
Online Intervention for Caregivers of Children with Early Traumatic Brain Injury: Pilot Trial

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Abstract

Objective To assess the feasibility and acceptability of an online parenting-skills program for caregivers of young children with traumatic brain injury (TBI). Positive parenting contributes to recovery following early TBI and social and emotional development in typically developing children. Yet, few interventions have been designed to support psychosocial recovery and subsequent development after early TBI. **Methods** This study protocol was registered with clinicaltrials.gov (NCT05160194). We utilized an academic hospital's Trauma Registry to recruit caregivers of children, ages 0–4 years, previously hospitalized for TBI. The GROW intervention integrated six online learning modules with videoconference meetings with a coach to review and practice skills while receiving in vivo coaching and feedback. Interactive modules addressed strategies for responsive parenting, stimulating cognition, and managing parenting stress. Enrollment and retention rates served as feasibility metrics and satisfaction surveys assessed acceptability. **Results** 18 of 72 families contacted (25%) consented, and 11 of 18 (61%) completed the intervention and follow-up assessments. All participants rated the intervention as helpful and indicated that they would recommend the intervention to others. All endorsed a better understanding of brain injury and how to optimize their child's recovery and development. Both coaches rated intervention delivery as comparable to traditional face-to-face treatment. **Conclusions** Low levels of uptake and initial engagement underscore the challenges of intervening with caregivers following early TBI, which likely were exacerbated due to the COVID-19 pandemic. High levels of acceptability and perceived benefit support the potential utility of GROW while highlighting the need to improve accessibility and early engagement.

Key words: eHealth/mHealth; infancy and early childhood; parenting; Pilot/Feasibility Trial; traumatic brain injury.

Introduction

Very young children (ages 0–4) account for 35.5% of hospitalizations and deaths following traumatic brain injuries (TBI) in the United States, and at least 20% of injuries within this age group involve nonaccidental trauma (NAT; CDC, 2021). Mounting evidence suggests that the developing brain is more susceptible to neurological trauma although injury consequences may be initially underestimated as many skills critical for independent functioning have yet to emerge (Vassel-Hitler et al., 2019). Consequently, children injured in early childhood may be at greater risk of protracted or poor recovery than children injured at later ages. Early TBI has been associated with impairments in expressive language, executive functioning skills, social cognition, behavior, and academic achievement (Keenan et al., 2019).

Hospitalization for TBI in early childhood also contributes to elevated parental stress and burden (Rashid et al., 2014). In addition to normative parenting challenges, caregivers of young children with TBI face additional stressors, such as behavioral changes in their child, changing family roles and relationships, and uncertainty regarding their child's long-term functioning (Babikian et al., 2015). Early TBI also contributes to elevated psychological distress that may reduce a parent's ability to engage positively with their child (Chavez-Arana et al., 2019). Caregivers report negative emotions including anxiety, guilt, and reliving the injury, suggestive of possible post-traumatic stress (Narad et al., 2017). Additionally, caregivers of children with NAT described lingering questions about how the injury occurred (Miley et al., 2022). Caregivers also identified difficulty differentiating between the effects of the injury and normal development, underscoring a key difference in caregiver experience between early and middle childhood TBI in which caregivers perceive differences pre- to post-injury (Clark et al., 2008).

Social environmental factors, including family functioning and parenting practices, are known to influence recovery following childhood TBI, with evidence supporting a reciprocal relationship between caregiver and child functioning (Chavez-Arana et al., 2019). However, parental distress from early childhood TBI may reduce a parent's ability to implement *responsive parenting skills* with their child. Consistent and warm interactions that are characteristic of responsive parenting contribute to better emotion regulation as well as social and cognitive development for typically developing children (Knauer et al., 2019), and these factors may have a greater impact following TBI (Wade et al., 2011). Thus, parenting constitutes a potentially modifiable influence on recovery and subsequent development.

Prior research supports the efficacy of parenting-skills training for improving behavioral outcomes and caregiver functioning for preschool-aged children (Laatsch et al., 2020); however, these programs may not support families experiencing early TBI. Moreover, because NAT is often excluded from research studies given its legal and custodial complexities, extant interventions fail to address the unique concerns of this subpopulation. While parenting behaviors can promote better long-term outcomes, injury-related burdens and parenting stress may compromise consistent parenting efforts, underscoring the need for tools to support caregiver coping and stress management. Thus, parenting interventions targeting positive parenting and parental coping may improve outcomes for both caregivers and their children.

