



Brief, digital, self-directed, and culturally adapted: Developing a parenting intervention for primary care

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ABSTRACT

Preventive positive parenting interventions support healthy outcomes for children and have the potential to buffer the effects of poverty via changes in parent attitudes and behaviors. Delivering digital parenting interventions that have been adapted for the end-user population within pediatric primary care settings has the potential to support fit, acceptability, and reach of such interventions. This study used an experimental mixed-methods design to develop and test a digital, single-session, self-directed preventive parenting intervention in pediatric primary care during well-child visits. The intervention was developed through integration of common elements of evidence-based parenting practices and surface structure adaptations following end-user (i.e., caregiver) prototyping (Phase 1). The adapted intervention, *Parenting A to Z*, was tested in a beta-testing randomized controlled trial ($N = 60$) during well-child visits for children ages 2 to 8 years of age in primary care clinics serving primarily low-income Latinx families (Phase 2). Phase 1 results included adaptations to the procedures, content, and aesthetics using end-user feedback. Phase 2 results indicated the feasibility and acceptability of the adapted intervention and its digital delivery format. The effect size of the intervention on parental stress was commensurate with other, higher dose evidence-based preventive interventions. The results demonstrate how a brief, digital, self-directed parenting intervention aligned with the goals of the end-user population increased the reach and access to underserved children and families.

1. Introduction

Positive parenting practices, characterized by high levels of parental warmth, attention, and timely responsiveness, are viewed as a pathway to enhancing the wellbeing of children and caregivers (Sanders, Kirby, et al., 2014). Parent knowledge and use of these practices are associated with parental confidence in their ability to parent (i.e., self-efficacy; Gross et al., 2003) as well as decreases in parental stress and increases in parents' psychosocial wellbeing (Sanders et al., 2008). Studies have shown that use of positive parenting practices prevents child maltreatment, prevents and reduces child behavior problems, and improves emotional and behavioral adjustment in children (Sanders, Kirby, et al., 2014). Positive parenting practices are protective for families who experience poverty and its interrelated stressors (e.g., food insecurity, housing instability, community violence) which put parents at increased risk for stress and use of harsh and inconsistent parenting practices (Steele et al., 2016) and children at risk for social, behavioral, and emotional problems (Morrow & Villodas, 2017). Ethnic minority children and families are disproportionately impacted by poverty (Jiang

et al., 2014), putting them at increased risk for poor outcomes. Prevention-oriented positive parenting programs promote competency in the use of supportive and safe parenting strategies that may avert negative outcomes and lead to positive effects decades later (Sandler et al., 2015), thus functioning as a counterbalance to the many stressors for families who experience poverty.

Numerous logistical and perceptual barriers (e.g., transportation, cost, shortage of clinicians, stigma, discomfort in group services) may prevent families who are contending with poverty from engaging in such interventions (Lakind & Atkins, 2018). A public health approach to dissemination and implementation of parenting interventions can reduce barriers that limit reach by aligning interventions with settings important to families (Atkins et al., 2016). Pediatric primary care is a particularly promising venue for behavioral health interventions (Committee on Child Health and Financing, 2013), as caregivers are more likely to seek out a physician than a therapist for child behavioral difficulties (Polaha et al., 2011) and prefer to receive behavioral health services in this setting (Kolko, et al., 2010). The American Academy of Pediatrics calls for anticipatory guidance that proactively counsels

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children and families on relevant physical, emotional, psychological, and developmental topics, including parenting at routinely scheduled well-child visits (Committee on Psychological Aspects of Child and Family Health and Task Force on Mental Health, AAP, 2009). Furthermore, preventive well-child visits, provided to families at no out-of-pocket cost, permit greater access to economically disadvantaged and racial minority children who face the highest rates of unmet mental health needs (Merikangas et al., 2011). A growing literature supports the clinical benefit of delivering positive parenting interventions within a pediatric primary care setting (e.g., Kolko & Perrin, 2014; Shah et al., 2019). However, many existing interventions rely on providers (i.e., nurses, pediatricians, external research teams, behavioral health specialists) as implementors, placing increased demands on an already overburdened system.

