aligns with the public health approach advocated by parent and family scholars (e.g., Prinz, 2019).

Per DoD MC&FP's instructions, Take Root was developed for use with military and civilian families. Directives for developing Take Root specified that physical health-promotion content needed to be included in addition to general parenting content related to emotional and behavioral health. Physical health promotion is an underemphasized aspect of PFIs, especially those delivered in the United States (Chesnut et al., 2018). Further, instructions specified Take Root needed to have a cost-efficient delivery format capable of reaching a geographically dispersed

and highly mobile audience. Thus, Take Root is a universal, web-based PFI that is designed for military and civilian parents of children who are 0- to 3-years-old, and it is provided to them at no cost.

The core components of Take Root were identified through a Common Components Analysis (CCA; see Czymoniewicz-Klippel et al., 2018 for a description of the CCA process). A literature review was also undertaken to provide additional information and insight on health promotion for very young children, as this information was largely absent from or potentially dated in the programs included in the CCA. The final set of components that undergird Take Root include parental self-care, child safety, socio-emotional and cognitive development, positive parent-child interaction, developmental expectations, social support, nutrition, routines, and parental care of infant health. These components were grouped into three overarching learning domains: positive parenting, stress management, and health promotion. Further, social cognitive theory (Bandura, 1986), attachment theory (Bowlby, 1969), and anticipatory guidance (Nelson et al., 2003) were used to help organize the development of the program's parenting and health promotion content and inform decisions on how best to provide parents with the information within the program's website (e.g., role-modeling, reflection exercises).

Take Root consists of three, developmentally age-graded program tracks that focus on parenting a child 0- to 6-months-old, 6- to 12-months-old, and 1- to 3-years-old. Each track consists of a brief introductory session, three core sessions, and a review session. The introductory session helps orient parents to the nature and structure of the program and provides an overview of developmental milestones across the first three years of a child's life. The three core sessions for each program track are designed to promote self-regulation in the parent, child, and the parent-child relationship (Sanders et al., 2019). The first core session, "Through Your Eyes", focuses on the parents' perspective emphasizing the importance of self-care and mindfulness in the parenting journey. The second core session, "Through Your Child's Eyes", focuses on the child's perspective seeking to promote parents' sensitive and responsive caregiving through increased awareness of their child's developmental needs. The final core session, "Figuring It Out Together", employs a co-regulation perspective that encourages parents to problem-solve common parent and child development tasks with their child. Finally, the review session provides parents with an opportunity to reflect on what they have learned by stimulating them to think about the efficacy expectations, goals for future practice, and problem-solving aspects of self-regulation (Sanders et al., 2019).

Each program track is estimated to take 90 minutes to complete, and parents move through the program in a sequential fashion with the completion of one session unlocking the next session. Participants can access Take Root by using a desktop or laptop computer or a mobile device (i.e., smartphone or tablet). Each of the core sessions include exercises throughout designed to help parents develop a plan for how they can use the information and strategies they are learning, and each core session concludes with knowledge check questions. There are also links to downloadable resources that parents can use, such as a form for recording parents' social support system and a handout on safe sleeping habits, embedded within the sessions. These exercises and resources are intended to encourage parents to put what they learn into practice. Skill practice is further encouraged by way of an Interact activity at the end of the third core session. In the Interact activity, parents are asked to select one or more of the program's topic areas that they find most relevant and develop a plan for how they are going to enact the strategies they have learned moving forward.

Though heterogeneity exists in the experiences of parents raising a child across the first three years of life, there is also considerable consistency. For instance, the specifics of sensitive and responsive parenting may change as the child develops, but the need for parents to be warm and respond consistently and appropriately to their child's signals remains constant. Take Root balances this continuity-discontinuity dialect by emphasizing the same general content throughout all program tracks while tailoring this content to specific developmental periods (i.e., 0–6 months, 6–12 months, and 1–3 years). Thus, the primary objectives of Take Root are the same regardless of program track and include increasing parenting efficacy and satisfaction and reducing parenting stress. Though distinct constructs, they are related and have been implicated as important in supporting competent parenting and positive child adjustment (Crnic & Ross, 2017; Jones & Prinz, 2005). Similarly, the secondary objectives are the same across program tracks and include strengthening parents' self-care, sense of support, nurturing and warm behaviors, and family functioning while diminishing their use of harsh discipline.

The current study

The current study examined the feasibility and proof-of-concept of Take Root. Explorations of

feasibility included the research protocol (i.e., recruitment, assessment completion, and number of assessment reminders) and program implementation (i.e., engagement, adherence, acceptability/appropriateness, and website usability). Proof-of-concept focused on investigating pre- to post-program change on measures of parent and child functioning. This study served as a resource-efficient way for determining if further, more rigorous research on the program is warranted (Czajkowski et al., 2015).