Although evidence is lacking for psychosocial interventions for early TBI, interventions exist that target parental responsiveness and parent-child attachment (Gregory et al., 2020) and/or cognitive development for infants and young children at risk due to social or medical vulnerability. For example, the Play and Learning Strategies program (PALS) developed by Landry (2006) is an evidence-based program designed to train parents of children at risk of developmental difficulties to provide responsive parenting interactions and stimulate cognitive development. The 10-session PALS curriculum incorporates educational videos demonstrating skills, feedback by trained interventionists to increase warmth, responsiveness, and the quality of verbal interactions with the child, and homework regarding implementation with their infant or young child. One study found that PALS demonstrated significant increases in warm, responsive parenting which mediated improvements in infant social and cognitive skills (Landry et al., 2008). These studies support the value of parent-skills coaching and early intervention to promote social-emotional and cognitive development in children at elevated risk. Existing research on populations at risk for poor neurobehavioral outcomes suggests that parenting interventions could be useful following early TBI.

Caregiver circumstances can result in barriers to the successful implementation of group-based treatment or home-visit interventions (Leong & Kalibatseva, 2011). As such, telehealth interventions have gained popularity, especially during the COVID-19 pandemic. Telehealth delivery can reduce travel time, increase accessibility, decrease cost, and allow for greater flexibility and tailoring to family-specific needs compared to traditional models. For example, an internet-based translation of PALS expanded its reach while retaining program efficacy (Baggett et al., 2017). Telehealth programs have also demonstrated efficacy in reducing behavior problems in older children with TBI (Laatsch et al., 2020).

To address the gap in accessible interventions tailored to the needs of caregivers of children with early TBI, we developed an online intervention called Gaining Real Life Skills Over the Web (GROW). GROW integrates elements of the PALS program with psychoeducation about early TBI and how it may impact young children and their families with the goals of: (a) reducing injury-related stress and burden and (b) improving parental responsiveness and cognitive stimulation. The aims of the current article are to describe the GROW intervention and report findings from an open pilot study regarding feasibility, assessed by enrollment and completion rates of the intervention, and acceptability, assessed by caregiver and coach satisfaction. We hypothesized that GROW would be considered both feasible ($\geq 50\%$ enrollment of eligible families and $\geq 75\%$ completion rate for those enrolled) and acceptable (80% of parents rating the intervention as helpful).

Methods

Participants

Participants were recruited from a large Midwestern tertiary care children's hospital with a level 1 trauma center that provides care to large numbers of children with TBI. Eligibility criteria included overnight hospitalization for TBI and current age of less than 4 years. Participants were excluded if the child resided with the caregiver less than half-time, the caregiving situation was unstable, the caregiver was hospitalized for psychiatric reasons in the past year, or the primary language was not English. Children with confirmed or suspected NAT had to be in a stable living situation (i.e., residing with a caregiver for 6 months with no planned change of custody) and living apart from the suspected abuser. Families of children with disorders of consciousness or those deemed unable to interact with a coach were also excluded.

Recruitment Procedure

This study protocol was registered with clinicaltrials.gov (NCT05160194) and approved by the Institutional Review Board. From December 2020 through July 2021, trained research assistants (RA) identified eligible patients via Trauma Registry searches and tracking of outpatient visits through the NAT and brain injury follow-up clinics. Identified families received a letter describing the intervention and the process to opt out from further communications. RAs contacted caregivers who did not opt out to explain the study and determine eligibility. RAs completed an online consent with interested caregivers who then received a REDCap link to complete the parent-report measures (see below). Eligible families who agreed to participate were assigned to the

GROW intervention. Upon completion of baseline measures, caregivers met their GROW coach and scheduled their first coaching session. Measures were repeated upon treatment completion. Participants received \$50 after completing the baseline and follow-up assessments for a total \$100 compensation. With an original recruitment goal of 20 families, 18 families were included in the current study prior to ending recruitment due to time and financial restraints. Research staff had bachelor's degrees in psychology or related fields and completed CITI training regarding the ethical conduct of research with children/pediatric populations prior to beginning the trial. Ongoing supervision was provided during weekly team meetings.