Technological innovations could extend intervention reach to a greater number of families (Kazdin, 2015) while also reducing burden on providers and ensuring fidelity to evidence-based practices (Breitenstein et al., 2014). There is a promising literature on preventive parenting interventions delivered via digital applications (see, Bert et al., 2008; Ehrensaft et al., 2016; Stalker et al., 2018), with a smaller subset tested in the primary care setting (see, Breitenstein et al., 2019; Scholer et al., 2012; Sourander et al., 2016) and found to be feasibly delivered and acceptable to caregivers. These programs, delivered in various digital (e.g., tablet, computer) and interactive (e.g., videos of parents using strategies, activities, didactics, coaching) formats, are targeted at altering and strengthening effective parenting behaviors (e.g., use of differential reinforcement) thereby enhancing parental well-being as well as developmental outcomes for children. Despite evidence that caregivers are particularly receptive to video interventions available during a well-child visit (Riley et al., 2016), all but one require participation outside of the clinical setting (Scholer et al., 2012), like at the family's home. Additionally, many of the existing programs are lengthy (e.g., multiple sessions over several weeks) requiring participation that extends beyond the time in the doctor's office. In light of the promising efficacy for single-session parenting interventions (Schleider & Weisz, 2017), enhancing the fit, acceptability, and engagement of brief parenting interventions delivered digitally during a well-child visit is warranted.

In order to promote accessible and effective interventions for populations that experience stressors associated with poverty, treatment development researchers are encouraged to integrate the unique features of the context (e.g., setting, stakeholders, end-user) into evidence-based practices rather than promoting externally-produced packaged programs (Atkins et al., 2016). Systematic adaptations to existing interventions may increase their fit within the culture and experience of diverse populations and foster receptivity, comprehension, and acceptance of messages (Resnicow et al., 2000). This may be particularly relevant to positive parenting interventions since meta-analyses have indicated mixed evidence regarding their benefit for economically disadvantaged families (Leijten et al., 2013; Lundahl et al., 2006; Reyno & McGrath, 2006). Efforts to include end-users—including parents—in the adaptation process have also been described in other parenting interventions (Breitenstein et al., 2015).

This two-phase study utilized an embedded experimental mixed-methods design to adapt evidence-based positive parenting practices for delivery during well-child visits as a prelude to a larger trial. In Phase 1, the research team developed, and then adapted with end-user feedback, a digital single-session positive parenting intervention for delivery in pediatric primary care clinics serving predominantly low-income, Latinx families. Researchers utilized Resnicow et al. (2000) Cultural Sensitivity framework to enhance the fit, acceptability, and face validity of evidence-based positive parenting practices for the target population. This framework was selected because it seeks to enhance intervention fit within a specific end-user population via involvement of stakeholders and adaptations to the intervention itself, as well as the procedures and method of delivery (Resnicow et al., 2000).

Phase 2 included a beta-testing RCT of the intervention to assess its feasibility and acceptability, and to explore parent and child outcomes. We hypothesized that the intervention would be feasible, indicated by rates of recruitment and enrollment in Phase 2 comparable to other studies testing preventive parenting interventions in primary care using digital applications (see, de Graaf et al., 2009; Scholer et al., 2007). Based on prior studies (e.g., Bert et al., 2008), we hypothesized that the intervention would be equally, but not more, acceptable than the control condition. Acceptability was based on participant ratings of satisfaction with the technology, the intervention, and its delivery in primary care. Because the aim of this study was to pilot procedures and test feasibility with a small sample ($N = 60$), parent and child outcomes are exploratory in nature.

2. Phase 1: Intervention development

2.1. Materials and methods

2.1.1. Participants

The institution's Human Subjects Institutional Review Board approved all methods. Participating caregivers ($N = 13$) were recruited from three pediatric primary care clinics in Central Texas. The first author contacted clinics with patient populations served primarily by Medicaid and enrolled three clinics that expressed interest in increasing their behavioral health service capacity. The three clinics had varying levels of pre-existing behavioral health services (e.g., psychiatrist on-site weekly, social workers available through referrals, graduate psychology students semi-integrated several days a week). Participants were primarily mothers ($n = 12$) and identified as Hispanic/Latinx ($n = 12$). The age of their children ranged from 2 to 8 years of age with an average of 4.1 years. The majority were born in Mexico ($n = 7$) and spoke English as their primary language ($n = 7$). According to the US Department of Health and Human Services Federal Poverty Guidelines of 2018, 7 of the participants in this sample met the poverty threshold.