Method

Participants

Participants were recruited from two Armed Services YMCA (ASYMCA) sites in fall 2019 (cohort 1) and summer (cohort 2) 2020. Both sites were located in large urban areas with cohort 1's site located in the Mid-Atlantic region of the US and cohort 2's site located in the Southwest region of the US. Eligibility criteria included being at least 18 years old, a parent or caregiver of a child who is 0- to 3-years-old, and an ASYMCA member; having access to the internet; and being fluent in English. Researchers worked with the leadership of each site to develop a recruitment strategy that ASYMCA staff could easily implement with the families they serve. At cohort 1's site, recruitment methods included social media posts, flyers, and direct staff interactions, via emails, phone calls, and in-person conversations, with families. At cohort 2's site, direct staff interactions, via email, phone calls, and in-person conversations, with families was the only recruitment method employed. The specifics of recruitment numbers are provided in the results section. Table 1 displays the demographic and military characteristics of the participants with pre and posttest data. In general, participants were White, mothers, well-educated, and stay-at-home parents.

Procedure

The study was approved by the Institutional Review Board of the researchers' university. During the recruitment period, parents were directed to sign up for Take Root by completing a brief, online registration survey housed in Qualtrics. This registration survey provided participants with a short overview of the study's purposes and objectives, served as a mechanism for ensuring participants met the study's inclusion criteria, allowed participants to select their program track, and collected necessary data (e.g., email address, mobile number) for distributing important research and program information to the participants. The registration survey also directed interested participants to contact the study team if they had questions. All participants who completed this initial enrollment step were emailed a secure link to access the study's pretest, which was also housed in Qualtrics, 2 weeks prior to the scheduled start of their program implementation. This email contained a PDF copy of the informed consent form, and participants were presented with an electronic copy of informed consent prior to starting the pretest. Reminder emails and text messages were sent every 72 hours to unfinished respondents until the end of the assessment period. Completion of the pretest was a requirement for gaining access to the program. Participants were compensated with a $10 Amazon gift card for completing the pretest.

Login credentials were sent to participants on the scheduled start date of their program implementation. Informed by a similar study of a brief, low-intensity PFI (Morawska et al., 2014), participants were given 2 weeks to complete all program sessions. While Take Root is self-directed, meaning the participants had latitude in how they completed the sessions within the 2-week timeframe, participants were encouraged to take 1 to 2 days between sessions to allow for skill practice. Reminder messages were sent to participants by email and text if more than 2 days had elapsed since their last completed session. Participants were compensated with a $30 Amazon gift card for completing the program.

At the end of the program implementation period, all participants who completed a pretest were sent a secure link to access the posttest, which was also housed in Qualtrics. Similar to the pretest, participants were given 2 weeks to complete the posttest, and reminder emails and text messages were sent every 72 hours to unfinished respondents. For those participants who did not complete the program, an additional item was included on the posttest that requested information on what prevented them from completing the program. Participants were compensated with a $20 Amazon gift card for completing the posttest.

Feasibility measures

Feasibility of research protocol

Feasibility of the research protocol included the number of participants recruited, the number of pretests and posttests completed, and the number of assessment reminders sent to participants.

Table 1. *Participant demographics.*

Participant (n = 55)	n (%)
Relationship to child	
Mother (biological or adoptive)	51 (92.7%)
Father (biological or adoptive)	3 (5.5%)
Other: guardian	1 (1.8%)
Hispanic ethnicity	
No	42 (76.4%)
Race (n = 52)	
Caucasian	40 (76.9%)
African American	4 (7.7%)
Asian	5 (9.6%)
Multiracial	3 (5.8%)
Age	
18–24 years	5 (9.1%)
25–34 years	40 (72.7%)
35–44 years	10 (18.2%)
Education	
Less than high school diploma	1 (1.8%)
Vocational school	3 (5.5%)
Some college, no degree	15 (27.3%)
College degree (e.g., associate, bachelor)	30 (54.5%)
Post-college degree (e.g., master's, doctorate, professional)	6 (10.9%)
Employment status	
Full-time	10 (18.2%)
Part-time	2(3.6%)
Unemployed	3 (5.5%)
Stay-at-home parent	37 (67.3%)
Student	2 (3.6%)
Other: self-employed	1 (1.8%)
Annual family income (n = 53)	
Less than $30,000	7 (13.2%)
$30,000–$49,999	20 (37.8%)
$50,000–$69,999	13 (24.5%)
$70,000 or more	13 (24.5%)
Military affiliation	
Active duty Service member	5 (9.1%)
Previously active duty, Guard, or Reserve Service member	2 (3.6)
Spouse/partner of an active duty Service member	50 (90.9%)
Spouse/partner of a previously active duty, Guard, or Reserve Service member	1 (1.8%)
Service branch (n = 7)	
Army	2 (28.6%)
Navy	5 (71.4%)
Spouse/partner Service branch (n = 48)	
Army	3 (6.2%)
Marine Corps	2 (4.2%)
Navy	43 (89.6%)
Relationship status	
Married – first and only marriage	46 (83.6%)
Married – second or later marriage	7 (12.7%)
Divorced/separated/widowed	2 (3.6%)
Family arrangement	
Two-parent family (biological or adoptive)	47 (85.5%)
Single-parent family (biological or adoptive)	3 (5.5%)
Step-family	5 (9.1%)
Take Root program track	
0–6 months	9 (16.4%)
6–12 months	8 (14.5%)
1–3 years	38 (69.1%)
Child (n = 55)	
Sex	
Female	29 (52.7%)
Premature birth	
No	44 (80.0%)
Age (M, SD in months) (n = 53)	21.3 (12.4)