The GROW Intervention

GROW is a telehealth intervention consisting of a constellation of techno-pedagogical supports: online learning modules, live one-on-one parent-skills practice sessions (hereafter "GROW coaching"), and weekly homework for parents to practice responsive parenting skills. Previous research demonstrates the additional benefit of combining traditional coaching sessions with online modules. Online modules provide additional opportunity to understand the concepts via text, narration, and videos provide valuable reinforcement of key concepts and skills. This supplemental training is beneficial especially to families that may have fewer resources (e.g., lower income) resulting in greater improvements than usual care (Wade, 2014).

Development

GROW content was informed by key informant and focus-group findings from caregivers of children with early TBI (Miley et al., 2022), the structure and content of PALS (Landry et al., 2006), and input from consultant Susan Landry and our expert advisory board, including professionals with expertise in early childhood education, special education/TBI, and learning technologies. GROW, like PALS, is grounded in attachment (Bowlby & Ainsworth, 2013), positive parenting (Laatsch et al., 2020), and cognitive development literatures (Rosen et al., 2019), as well as linkages between parental/family stress and poorer outcomes post-TBI (Chavez-Arana et al., 2019). To this end, we created online modules addressing responsive parenting and cognitive stimulation (three modules), self-care and family impacts of early TBI (two modules), and review and wrap-up. Evaluation of the GROW learning modules and treatment unfolded across two phases: (a) usability testing of the learning modules with adult users and (b) open trial of the GROW intervention including both the learning modules and GROW coaching with caregivers of children with early TBI.

Table I. *Online Learning Modules and Didactic Content*

Module Name	Subsections Covered
Interactions	<ol style="list-style-type: none"> 1. What changes parents might see after their child's TBI 2. How they can support their child's recovery and development by connecting with their child through warm parenting 3. Detecting and responding to their child's needs through responsive parenting skills
Language	<ol style="list-style-type: none"> 1. The importance of labeling, describing, asking questions 2. Using and modeling effective commands (for children >2) 3. The importance of reading in developing the parent-child connection and helping their child's vocabulary grow through exposure
Attention and play	<ol style="list-style-type: none"> 1. Skills to maintain and redirect their child's attention 2. How parents can utilize skills during play with age-appropriate toys
Self-care	<ol style="list-style-type: none"> 1. Sleep strategies 2. Stress management tools 3. Healthy habits (e.g., balanced diet, exercise) 4. Awareness of common emotions and how to accept them
Relationships	<ol style="list-style-type: none"> 1. Common changes to family dynamic and relationships 2. Tips to better communicate with a partner 3. How to discuss TBI with other children and siblings
(Optional/Supplemental) How do I work with my child's school?	<ol style="list-style-type: none"> 1. Services and supports (e.g., IEP, 504-Plan, etc.) available to children who are experiencing academic, mood, and/or behavioral challenges resulting from TBI 2. How to support their child's reentry into school/daycare programs and advocate their child's needs

Online Learning Modules

Six online learning modules incorporated key concepts from PALS paired with education about early TBI and the potential effects on the household, followed by strategies to facilitate stress management and family communication to mitigate family burden (see [Table I](#)). Each module included parenting tips, caregiver testimonial videos describing their experiences with very early TBI, and videos of caregivers applying the positive-parenting skills, self-care strategies, and communication skills. Modules contained 2–4 subsections, each designed to be completed in 10 min, and incorporated knowledge checks and activities to

enhance caregiver learning. Caregivers were instructed to review the online modules prior to GROW sessions and to record and upload a brief 5-min homework video practicing the skills discussed in the module. The coach reviewed parent responses to homework and discussed them with caregivers during their session. See [Supplementary Figure 1](#) for a Module Landing Page.