2.1.2. Procedures

Following Resnicow and colleagues' (2000) cultural sensitivity model of adaptation, the first author began by conducting a needs assessment with the primary care partner clinics, including the clinic leadership (i.e., medical director, pediatricians) and staff (i.e., administrators, nurse associates) to gauge behavioral health problems presented to clinic staff and assess the clinic's desire to deliver interventions focused on parenting. After, the first author embedded herself within each of the clinics (e.g., observed clinic waiting rooms, shadowed well-child visits). Next, guided by clinic stakeholders' input and a basic understanding of the procedures within a well-child visit, the research team developed a brief (~4 min) video prototype that explained positive parenting practices (i.e., positive attention, differential reinforcement) as modeled by a mother-son dyad engaged in joint play within their home. These practices were selected because they are high-frequency strategies that appear in evidence-based parenting interventions (Chorpita & Daleiden, 2009). The narration was provided in English with Spanish subtitles.

Next, caregivers attending a routine well-child visit for their child between the ages of 2 and 8 who spoke English or Spanish were recruited by front desk staff or by research team members in clinic waiting rooms when they checked in for their child's well-child visit. Interested caregivers were scheduled for a one-hour interview conducted by the first author or a bilingual research assistant. Caregivers completed consent, filled out a demographic survey, and participated in a semi-structured interview. Caregivers were shown the video prototype and asked to provide feedback. The format of the interview remained flexible and interviews were audio-recorded. Caregivers received a monetary incentive for their participation in the interview. Interview recordings were transcribed verbatim in their original language. Interviews conducted and transcribed in Spanish were translated into English by the

research assistant that conducted the interview. Next, the research team completed inductive thematic analyses of the interviews from which themes relevant to intervention adaptation emerged. Last, the team implemented surface structure adaptations to the intervention based on these themes. Surface structure adaptations involve matching the intervention messages and its delivery materials to observable social and behavioral characteristics and preferences (e.g., people, places, language, locations) of the target population (Resnicow et al., 2000).

2.1.3. Measures

2.1.3.1. Demographics. A measure was developed for this study to assess parent demographics, including race/ethnicity, family characteristics, employment status, and socioeconomic status. This demographics measure was translated into Spanish according to the recommendations made by Brislin (1970).

2.1.3.2. Interview. Interview questions were designed specifically for the study. The interview was delivered in a semi-structured format consisting of broad, open-ended questions followed by queries intended to illicit experiences and preferences regarding their child and family's health care services, their experiences and preferences accessing and receiving mental/behavioral health care for their child and family, feedback on the video prototype, and perspectives on using technology for mental health services.

2.1.4. Qualitative data analysis

Interviews were analyzed using an inductive thematic analysis approach (Braun & Clarke, 2006) to identify themes relevant to intervention adaptation. Themes emerged through the following process: (1) the authors and three bilingual research assistants read the entire body of text and generated themes collaboratively; (2) relevant text was highlighted and coded in an open analysis; (3) codes that emerged from the data were discussed and the authors refined, combined, and disaggregated codes; and (4) a coding manual was developed by the first author. This procedure was repeated until no major themes emerged that were not already documented in the codebook, indicating theoretical saturation. Next, using the codebook, three coders analyzed and assigned codes to each text unit. The first author and a research assistant coded all English transcripts and two bilingual research assistants assigned codes to the Spanish transcripts. All interviews were double coded, with coding discrepancies discussed and resolved with the first author, and the codebook revised as needed. Coding agreement ranged from 91% to 100% ($M = 98.18$, $SD = 2.13$) for all codes. The result was a set of related themes that were organized into categories to inform surface adaptations to the intervention and procedures.

2.2. Results

2.2.1. Qualitative analysis for intervention adaptation

The themes relevant to intervention adaptation were organized into three categories: (1) procedural, (2) content, and (3) aesthetics. Table 1 presents the categories and themes as well as exemplar quotes. Surface structure adaptations following qualitative analysis included changes to the language, persons, content, and means of delivery (Resnicow et al., 2000), as well as to study procedures. Related to procedures, the intervention was developed to be a brief, fully automated behavioral intervention in a video format viewed by the end-user without direction from a provider (Hermes et al., 2019) following provider feedback there was limited time during a well-child visit to deliver additional intervention or anticipatory guidance. In addition, because caregivers reported extended wait times in clinic exam rooms during their well-child visits, study procedures were adapted to enroll caregiver participants in the trial while they waited for their medical providers. Caregivers were recruited by primary care clinic staff rather than external research

Table 1
Qualitative Data Analysis for Intervention Adaptation: Categories and Themes.