Note. Percentages for military affiliation add to more than 100% because participants could select multiple options.

Feasibility of program implementation

Feasibility of program implementation included engagement, adherence, acceptability/appropriateness, and website usability. *Engagement* was measured by the number of program sessions completed, the number of days taken to complete the program, the number of reminder messages sent, and reasons for not completing the program. *Adherence* was assessed by

the amount of time that elapsed between session completions. Participants are instructed to take 1 to 2 days between sessions for skill practice. *Acceptability/appropriateness* was measured by the 8-item Client Satisfaction Questionnaire (CSQ-8; Larsen et al., 1979) and four study-specific items that asked participants how much they liked the following program features: (a) the downloadable handouts and resources available for each program track, referred to collectively as the Parent Toolkit; (b) the exercises within each session; (c) the introductory video at the start of session 1; and (d) the Interact activity at the end of session 4. The CSQ-8 and the program-specific items were measured on a 4-point scale, and both measures were administered within the program's website after participants finished the final session. Prior work (Larsen et al., 1979) has found the CSQ-8 to be a reliable and valid instrument. Cronbach's alpha for the present study was .85. Finally, *website usability* was assessed within the program's website after participants finished the program using four items that asked about the following: their overall experience with the program (5-point scale); their likelihood of taking another parenting program using the website (5-point scale); whether they found the website confusing (yes/no); and, if so, what they found confusing (open-ended).

Proof of concept measures

Parental self-care strategies

The following three subscales from the 33-item Mindful Self-Care Scale (MSCS; Cook-Cottone & Guyker, 2018) were administered: physical care (9 items), mindful relaxation (6 items), and supportive structure (4 items). Prior work (Cook-Cottone & Guyker, 2018) has indicated the MSCS is a reliable and valid assessment tool. Participants responded to each item on a 4-point scale, which reflected the frequency with which the participant engaged in the practice identified in the item. Cronbach's alpha for the physical care[1], mindful relaxation, and supportive structure subscales ranged from .75–.86 at pretest and .81–.85 at posttest.

Parental competence

The participants' sense of competence as parents was assessed by the 16-item Parenting Sense of Competence scale (PSOC; Johnston & Mash, 1989). The PSOC measures two aspects of parenting competence: satisfaction (9 items) and efficacy (7 items). Previous research (Johnston & Mash, 1989) has indicated this scale is a reliable and valid measure. All items were assessed on a 6-point scale that asked participants to indicate their level of agreement with each statement. Cronbach's alpha for the satisfaction and efficacy subscales ranged from .83–.87 at pretest and .86–.90 at posttest.

Parental stress

Participants' feelings of stress related to their parenting roles were assessed by the 7-item parental stressors subscale of the 20-item Parental Stress Scale (PSS; Berry & Jones, 1995). Previous studies (Berry & Jones, 1995; Oronoz et al., 2007) have indicated the PSS is a reliable and valid assessment tool. Participants responded to the items on a 5-point scale that is designed to ascertain their level of agreement with each statement. Cronbach's alpha was .79 at pretest and .89 at posttest.

Aversive discipline

Participants' use of aversive discipline practices (i.e., yelling and spanking) was assessed with two items from the National Survey of Early Childhood Health (NSECH; Regalado et al., 2004). Participants indicated, on a 4-point scale, how often they used each aversive discipline strategy. Cronbach's alpha was .72 at pretest and .71 at posttest.