Usability Testing

We conducted usability testing on an early version of the GROW online modules with the goals of (a) assessing how well, how quickly, and how easily users navigated the website, (b) uncovering basic usability problems, and (c) evaluating user experience. Parents of young children were not recruited for this phase of the research. Instead, usability evaluation was conducted with adult students enrolled in an Educational Technology program at a large Southern research university. According to usability evaluation methodology, representative samples are not necessary for problem discovery and may introduce threats to innovation and reduce the chances of finding usability problems with content with which participants may already be somewhat familiar ([Albert & Tullis, 2013](#)). Usability testing was conducted in the laboratory of 5th author (MMS) at a large Southern University. Results indicated high user satisfaction with the design, navigation, and video components. Feedback resulted in the removal of extraneous buttons and the incorporation of progress bars to allow users to track their place in the modules prior to the open pilot.

GROW Coaching

The 45-min GROW coaching sessions were conducted via teleconferencing either weekly or biweekly. The initial meeting established rapport and identified family goals for treatment; it did not involve coaching on parenting skills. The five core coaching sessions corresponded to the learning modules. Caregivers and coaches spent approximately half of each session on a didactic review of the content (including a review of the “GROW time” video) and at least 20 min on live parent coaching during a designated play period. Coaches focused on building caregiver skills identified as areas for improvement in the homework video. Sessions were occasionally split into two mini-sessions (i.e., didactic and coaching components) to accommodate caregiver schedules. Coaching focused on increasing caregiver use of responsive parenting (e.g., reading child's signals, enthusiastic tone of voice, labeled praises, and descriptive statements) and cognitive stimulation (e.g., scaffolding statements), while decreasing harsh parenting (e.g., criticisms, negative affect, and commands). Coaches tailored activities to the developmental level of the child. Skills were

modeled by coaches and prompting decreased as caregiver skills increased. After the five core coaching sessions and optional supplemental coaching sessions (up to two), a final coaching session was conducted to review and discuss generalization of skills for a total of up to eight coaching sessions.

Therapist Supervision and Fidelity

A White male, postdoctoral fellow and White female, advanced graduate student provided the coaching under the supervision of a White female, licensed clinical psychologist. Both coaches had previous experience delivering online parenting interventions. Prior to delivering GROW, the coaches completed a training with the supervising psychologist that included reviewing the GROW and PALS manuals and GROW website and discussing how TBI-related challenges varied by age and developmental stage. Coaches completed end-of-session checklists to determine coach fidelity to specified objectives. To ensure fidelity between coaches, weekly supervision meetings were held. During supervision, coaches discussed participant progress and any treatment issues.

Measures

Background and Family Information

Prior to beginning the intervention, caregivers provided information regarding family structure and injury, including their perceptions of how the injury impacted their child's development. Demographic data were also collected.

Caregiver Satisfaction

Upon intervention completion, caregivers completed a 31-item satisfaction form to evaluate the ease of use and intervention helpfulness. The form, adapted from prior studies (Antonini, 2012) and tailored to reflect GROW content, consisted of Likert scales and open-ended responses. A 20-min semistructured qualitative interview was conducted to obtain feedback about the structure, content, and family's experience with the intervention.

Coach Satisfaction

Upon completing intervention delivery, coaches completed a 31-item clinician background and satisfaction form (Wade et al., 2019) evaluating the advantages/disadvantages of the delivery modality and comparing it to the acceptability of previous telehealth parenting programs. The form consisted of Likert-scales and open-ended responses.

Data Analysis

Descriptive analyses were conducted on the recruitment, enrollment, and adherence data. Independent sample *t*-tests and chi-square analyses were conducted to examine differences between those enrolled and

those who declined to participate and completers and non-completers. Acceptability was evaluated by analyzing caregiver and therapist satisfaction forms. A simple, conventional qualitative content analysis approach (Hsieh & Shannon, 2005) was used to find and summarize common themes across qualitative interviews with caregivers and coaches. Summarized findings and reports across informants provide additional insight into the intervention's feasibility and acceptability. Data are available on request.