Category	Exemplar response
1. Procedural	
1.1. Wait time at clinic	<i>Usually it's waiting in the lobby for about 45 min, and then we'll wait in the [exam] room for another 30 min...so it's just a lot of waiting.</i>
1.2. Technology access	<i>I would say my phone, or the computer, or the iPad. Or maybe if I need to on YouTube, TV, on iTunes, or something like that. My number one preference I know would use my phone. I always have in hand that one.</i>
1.3. Follow up time	<i>Probably at night ... kids are showered they're ready in bed too for school and that's the only time I really have for me.</i>
2. Content	
2.1. Trust in medical provider	<i>I love the people here, the doctors and the staff... they're pretty nice and friendly and caring and I love the support...whatever we would need they'd pretty much would tend to it.</i>
2.2. Limited use and access to behavioral health services	<i>Uh, I haven't seen, I haven't needed to use [behavioral health services] or anything</i>
2.3. Potential to reduce parental stress	<i>[I would watch something like this because] sometimes you need...do things differently for the better. Try new things that also help us to not stress ourselves and also help our children.</i>
2.4. Dislike of "ignoring"	<i>I don't watch more explaining because to me I feel like if I turn my back and they're acting up and they know that they're acting up and I'm not correcting it, it's just allowing them to do it.</i>
2.5. More explaining	<i>I'd say more examples, or a longer video explaining why, why we're doing this...And somebody just explained, 'well this is the reason why because then this could happen.'</i>
2.6. Other settings	<i>I don't know what put that lady and that kid in a public setting and letting him do that... change the settings where you're not in your home, because sometimes when you're in your home it's calmer, but sometimes when you're not in the home your child changes, like mine does.</i>
3. Aesthetics	
3.1. Ways to engage children	<i>[make it a] little bit more interactive or something. Put something the kids can watch too, because the kids want to see what happens too.</i>
3.2. Text and verbal	<i>It tells you in lettering what they're saying, and I liked that.</i>

Note. Text included in brackets has been included by the author for clarification or to replace identifying information.

personnel to capitalize on their trust of medical providers at their clinics. Related to the content, the video intervention was created in both English and Spanish with a Latinx, bilingual mother-daughter dyad representative of the patient population. The intervention was narrated by a bilingual pediatrician consistent with caregiver report of high levels of trust in their primary care providers. Following caregiver feedback that it would be helpful to see the strategies modeled outside of the home, the intervention included a scene where the mother utilized the strategies while waiting with her child in a doctor's office waiting room. Regarding language, we replaced the word "ignoring" with "taking attention away" in response to discomfort from a subset of caregivers with "ignoring" their child, but maintained the strategy in order to adhere to the evidence base for positive parenting. We also utilized metaphors that leveraged caregiver trust in the clinics but limited exposure to mental health services (e.g. comparing the use of the positive parenting strategies and vaccinations to prevent illness). Lastly, related to aesthetics, the intervention was adapted to include text that emphasized examples narrated throughout the video, as well as cartoons and music to enhance user engagement. Table 2 provides an overview of the modifications made following the interviews.

Table 2
Surface level adaptations

Adaptation	Example
Language	Available in English and Spanish
Persons	Latinx, bilingual mother-daughter dyad representative of clinic population Narrated by bilingual pediatrician from primary care partner clinic Recruitment conducted by primary care clinic staff
Implementation Location	Delivery of intervention during wait time at primary care clinic
Medium of Presentation	Delivery of a digital intervention
Context	Modeled parenting strategies outside of home in doctor's office
Metaphors	Comparison drawn between use of positive parenting strategies and child vaccinations
Content	Replaced the word "ignoring" with "taking attention away"
Goals	Potential to reduce parental stress Short and long-term outcomes for children

Note. Surface level adaptations, identified and implemented following caregiver interviews, followed procedures outlined by Resnicow et al. (2000).

2.2.2. Intervention

Parenting A to Z (PAZ) is a video approximately 6 min long that is entirely self-directed (e.g., fully automated; Hermes et al., 2019) on a web browser. The video, delivered in either English or Spanish based on user preference, is narrated by a bilingual pediatrician who presents the positive parenting strategies and their potential benefits. A bilingual parent and child model the parenting techniques of positive attention (i.e., labeled praise, describing behavior, reflecting verbal statements) and differential reinforcement (i.e., active ignoring and praise) in a home play situation and in a doctor's office waiting room.