Protective factors

The Protective Factors Survey (PFS; Counts et al., 2010) was used to assess the following four family-level domains that have been found to predict child maltreatment: family functioning (5 items), emotional support (3 items), concrete support (3 items), and nurturing and attachment (4 items). Previous research (Counts et al., 2010) has indicated the PFS is a reliable and valid measure. For the family functioning and nurturing and attachment subscales, participants responded to the items using a 7-point scale that assessed the frequency with which particular behaviors occurred in the family. For the emotional and concrete support subscales, participants responded to the items using a 7-point scale that assessed their level of agreement with each statement. Cronbach's alpha for the family functioning, emotional support, concrete support, and nurturing and attachment subscales ranged from .80–.92 at pretest and .69–.93 at posttest.

Analytic plan

The data were analyzed using SPSS version 26. For the feasibility measures, descriptive statistics were

generated and included means, standard deviations, medians, modes, frequencies, ranges, and percentages. For the proof-of-concept measures, an examination of pre- to post-change was done using Wilcoxon signed-rank tests because visual and statistical (e.g., Kolmogorov-Smirnov test) inspections of the data indicated the difference scores were not normally distributed. The *r* effect size was calculated to quantify the magnitude of change (Field, 2013). Cohen's (1988) guidelines were used to aid in the interpretation process of the effects: |.10| to < |.30| – small, |.3| to < |.5| – medium, and ≥ |.5| – large.

A series of comparisons (e.g., Mann-Whitney *U*-tests) were conducted to examine potential differences between cohorts on feasibility and proof-of-concept outcomes. This was deemed especially relevant given cohort 2 participated during the COVID-19 pandemic. A significant difference was found for only one implementation outcome, which is described in more detail in the Results section. Differential attrition analyses based on pretest and posttest completion were not conducted due to the small number of participants (n = 2) who completed a pretest but did not complete a posttest.

Results

Feasibility of research protocol

Due to budgetary considerations, the number of participants to recruit was set at 79. Forty-five participants were recruited for cohort 1, and 34 participants were recruited for cohort 2; thus, the target recruitment goal of 79 was achieved (see Table 1 for the number of participants in each program track). Figure 1 displays the flow of participants for the separate feasibility and proof-of-concept analyses. The number of pretest assessment reminder messages ranged from 0–7 ($M = 2.35$, $SD = 2.14$) with just over two-thirds (67.1%) of the sample receiving three or fewer reminders. The number of reminder messages for the posttest ranged from 0–6 ($M = 1.25$, $SD = 1.55$) with just over three-quarters (78.5%) of the sample receiving two or fewer reminders. A member of the research team unsuccessfully attempted to contact the 14 individuals who did not complete a pretest and the two individuals who did not complete a posttest to ascertain why.

As noted in Figure 1, eight participants from cohort two were excluded from the final sample for the proof-of-concept analyses due to errors by the research team. An investigation of the technical glitch determined the pre and posttest surveys did not recognize the format seven participants used to enter their child's birthdate, which resulted in them erroneously being sent to the end of the surveys and coded as having completed 100% of the surveys. Since preliminary determinations of survey completion were based on Qualtrics' percent complete classification, this error went unnoticed until after the study ended. The surveys have been adjusted to prevent this glitch from happening in the future, and the research team will no longer be relying on Qualtrics' classifications to make determinations of survey completion. The premature program login occurred as a result of a research team member accidently hitting send instead of save as they were editing the email template used for all participants. This resulted in the participant receiving their program login credentials prior to completing the pretest.

Feasibility of program implementation

Engagement

Figure 1 displays the number of participants who started and finished the program. On average, participants took a little over 1 week to finish the program ($M = 7.63$ days, $SD = 4.95$ days, $Mdn = 7.00$, $Range = 0–15$ days). The number of program reminder messages ranged from 0–7 (M = 2.62, SD = 2.04) with almost two-thirds (64.6%) of the sample receiving three or fewer reminders. All participants who were eligible to participate in the program but did not finish the program (n = 10) were asked in their posttest to indicate the reason(s) they did not complete the program. Half provided a response to this item, and two indicated they never received any emails or texts about the program, one indicated he or she was experiencing too much stress in his or her life, one indicated he or she had no time for the program, and one indicated the program email got buried in his or her inbox.