Results

Feasibility

A total of 97 families were identified as potentially eligible. Of the 72 contacted and determined to be eligible, 18 (25%) enrolled (see [Supplementary Figure 2](#) for a recruitment flow). Participants differed from those who did not enroll in the time since the injury with children who had a greater time since injury ($M = 2.11$ years, $SD = 1.31$) being less likely to participate than those who sustained their injury more recently ($M = 1.45$ years, $SD = 0.90$), $t(df) = 2.03(95)$, $p = .04$. Injury severity did not differ between participants and nonparticipants. All but two participants had complicated mild TBI as defined by a GCS score of 13–15 and accompanying abnormal imaging findings. Of the 18 consented families, all primary caregivers identified as female. One male caregiver participated but did not complete any forms. No participants identified as Hispanic or Latinx. Three (16.7%) families did not meet their GROW coach and four (22.2%) discussed goals in an initial session but were lost to follow-up prior to commencing treatment. Two families stated they were unable to make the time commitment to the intervention. The other five families each rescheduled and did not attend appointments on five separate occasions before ending communication with study staff. See [Table II](#) for a comparison of completers versus dropouts on key demographic and injury characteristics.

All remaining 11 families (61% of enrolled) who completed module 1 also completed all 5 core modules of the intervention. The average number of coaching sessions completed among enrollees was 5.53 ($SD = 2.88$, range = 1–9), with intervention completers averaging 7.18 sessions ($SD = 0.6$, range = 7–9). One identified as Biracial and ten identified as White. Black/African American families were more likely to discontinue treatment ($X^2(2, N = 18) = 8.8$, $p = .01$) than complete treatment. Out of the seven families lost to follow-up, four identified as Black/African American, two as White, and one as Biracial. Additionally, caregivers of males were more likely to drop out than caregivers of females ($t(df) = -2.21(16)$, $p = .04$).

Table II. Completer and Dropout Demographics

	Total sample <i>n</i> = 18	Completed treatment <i>n</i> = 11	Discontinued treatment <i>n</i> = 7	<i>t</i>	<i>X</i> ² (<i>df</i>)	<i>p</i>
Sex: Male	10 (55.56)	4 (36.36)	6 (85.71)	-2.21		.04
Race					8.8 (2)	.01
Black/African American	4 (22.22)	0	4 (100)			
White	12 (66.67)	10 (83.33)	2 (16.67)			
Biracial	2 (11.11)	1 (50)	1 (50)			
Parental education					3.2 (4)	.523
<High school education	1 (5.56)	0	1 (100)			
High school education/GED	9 (50)	5 (55.56)	4 (44.44)			
2 years of college	2 (11.11)	1 (50)	1 (50)			
College degree	5 (27.78)	4 (80)	1 (20)			
Graduate degree	1 (5.56)	1 (100)	0			
Family income					9.6 (7)	.21
<\$30,000	8 (44.45)	2 (25)	6 (75)			
\$30,000–\$60,000	3 (16.67)	3 (100)	0			
\$80,000–\$90,000	2 (11.12)	2 (100)	0			
>\$120,000	5 (27.78)	4 (80)	1 (20)			
TSI	1.45	1.62 (1.11)	1.18 (0.35)	1.22		.25
Age at BL	1.92	2.11 (1.42)	1.62 (0.93)	0.82		.43
Age at injury	1.08	1.15 (1.39)	0.97 (0.98)	0.31		.76
Lowest GCS	14.35	14.5 (1.58)	14.13 (2.27)	0.38		.71
Mechanism of injury					1.7 (2)	.42
NAT	5 (27.78)	3 (60)	2 (40)			
Fall	12 (66.67)	8 (66.67)	4 (33.33)			
MVC	1 (5.56)	0	1 (100)			

Note. TSI = Time Since Injury in years; BL = baseline; GCS = Glasgow Coma Scale; NAT = non-accidental injury; MVC = motor vehicle crash.

Adherence, defined as the number of sessions completed divided by the number of sessions scheduled, ranged from 50% to 100% ($M = 87\%$ $SD = 18\%$). Length of time to complete the intervention ranged from 40 to 203 days, with a median of 68 between the initial and final session ($SD = 45.44$). Seven of the 11 families attended all scheduled appointments; however, four families had sessions rescheduled due to either not attending or canceling a scheduled appointment (range 2–7). All missed or canceled sessions were rescheduled by the coach. One family required assistance to access online modules and participate in coaching sessions due to inconsistent internet access in their rural location. Only one participant utilized the optional supplemental session for working with their child's school.