3. Phase 2: Beta-testing randomized controlled trial

3.1. Materials and methods

3.1.1. Participants

Participants included 60 caregivers from three primary care clinics (eligibility criteria and clinics were the same as Phase 1). Ninety percent of caregivers were mothers ($n = 54$) and the majority reported that they were Hispanic/Latinx (78.3%) with 51.7% born in the United States. Fifty-five percent ($n = 33$) were primarily English speaking. According to the 2018 US Department of Health and Human Services Federal Poverty Guidelines, 63.3% ($n = 38$) met the poverty threshold. Pre-intervention ratings indicated that 11.7% of participants ($n = 7$) had clinically significant ratings of disruptive behaviors (ECBI ratings > 131).

3.1.2. Procedures

A beta-testing RCT tested the impact, feasibility, and acceptability of a digital intervention on positive parenting practices delivered to families in the primary care setting. Caregivers that presented for routine well-child visits for children between the ages of 2 and 8 were invited by their medical assistant or nurse to participate while waiting in the exam room for their medical provider. Families willing to participate were provided a digital tablet from clinic staff. All procedures thereafter were self-guided on a web browser, including consent, questionnaires, and automated randomization to the experimental or control conditions.

Caregivers were randomized to the experimental condition in which they watched *PAZ* ($n = 31$; described above), or to the psychoeducational control condition ($n = 29$) in which they were presented a digital handout with recommended positive parenting strategies (i.e., praise, active ignoring) in a brief, bulleted format. The psychoeducational condition was modeled after the American Academy of Pediatrics Bright Futures handouts often distributed as a part of anticipatory guidance at well-child visits (see, <https://brightfutures.aap.org>). Questionnaires

were completed directly before the intervention was viewed (pre-intervention), directly after the intervention was viewed (post-intervention), and one-week and one-month after clinic participation. Caregivers were compensated for completion of questionnaires at each time point. Families received follow-up assessments and a link to the intervention to watch/read again if they chose via text message on their mobile devices. Once sent, participants could use the intervention link as many times as desired, allowing for assessment of intervention dosage, or the number of times it was accessed. Participants' cell phone numbers were linked to unique study identifiers. All deidentified data were stored on a secure database hosted by the research institution's information security office.

3.1.3. Measures

3.1.3.1. Demographics. A measure was developed for this study to assess parent demographics, including race/ethnicity, family characteristics, and socioeconomic status. This measure was translated into Spanish according to the recommendations made by Brislin (1970).

3.1.3.2. Acceptability. A measure was developed for this study to assess acceptability of study procedures and the intervention. The measure assessed experiences using technology, the extent to which information on parenting was deemed valuable, level of engagement with the intervention, and the degree to which caregivers liked learning about parenting within the context of the primary care setting. Items were rated on a 5-point Likert scale from 1 (*strongly agree*) to 5 (*strongly disagree*). This acceptability measure was translated into Spanish according to the recommendations made by Brislin (1970).

3.1.3.3. Child disruptive behaviors. The Eyberg Child Behavior Inventory (ECBI; Eyberg & Pincus, 1999) assesses parents' perceptions of child conduct problems. The 36-item measure includes an Intensity scale that assesses the frequency of problem behaviors rated on a 7-point Likert scale from 1 (*never*) to 7 (*always*), and a Problems scale that rates (Yes/No) if a behavior is problematic for the reporting parent; only the Intensity scale was used in this study. Numerous studies have supported the validity of the ECBI (e.g., Eyberg & Pincus, 1999). The scale is also published in Spanish. In the present study, the internal consistency for the total scale was 0.96.

3.1.3.4. Parental stress. Parenting stress was assessed using the five-item parental adjustment subscale from the Parent and Family Adjustment Scales (PAFAS; Sanders & Morawska, 2010). Caregivers rated their experiences of parental stress on a 4-point Likert scale (0 = *not at all* to 3 = *very much*). The items yield a total stress score, with higher ratings indicating higher dysfunction. Psychometric evaluation of the PAFAS indicate good internal consistency and satisfactory construct and predictive validity (Sanders, Morawska, et al., 2014). Internal consistency in the current study was 0.52. This measure was translated into Spanish according to the recommendations made by Brislin (1970).