Adherence

Take Root is a self-directed program, which means that participants were free to complete sessions within the 2-week implementation period at whatever pace they chose. The only restriction that was imposed by the program website was that sessions had to be completed in a sequential manner (e.g., participants had to complete session 1 in order to access session 2). That said, participants were encouraged to take 1 to 2 days between sessions to practice the skills they were learning. Despite this encouragement, all of the participants who finished the program (n = 55) completed two or more sessions consecutively – 25% completed

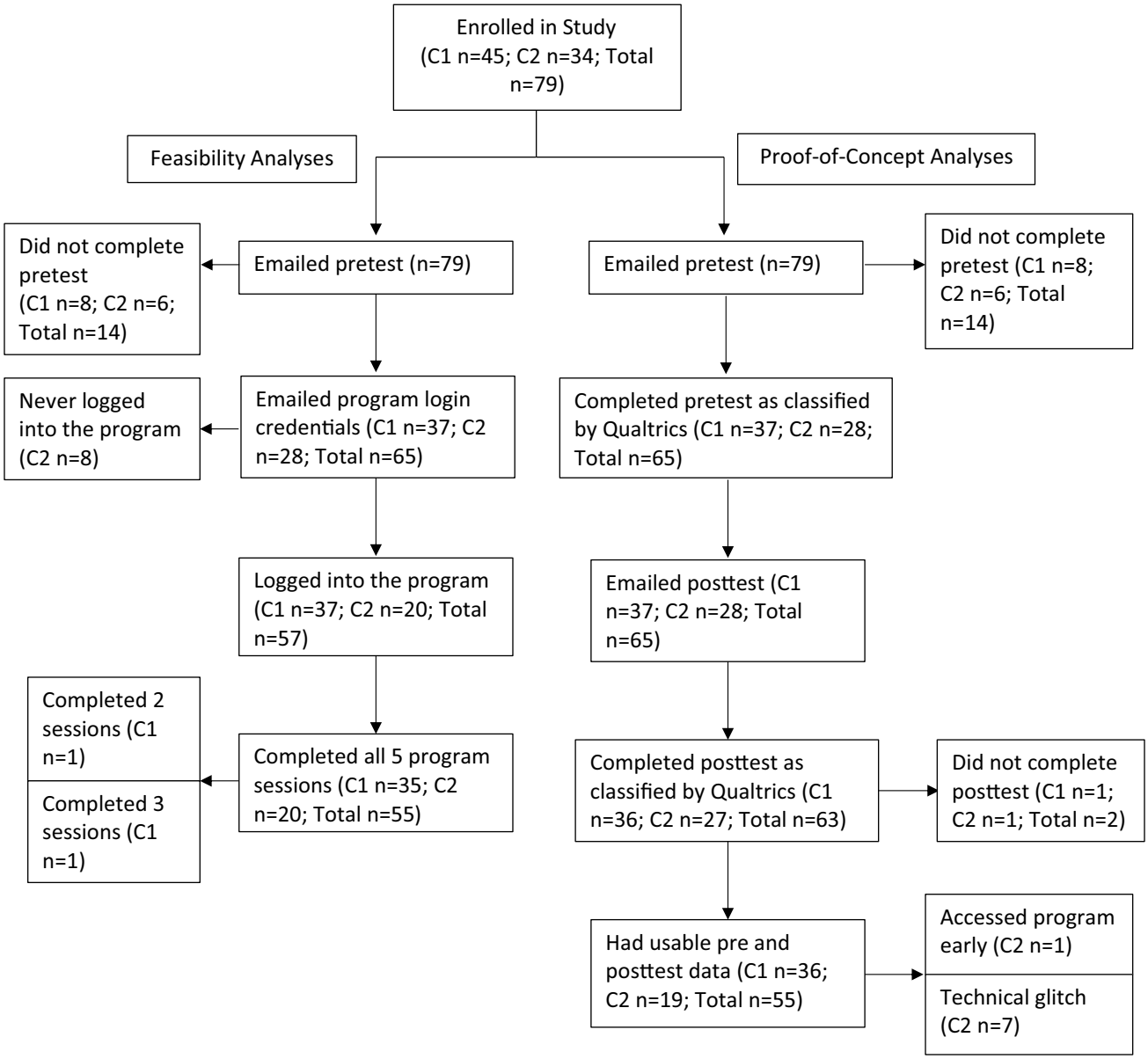

Figure 1. Participant flow for feasibility and proof-of-concept analyses.*Notes*. C1 n = Cohort 1 sample size; C2 n = Cohort 2 sample size.

four sessions consecutively; 38% completed all five sessions consecutively.

Acceptability/appropriateness

Fifty-four participants provided responses to the CSQ-8. The CSQ-8 total score, which is calculated as a sum of the participants' responses to the eight items, ranges from 8 to 32. Higher scores indicate greater client satisfaction. Overall, participant responses to the CSQ-8 indicated high satisfaction with the program ($M = 29.20$, $SD = 2.74$, *Range* = 19–32). For three of the eight items, all participants selected the two highest response options of 3 or 4, which indicated moderate to strong endorsement of the items. For the remaining five items, the two highest response options of 3 or 4 were selected by 98.1% of the participants. In other words, one participant selected a response other than 3 or 4 for each of these five items, and, in each case, the second lowest response option of 2 was selected, which reflected a moderate level of disagreement with the items.