Nine families shared videos of them interacting with their children. Of those, three families uploaded videos to the GROW site and six shared their videos through other means due to technical challenges with the website. Among families that shared videos with their coach, the average number of videos shared was 2.91 ($SD = 2.02$, range = 0–5) out of the possible six videos.

Coaching Feasibility

On average, sessions lasted 50.2 min ($SD = 6.58$). Coaches reported only contacting families if they

failed to attend their appointment. Additionally, coaches spent up to 10 min per family on weekly tasks (e.g., reviewing caregiver videos/homework and completing fidelity checklists). Coaches also participated in weekly supervision for 60 min. Adverse events were monitored by study staff and therapists and none were reported.

Acceptability

Caregiver Satisfaction

All caregivers who completed the intervention (11) completed the satisfaction survey (see Table III). Every caregiver found the information to apply to them and for GROW to be “helpful” or “very helpful.” All indicated their expectations for the intervention to be met, goals entering the study to be reached, and that they would recommend the intervention to others. All “agreed” or “strongly agreed” that they understood brain injury better, felt less stressed due to strategies provided by the intervention, and learned how to leverage environmental factors to help their child's recovery and development. Open-ended feedback (see Supplementary Table 1) indicated that participants found individual time with their coach to be particularly helpful, including the coaching sessions, live coaching of parent-child play, and coach feedback on recorded playtime videos. Suggestions for improving the intervention were oriented towards improving

website features, particularly the process of uploading weekly homework videos. Three families suggested including more content on how the injury affected their entire family. When asked about their experiences, families provided only positive feedback about the intervention and how it improved their lives. No families reported negative experiences.

Coach Satisfaction

Both coaches found the online GROW coaching sessions to be *comparable or better than face-to-face delivery* in their ability to establish and maintain rapport with the family, understand family dynamics that contribute to responsive care, engage caregivers during the session, check weekly progress, and cultivate motivation. Coaches reported an ability to better understand the family's home environment through the telehealth approach, allowing them to tailor their recommendations for each family. Coaches also noted that telehealth sessions may be beneficial for families with limited availability, who live far from the hospital, who may incur a financial burden if they miss work and/or travel to the session, who are familiar with videoconferencing and have the means to do so, and those who consider themselves visual and auditory learners.

Both coaches also recognized aspects of interventions that are better addressed in a face-to-face format. Both rated online delivery of the GROW coaching session to be comparable or somewhat less effective at reading nonverbal signals and communication, minimizing disruptions to the session, and engaging the child. They found it more difficult to establish a strong enough relationship via the online meetings to enhance family follow-through on recommendations. Coaches indicated appointments were "too convenient" allowing families to feel more comfortable rescheduling or having disruptions during the coaching session.

Discussion

We describe the findings of an open pilot trial of a novel online intervention for caregivers of young children who were hospitalized for TBI. Our findings offer a mixed picture regarding the feasibility and acceptability of the GROW intervention and suggest the need to better understand barriers to engagement and uptake. Feasibility, as defined by agreement to participate, was lower (25%) than hypothesized. Our hypothesized participation rate of 50% was informed by similar or higher participation rates in PALS trials (same age neurodevelopmentally at-risk children; Landry et al., 2008) and parenting skills interventions with 3- to 9-year-old children hospitalized for complicated mild to severe TBI (I-Interact; Wade et al.,

2017). Unlike prior studies with TBI, we did not limit our sample to children with severe injuries or to those currently experiencing problems. As such, our low participation rate may draw support from a recent telehealth parent intervention for survivors of acute leukemia (Lambert et al., 2021). Lambert and colleagues had a 21% participation rate and found that families were less likely to enroll the greater the time since recovery. We also found that nonparticipants had a greater time since injury than participants. Caregivers provided the reason for declining participation as their child was recovering well and not currently experiencing any problems. It is possible that our low rate of enrollment was due to families perceiving their child's development as recovered (i.e., normal) and having no need for intervention. Thus, families may be more likely to engage in an intervention like GROW soon after injury when concerns about potential developmental consequences are at their highest.