3.1.3.5. Parenting practices. Parenting practices were assessed using the Parent and Family Adjustment Scales (PAFAS; Sanders & Morawska, 2010). Thirteen items comprised of three subscales (parental consistency, coercive parenting, positive encouragement) were used to assess parenting practices, with higher scores indicating more dysfunctional parenting practices. The measure has demonstrated good internal consistency, construct validity, predictive validity, and convergent validity (Sanders, Morawska, et al., 2014). Internal consistency in the current study was 0.67. This measure was translated into Spanish according to the recommendations made by Brislin (1970).

3.1.3.6. Knowledge of effective parenting practices. The Knowledge of Effective Parenting Practices Scale (KEPPS; Morawska et al., 2005) is a

30-item multiple choice instrument that assesses knowledge of effective parenting strategies from the Triple P-Positive Parenting Program, an evidence-based, multilevel system of parenting support (Sanders, 2012). Five items were selected based on content that fit the study's digital intervention and adapted to fit the context and goals of the intervention. Test-retest reliability across a 2-week interval (post-intervention and one week follow up) was adequate ($r = 0.46$) and internal consistency was not acceptable ($\alpha = 0.12$). This measure was translated into Spanish according to the recommendations made by Brislin (1970).

3.1.3.7. Parental self-efficacy. Parental self-efficacy was assessed using the Parenting Sense of Competence Scale (PSOC; Johnston & Mash, 1989). This self-report measure assesses parents' overall sense of confidence in their parenting role. It consists of 16 items rated on a 6-point Likert scale ranging from 1 (*strongly agree*) to 6 (*strongly disagree*). Higher scores reflect greater self-efficacy. Internal consistency was found to be satisfactory in a non-clinic sample of parents (Morawska et al., 2009). In the current sample, internal consistency was 0.73.

3.1.4. Data analysis plan

Descriptive analyses were conducted with SPSS Statistics (version 23) to characterize feasibility and acceptability. An independent sample *t*-test assessed group differences in acceptability. Growth curve modeling using HLM7 software was used to test growth of the caregiver and child outcomes across four intervals (pre-intervention, post-intervention, one-week, and one-month). Growth curve analysis was used to determine whether caregivers in the intervention condition changed at a faster rate over time compared to those in the control group. A two-level multilevel model was used nesting outcomes measurements within participants to examine the intervention's impact on each outcome over time.

3.2. Results

3.2.1. Feasibility

Feasibility was assessed according to rates of recruitment. Over a 50-day period, 148 eligible caregivers presented across the three clinics and 100 were invited to participate by clinic staff. Although reasons for not inviting caregivers to participate were not systematically tracked, they included: medical staff perceived that the caregiver had minimal time, caregiver had multiple children in exam room that required attention, or the medical staff forgot to invite the caregiver. Of the 100 caregivers invited, 90.0% consented ($n = 90$) and were randomized. After completing consent on the tablet, 66.7% of those that consented completed participation ($n = 60$). Completion was defined as response to items from the pre-intervention survey (individual items may be skipped), observation of intervention, and response to items from the post-intervention survey. Caregivers did not report reasons for non-completion; however, anecdotal accounts from clinic staff attributed non-completion to time constraints, caregiver need to manage child behavior, challenges reading and comprehending survey questions, and challenges using the tablet. Follow-up data collection procedures also indicated feasibility. Of the 60 participants, 88.3% ($n = 53$) completed the one-week follow up survey from their personal mobile device. At one-month follow up, 70.0% of participants completed the survey ($n = 42$), comprised of 74.2% of participants ($n = 23$) from the PAZ condition and 65.5% of participants ($n = 19$) from the control condition.

Participants could access the intervention (video or psychoeducational control digital handout) at follow up via their personal device. Dosage of the intervention (i.e., number of times the video or the digital handout were accessed) indicated that those in the experimental condition accessed the video 1.2 times on average (*range*: 1–3), while those in the control condition accessed the reading material 1.1 times on average (*range*: 1–3). Independent samples *t*-tests showed no significant differences in dosage between the PAZ condition ($M = 1.2$, $SD = 0.5$)

and the control condition ($M = 1.1$, $SD = 0.4$); $t(58) = -0.517$, $p = .607$.