Further, participants' responses to the four items that asked about how much they liked various features of the program indicated a high degree of satisfaction. For the Parent Toolkit (n = 47), session exercises (n = 52), introductory video (n = 52), and Interact activity (n = 52), 100%, 100%, 92.3%, and 98.1% of the respondents, respectively, selected the two highest response options of 3 or 4, which

reflected a moderate to strong liking of the feature. For the introductory video, four participants selected the second lowest response option of 2, and, for the session exercises, one participant selected the second lowest response option of 2. In both instances, these responses reflected a moderate dislike of the feature.

Website usability

Fifty-three participants provided feedback on the website's usability. The vast majority (96.3%) indicated their overall experience using the website was "good" or "very good." The remaining two participants indicated their overall experience was "fair." A total of 94.4% indicated they were "likely" or "very likely" to participate in another parenting program using the website, and the remaining 5.6% selected the neutral option for this item. A significant difference was found between cohorts with respect to their likelihood to participate in another program ($U = 225.00$, $z = -2.49$, $p = .01$, $r = -.34$). Cohort 1 participants had higher likelihood scores (*mean rank* = 29.88) than cohort 2 participants (*mean rank* = 21.84). Further, all but one participant indicated they did not find anything confusing about the program's website. In the follow-up question, the one participant who indicated he or she found something confusing about the website wrote that he or she initially had difficulty registering for the study, which actually took place outside of the program's website.

Proof-of-concept

Table 2 provides the results of the Wilcoxon signed rank tests. In short, of the 11 comparisons tested, the following three were statistically significant at $p < .05$: (a) mindful relaxation, (b) parent efficacy, and (c) family functioning. In all instances, change occurred in the theoretically expected direction (i.e., the majority of scores within the outcome improved). When a Bonferroni-Holm correction (Holm, 1979) to the alpha level was applied to adjust for the possibility of inflated Type 1 error due to multiple comparisons, only the change in parent efficacy remained statistically significant. Spearman correlations between the time spent in the program and the difference scores of the significant outcomes were nonsignificant. Effect sizes for the statistically significant outcomes ranged from |.27| to |.44|, which reflect a small to medium magnitude of change.

Discussion

This study examined the feasibility and proof-of-concept of the Take Root parenting program. To the authors' knowledge, Take Root is the only evidence-informed, universal, fully self-directed, web-based PFI available for military families with a child who is 0- to 3-years-old. Given the demands of life in the military for Service members and their families, having high-quality, technology-based parenting support readily available is important (DiNallo et al., 2016; NASEM, 2019). Take Root seeks to fulfill this need for military families with young children, and this study served as a first step in determining the program's viability and utility.

Feasibility was investigated with respect to the research protocol and program implementation. Overall, the results indicated the research protocol and the program were implemented successfully. The study's recruitment goal of 79 participants was achieved across the two sites. Recruitment methods differed between the sites with the first site utilizing a number of methods (e.g., flyers, social media) and the second site deciding to only engage parents through direct interaction by email, phone, or in-person conversations. Given that the staff at each site are in the best position to make determinations about the most effective way to promote programming, the study team's decision to work with the staff to develop a recruitment strategy, as opposed to simply prescribing one to them, appears to have been beneficial. Further, recruitment for cohort 2's site took

Table 2. Proof-of-concept results.

Outcome	Negative mean rank (n)	Positive mean rank (n)	Ties	*z*	*p*	*r*
Physical Care	21.85 (20)	27.17 (29)	6	−1.760	.08	−.24
Mindful Relaxation	21.50 (19)	27.22 (30)	6	−2.038	.04	−.27
Structured Support	19.20 (22)	24.93 (21)	12	−.615	.55	−.08
Parental Stress	27.59 (27)	19.15 (20)	8	−1.921	.06	−.26
Parent Satisfaction	29.34 (25)	21.66 (25)	4	−.929	.36	−.13
Parent Efficacy	16.33 (15)	26.97 (31)	8	−3.239	< .001	−.44
Family Functioning	21.73 (15)	23.63 (30)	9	−2.174	.03	−.30
Emotional Support	21.19 (16)	17.33 (21)	17	−.190	.85	−.03
Concrete Support	22.78 (20)	21.33 (23)	11	−.212	.84	−.03
Nurturing & Attachment	17.37 (15)	15.74 (17)	22	−.066	.95	−.01
Aversive Discipline	15.64 (11)	11.93 (15)	29	−.093	.94	−.01

place during the COVID-19 pandemic, yet there was no noticeable impact on the staff's ability to promote the program and procure participants.