Feasibility, as defined by completion of the GROW intervention, compares less favorably to some interventions. Dropout rates approached 40%, while PALS yielded ~8%, and the I-InTERACT trials yielded 15% at 3 months and 20% at 6 months. However, GROW had similar dropout rates (25-36%) compared to other interventions (Fernandez & Eyburg, 2009; Lambert et al., 2021). Although the completion goal rate for those enrolled was not met ($\geq 75\%$), notably, all seven (100%) families that dropped out did so prior to the first session with their coach. With five families providing no reason for dropping out, we look to similar research for potential explanations. It is possible that, after baseline, families dropped out because they believed their child was recovered and no longer needed intervention (Lambert et al., 2021). Furthermore, disruptive behaviors that result from TBI may be more noticeable or considered more problematic in females, as disruptive behavior are seen as more typical among males (Huselid & Cooper, 1994). Thus, caregivers feeling that their male child was demonstrating age-appropriate behaviors may have led to a greater dropout rate among males. It is also possible that parents did not agree with the treatment approach, were too busy with other commitments, or had additional stressors that interfered with participation (Fernandez & Eyburg, 2009).

Although GROW incorporated videos and images from diverse caregivers to resonate with a diverse audience, dropout rates among White families (17%) were comparable to prior studies; however, dropout rate among non-White families was unacceptably high (83% dropout among Black, African American, and Biracial families). Psychotherapy research suggests that when the client and the therapist race, ethnicity, and gender match, similar worldviews and shared values build trust and strengthen therapeutic alliance,

Table III. Caregiver Acceptability and Satisfaction Survey

	Strongly disagree (%)	Disagree (%)	Agree (%)	Strongly agree (%)
I have reached the goals I had when I began the program.	0	0	64	36
I understand brain injury better.	0	0	55	45
I feel less stressed.	0	0	64	36
The program was too long.	18	64	9	9
The program was too short.	9	91	0	0
The information did not apply to me or my family.	55	45	0	0
I would recommend the program to others.	0	0	36	64
My questions about brain injury have been answered.	0	0	45	55
I have learned how to help with my child's development after brain injury.	0	0	45	55
The program met my expectations.	0	0	36	64

	Not at all helpful (%)	Neither helpful nor unhelpful (%)	Helpful (%)	Extremely helpful (%)
The online program overall	0	0	64	36
Meetings with the therapist	0	0	18	81
Information about brain injury	0	0	36	64
Learning how to read and interpret my child's cues	0	0	36	64
Weekly GROW time to play with my child	0	0	27	73
Live coaching during GROW time	0	0	27	73
Feedback about my GROW videos	0	0	36	64
Self-care strategies, such as belly breathing and relaxation skills	0	18	45	36
Learning how to reframe my thoughts	0	0	55	45
Learning communication strategies to help my relationships ^a	0	10	40	50
Learning about how to support my child	0	0	45	55
Learning how to help with my child's sleep	0	27	36	36

Note. Results reflect all 11 families that completed the program ($n = 11$).

^a($n = 10$) one caregiver did not provide their response to item.

making it more likely the client remains in treatment (Smith & Trimble, 2016). In addition to the reasons previously listed, coach race and ethnicity may have played a role in family dropout as both coaches identified as White and Non-Hispanic. At the same time, Black households were disproportionately affected during COVID-19 with Black caregivers experiencing greater stress due to financial and housing instability (Kullar et al., 2020). The increased stress Black and African American families were experiencing during the pandemic likely contributed to the high dropout rate. It is also possible that coach-caregiver gender incongruence influenced dropout for some families (Kivlighan et al., 2019); all caregivers identified as female while GROW had one male and one female coach.

While we argue that telehealth approaches may make interventions more accessible, recruitment feedback highlights the additional burden the ongoing and coinciding COVID-19 pandemic has placed on families. It is likely that these additional external factors

(e.g., increased workload, change in household responsibilities, breakdowns in childcare) imposed by the pandemic impacted families' ability to engage in and complete treatment. One coach commented that caregivers experienced "Zoom burnout," and appeared less engaged during some sessions. It is possible that the additional burden on caregivers made the introduction of a new intervention challenging and potentially unwelcome. Therefore, it is important to obtain feedback about caregiver needs and the factors contributing to participation throughout the intervention. Further, future research could tease apart the contributions of the modules versus online coaching.