3.2.2. Acceptability

Acceptability of the study procedures and intervention were high across both conditions (Table 3). Results indicated high rates of acceptability related to ease and preference for technology (e.g., tablet was easy to use), the intervention content (e.g., planned to use strategies), and receiving information about parenting in the primary care setting (e.g., liked learning in this setting). There were no significant group differences in acceptability at post-intervention between the PAZ condition ($M = 40.8$, $SD = 4.9$) and control condition ($M = 41.6$, $SD = 6.8$); $t(55) = 0.554$, $p = .582$. At one-month follow up, participants in the control condition reported greater acceptability ($M = 39.59$, $SD = 4.46$) than those in the experimental condition ($M = 36.29$, $SD = 3.69$), $t(36) = -2.5$, $p = .02$, $d = 0.81$.

3.2.3. Child and caregiver outcomes

Although underpowered to detect a true effect, exploratory analyses of child (disruptive behavior) and caregiver (parental stress, effective parenting practices, knowledge of effective parenting, parental self-efficacy) outcomes were conducted using a two-level model using HLM7 (Table 4). As anticipated, there were no significant differences between conditions. However, the effect size of the PAZ intervention on parental stress ($d = 0.11$) was in the small range and consistent with other well-established preventive interventions.

4. Discussion

This study used an embedded experimental mixed-methods design to develop, adapt and pilot a positive parenting intervention delivered to families during well-child visits. The digital intervention was feasible and acceptable in primary care during well-child visits, and follow-up procedures that relied on caregiver response via their personal devices were also feasible for retention. There were no statistically significant differences related to parent and child outcomes, but the effect size of PAZ on parental stress ($d = 0.11$), though in the small range, is commensurate with other preventive interventions that are presented in longer formats with a greater scope of parenting strategies (see, Menting et al., 2013; Sanders, Kirby, et al., 2014). This is an important finding as parenting stress is a keystone variable that has a direct influence on parenting behavior and consequent child outcomes (Pereira et al., 2012), and this effect has not consistently been detected in other trials of digital parenting interventions (Ehrensaft et al., 2016). These findings suggest the potential to attenuate parenting stress with a very brief, self-directed, digital parenting intervention during a well-child visit.

4.1. Factors supporting feasibility and acceptability

4.1.1. Surface structure adaptations

The procedures utilized in this study—conducting a needs assessment, developing an intervention prototype based on the evidence base, engaging end-users in feedback, making surface structure adaptations—provide a blueprint for digital intervention development that accounts for the unique features of the delivery setting and the target population. Surface structure adaptations included changes to the language, persons, context, content, and metaphors in order to enhance intervention fit with the end-user population, who were primarily low-income and Latinx (see, Table 2). The high rates of acceptability reported in Phase 2, as well as evidence of feasibility suggest some degree of perceived fit of the intervention with its target population. Therefore, surface structure adaptations that sought to match intervention format (e.g., digital, self-directed, brief) and content (e.g., comparing positive parenting to vaccinating a child) to the characteristics of the target population and delivery context may have enhanced engagement in the intervention with a low-income, ethnic minority population who researchers often fail to recruit and retain (Castro et al., 2006).

Table 3
Caregiver Reports of Intervention Acceptability

Post-Intervention	A ^a (%)	B ^b (%)	A(%)	B(%)	A(%)	B(%)	A(%)	B(%)	A(%)	B(%)
Technology/Procedures										
Registration was easy	0.0	0.0	0.0	3.4	9.7	6.9	58.1	48.3	29.0	41.4
Liked using tablet	3.2	3.4	9.7	0.0	3.2	0.0	38.7	34.5	41.9	62.1
Tablet easy to use	0.0	3.4	6.5	0.0	9.7	0.0	48.4	55.2	32.3	41.4
Had enough time	0.0	3.4	0.0	3.4	6.5	6.9	58.1	48.3	29.0	37.9
Paid close attention	0.0	3.4	0.0	0.0	9.7	10.3	61.3	51.7	25.8	34.5
Content										
Learned new information	0.0	6.9	3.2	0.0	12.9	13.8	54.8	31.0	25.8	48.3
Plan to use parenting strategies	0.0	3.4	0.0	0.0	9.7	3.4	54.8	48.3	29.0	44.8
Want more parenting information	0.0	3.4	3.2	0.0	12.9	20.7	58.1	31.0	22.6	44.8
Primary Care Context										
Liked learning at doctor's office	3.2	10.3	0.0	0.0	12.9	6.9	48.4	34.5	32.3	48.3
Plan to talk to medical provider	3.2	10.3	9.7	0.0	35.5	31.0	35.5	41.4	12.9	17.2
1 Month Follow-Up										
Technology/Procedures										
Liked using cell phone	0.0	0.0	4.3	0.0	0.0	5.9	47.8	41.2	43.5	52.9
Prefer phone over pen and paper	4.3	5.9	8.7	0.0	8.7	5.9	43.5	35.3	30.4	52.9
Content										
Plan to share parenting strategies	0.0	0.0	13.0	0.0	8.7	11.8	65.2	47.1	13.0	41.2
Planned use of strategies	4.3	0.0	4.3	0.0	13.0	0.0	60.9	58.8	21.7	41.2
Want more parenting information	0.0	0.0	8.7	0.0	8.7	17.6	65.2	23.5	17.4	58.8
Primary Care Context										
Plan to talk to medical provider	0.0	0.0	0.0	5.9	30.4	29.4	52.2	29.4	13.0	35.3
Comfortable talking to provider	4.3	0.0	0.0	0.0	13.0	0.0	60.9	47.1	21.7	52.9
Positive feelings towards clinic	0.0	0.0	4.3	0.0	8.7	0.0	65.2	41.2	21.7	58.9
Will continue to visit clinic	0.0	0.0	0.0	0.0	4.3	0.0	65.2	35.3	26.1	64.7