Moreover, 82% of the recruited individuals completed a pretest, and 80% completed a posttest. On average, participants received two reminder messages about completing the pretest and one reminder message about completing the posttest. During the study registration process, participants selected how they preferred to receive reminder messages (i.e., email, text, or both). While reminder messages were helpful for most of the participants, there were still 14 participants at pretest and two at posttest who received these messages and did not complete the assessments. Given the discrepancy between the number of non-completers at pretest and posttest, there is a possibility that those who did not compete a pretest are characteristically different from those who did, but that is an untestable assumption in the current study. The research protocol has been revised to include phone call reminders in an effort to boost assessment completion rates as there is some evidence to suggest phone calls can be an effective strategy for increasing survey response rates (Yu et al., 2017). Moreover, the technical glitch that resulted in the loss of some participants' proof-of-concept data at pretest and posttest has been addressed, so future data-collection efforts will not experience this problem. Technological challenges are an inherent part of delivering PFIs through digital mediums. Just as quality assurance is important to the development and sustainability of PFIs (Sanders & Kirby, 2018), it is also necessary for ensuring the technological aspects of the program are functioning properly.

The engagement data provide a very promising picture of the program's feasibility with military families with young children. Of the 65 participants who were eligible to start the program, 88% (n = 57) did start the program, and 96% (n = 55) of this subsample completed all five program sessions. Given that participant retention can be a challenge for technology-based PFIs (Chesnut et al., 2019; Baumel et al., 2017), this study's program completion rate is encouraging. While the present study was not designed to investigate aspects of the program or research protocol that may moderate retention rates, perhaps the program length and incentives played a role in the retention rates. For example, the program implemented by Chesnut and colleagues (2019) consisted of 10 online sessions, and participants were not compensated for program completion. Indeed, in their review of technology-based PFIs, Baumel and colleagues (2017) found that average session completion rates decreased when longer programs (i.e., > 5 sessions) were included in the calculation. Thus, Take Root's brevity is likely advantageous for participant retention, but incentives for program completion may prove challenging from a sustainability standpoint. However, it is not uncommon for participants attending in-person programs to receive incentives designed to encourage retention, such as free childcare, meals, or reimbursement for transportation (Conduct Problems Prevention Research Group, 2002; Gross et al., 2001). Since these types of incentives are either not relevant to or feasible for technology-based interventions, researchers will have to be creative in the methods employed to encourage retention, such as providing modest compensation for program completion, which is a strategy that has been employed with in-person programming (Conduct Problems Prevention Research Group, 2002). One thing is clear, the role of incentives in participant retention and the long-term sustainability of technology-based PFIs is an area in need of further research.

Similar to assessment reminders, program reminders appeared helpful with participants receiving two to three reminders, on average. Even with these reminder messages, there were still eight individuals who never started the program and two who did not complete all sessions. Future program implementations will include phone call reminders in addition to email and text messages. Further, five of the 10 participants who did not complete the program provided feedback on the reason(s) why. Three of the responses involved either not receiving reminder messages or the message getting buried in their email. Phone call reminders might help to combat this issue. In addition, the research team is moving to an email system that provides metrics on whether an email has been opened. This would allow for a more tailored approach to reminders.

Adherence in web-based programs is complex. On the one hand, web-based programs are often described as self-directed or self-administered programs, which means participants have freedom in the way in which they complete program sessions. On the other hand, researchers often place constraints on participants, such as locking sessions until some criterion is met (e.g., finishing the prior session, waiting until a prespecified amount of time has passed). In the present study, participants were encouraged to take 1 to 2 days between sessions to practice skills, but the only constraint imposed by the website was keeping sessions locked until the preceding session had been completed. Overall, participants did not follow the recommendation to wait between completing sessions, and over a third (38%) completed all five sessions consecutively. The high number of participants who decided to

complete the entire program in one sitting was unexpected. Given the busyness that comes with being a parent (Pew Research Center, 2015), perhaps these participants thought they would be more likely to finish the program if they allotted time to do it all at once. Spreading the program sessions out over a period of 2 weeks may be difficult for some parents' schedules. Of course, the participants may have completed all of the sessions at once to get the incentive sooner, though given the education level of the sample and the modest size of the incentive relative to the time invested in the intervention, this seems unlikely. Still, it cannot be ruled out, which further highlights the potential challenges of incentivizing participants to complete a program. Future research should examine the implications of participants' program completion patterns on the effectiveness of PFIs. A thorough investigation of this issue was beyond the scope of the present study; however, correlations between total program completion time and the difference scores of the statistically significant proof-of-concept outcomes were nonsignificant. This provides preliminary evidence that participants' session-completion patterns may not affect the benefit they derive from the program.