Although initial recruitment and retention were challenging, GROW demonstrated promising acceptability, as assessed by high levels of caregiver and coach satisfaction in its content and design. Of the families who began module 1 ($n = 11$), 100% completed all five modules of the intervention. All caregivers reported that they found GROW to be helpful and would recommend the intervention to others.

Qualitative feedback underscored parental enthusiasm for the intervention, particularly regarding the GROW coaching sessions. This suggests that caregivers that commit to an online intervention may find great satisfaction and learn skills that increase their quality of life and reduce their overall daily stress burden.

Similar to findings examining therapist perceptions of delivering parenting-skill telehealth interventions during COVID-19 (Barnett et al., 2021), coaches reported high levels of satisfaction with the delivery modality of the GROW coaching sessions compared to face-to-face interventions. Reported advantages included greater ease of scheduling, attendance, and rates of homework completion. The online format reduced the time families dedicated to receiving treatment (e.g., driving to and from the appointment, waiting prior to being seen, and coordinating childcare). Coaches reported the telehealth approach allowed them to understand the family's home environment in a way that face-to-face therapy does not. Subsequently, online sessions may allow coaches to provide tailored recommendations utilizing available family resources.

Despite the potential promise of GROW, there are several limitations given the small sample size and limited range of injury severity of this open pilot that limits generalizability. A retrospective review of trauma registry data indicated that not all children with severe TBI were successfully identified, resulting in a disproportionately mild sample. Although both family and coach satisfaction were quite high, overall enrollment was relatively low with only 25% of those contacted agreeing to participate and only 61% retention in the intervention. Unfortunately, limited information was gathered about reasons for declining the intervention or dropping out, though time since injury, stress, telehealth fatigue, and increased pandemic-related burden likely contributed. Given that GROW was adapted from an existing intervention, families were not involved in designing the intervention approach (i.e., positive parenting vs. parental support) which may have reduced engagement. Although participants only differed from nonparticipants on time since injury, those who participated identified predominantly as White and female. Drop out was high among non-White families, underscoring the need to engage with stakeholders of diverse cultural backgrounds to better tailor intervention content, format, and delivery in a culturally responsive way. As therapist effectiveness can differ in relation to a caregiver's intersecting identities of race, ethnicity, and gender, researchers and therapists alike should be mindful of the intersecting systems of oppression experienced by diverse caregivers. While coaches reported high satisfaction, feedback may be biased as the coaches who provided the intervention also assisted in intervention development.

Similarly, researchers who conducted qualitative interviews and interpreted qualitative data were part of the development team.

Opportunities to improve future iterations of GROW include addressing barriers to study participation and identifying the optimal window to intervene in this age group. Recruitment efforts could be strengthened by narrowing the focus to families closer to the time of injury when neurodevelopmental difficulties are more evident or to caregivers experiencing questions or concerns about their child's recovery. Further identifying and targeting the unique stressors associated with parenting a very young child post-TBI could promote uptake. Examining these stressors within the context of intersecting systems of race, SES, ethnicity, and gender could provide insights regarding how to recruit, engage, and support diverse caregivers. It would also be beneficial to train and employ a more diverse cadre of coaches, thereby allowing us to better connect to and retain families. Integration of participant feedback regarding uploading videos, additional content regarding family consequences, and offering traditional paper supports may further strengthen the intervention. Given the usefulness of technology, recruitment efforts may also be bolstered by making the intervention "frictionless" and more "sticky" through an app-based intervention that eliminates barriers, such as logging in, navigating lessons, and managing the time it takes to complete the intervention with their child's needs, and integrates reminders of GROW components to aid in family retention (e.g., GROW time videos, reviewing GROW sessions, and coaching session appointments). Intervention redesign could also take into account considerations regarding successful implementation in clinical settings like models of cross-site supervision and additional video and training examples that reflect diversity across sites. Although acceptability data from GROW suggests potential utility with our target population, additional work understanding and addressing underlying feasibility and engagement issues is necessary prior to further clinical trials and eventual implementation in clinical settings.

Supplementary Data

Supplementary data can be found at: <https://academic.oup.com/jpepsy>.

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Data Availability

The data underlying this article are available in the article and in its online supplementary material.

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