Satisfaction and website usability data were also favorable, which indicates that most participants found the program acceptable and appropriate, and they had a positive experience with the program website. A few participants indicated a moderate amount of dissatisfaction with the program or dislike of certain program features. Unfortunately, the data-collection procedures did not provide a way for respondents to provide any specific feedback on their ratings, so the research team was not able to diagnose the reasons why a few participants provided lower scores. The research protocol has been modified to capture this type of feedback in future studies.

In addition to feasibility, the present study also sought to demonstrate the program's proof-of-concept. Results of Wilcoxon signed rank tests revealed statistically significant change, with small to moderate effect sizes, for parents' use of mindful relaxation self-care strategies, their sense of efficacy as a parent, and their perception of their family's healthy functioning. However, multiple comparisons were tested, so, when a correction was employed to account for the possibility of inflated Type 1 error, only parent efficacy remained significant. While the correction method employed is straightforward in terms of its calculation and interpretation, it is a conservative correction, which means it reduces statistical power (Felix & Menezes, 2018; Nakagawa, 2004). Given the already reduced statistical power due to the sample size and the use of non-parametric tests, the Bonferroni-Holm procedure may have over-corrected for Type I error thereby increasing Type II error.

Brief, low-intensity PFIs have been touted as an important component of a public health approach to parenting support (Sanders & Burke, 2018), and there is some evidence that such programming can be effective with parents of children as young as 2 years old (Baker et al., 2017). In the short-term, these types of PFIs may be most effective at altering parents' efficacy as this was the strongest effect observed in the current study and in the Baker and colleague's (2017) study. A parent's sense of efficacy plays a pivotal role in how he or she parents and has been linked to child adjustment (Jones & Prinz, 2005); thus, a short-term improvement in parents' efficacy may lead to additional benefits later. While the study by Baker and colleagues (2017) did not directly test this hypothesis, several nonsignificant effects at posttest were significant at the 9-month follow-up, which suggests one or more short-term effects (e.g., parental efficacy) may serve as a mediator for more distal outcomes. Future research on Take Root that utilizes a more rigorous research design will examine this issue.

While the findings overall are favorable with respect to feasibility and proof-of-concept, several limitations should be noted. First, no comparison group was used, so the effectiveness of the intervention could not be tested. Perhaps something other than participation in the intervention (e.g., maturation, multiple testing) could explain the significant effects found in this study. Second, no follow-up data were collected, so no inferences can be made regarding sustained effects or delayed effects. Third, the sample was homogenous with the majority of participants being White, the mother of the target child, the spouse or partner of a Service member, well-educated, stay-at-home parents, and affiliated with the Navy. Thus, the results of this study may not generalize beyond this sample. Fourth, all measures were self-reported; therefore, certain biases (e.g., social desirability, common method variance) could be unduly influencing the study's findings. Fifth, feasibility and proof-of-concept analyses were combined for the three program tracks. While the basic content and structure of the program tracks is the same, meaningful differences may exist that could impact feasibility or program impact. The imbalance in program track participation (see Table 1) precluded us from being able to conduct meaningful analyses investigating this possibility. It is an area of future research the study team intends to pursue. Finally, participants were compensated for program completion. This compensation may have

impacted participant recruitment, engagement, and retention, and this may have implications for replicability and sustainability. That is, the results of this study may not generalize to contexts without incentives, and the continued use of incentives may make program sustainability difficult.

Despite these limitations, this study represents a step forward for the field of PFIs as it is the only study that the research team is aware of that focused on a brief, universal, web-based program for military families with a child who is 3 years old and under. The largest percentage of military families' children are 5 years of age and under (Department of Defense (DoD), 2018), and programming for these families need to be flexible (Louie et al., 2021). A brief program delivered entirely online provides families with maximum flexibility. Thus, Take Root meets a need within the military community, and the promising findings of this study indicate that further, more rigorous evaluations of the program are warranted. In fact, plans are already underway to conduct a larger randomized controlled trial to examine program efficacy and test hypotheses about the mediational role of parenting self-efficacy in changing parenting behavior and supporting child development. This study will seek to recruit a more racially and socioeconomically diverse group of military families, as well as more fathers, and it will include the collection of follow-up data to examine the sustainability of program effects. This effort will allow for a more thorough understanding of Take Root's potential to be a valuable form of support to military parents with very young children.

Note

1. One item was removed due to very low correlations with other items.

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Disclosure statement

The authors declare that there is no conflict of interest.

Data availability statement

Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data is not available.

Originality statement

This manuscript is the original work of the authors and has not been published or submitted simultaneously for publication elsewhere.

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