Note. Percentages reflect the caregivers that responded on the acceptability survey at 1-month follow-up ($n = 40$); 74% ($n = 23$) of participants in the PAZ condition and 59% ($n = 17$) of participants in control condition completed one-month follow-up.

^a A = PAZ condition.

^b B = control condition.

Table 4
Growth Curve Models of Child and Caregiver Outcomes

Final Fixed Effects	Unconditional Model			Conditional Model		
	Coefficient	SE	p value	Coefficient	SE	p value
Child Disruptive Behaviors						
Mean child behavior at baseline (β_{00})	79.775	3.804	<0.001	79.739	3.798	<0.001
Slope (β_{10})	-0.899	0.923	0.334	-0.375	1.1640	0.748
Difference in slope by condition (β_{11})				-1.012 ^a	1.524	0.509
Parental Stress						
Mean parental stress at baseline (β_{00})	3.582	0.353	<0.001	3.574	0.352	<0.001
Slope (β_{10})	-0.103	0.105	0.331	0.0381	0.136	0.780
Difference in slope by condition (β_{11})				-0.275 ^b	0.175	0.122
Parenting Practices						
Mean parenting practices at baseline (β_{00})	10.583	0.615	<0.001	10.588	0.611	<0.001
Slope (β_{10})	-0.071	0.146	0.627	-0.174	0.233	0.458
Difference in slope by condition (β_{11})				0.200 ^c	0.278	0.476
Knowledge of Effective Parenting Practices						
Mean knowledge at baseline (β_{00})	3.851	0.144	<0.001	3.851	0.144	<0.001
Slope (β_{10})	-0.004	0.039	0.914	0.007	0.049	0.879
Difference in slope by condition (β_{11})				-0.023 ^d	0.067	0.740
Parental Self-Efficacy						
Mean self-efficacy at baseline (β_{00})	69.247	1.623	<0.001	69.268	1.627	<0.001
Slope (β_{10})	0.457	0.433	0.296	0.180	0.615	0.771
Difference in slope by condition (β_{11})				0.535 ^e	0.642	0.408

Note. ES = effect size.

^a ES = 0.04.

^b ES = 0.11.

^c ES = 0.04.

^d ES = 0.02.

^e ES = 0.05.

4.1.2. Utility of pediatric primary care

The current study supports the recommendation that primary care can reach segments of the population unlikely to obtain traditional mental health services (Hourigan et al., 2015). The enrollment rate (90%) in the current study reflected the feasibility of engaging caregivers in a brief, digital parenting intervention within this setting.

Several features that set it apart from other digital parenting interventions within primary care, such as its delivery within the scope of a well-child visit, as well as its very brief, self-directed format, may have fostered high rates of enrollment (90.0 %) and participation (66.7%).

Study participants were largely Latinx caregivers living below the national poverty threshold who face elevated risk for parental stress

(Steele et al., 2016); their engagement during their child's well-child visit highlights a practical opportunity to intervene with families who may be unlikely to access mental health services due to racial minority (Merikangas et al., 2011) and socioeconomic status (Bringewatt & Gershoff, 2010). Embedding mental health services in the context of doctor visits intended to be preventative and where costs are covered (Patient Protection and Affordable Care Act, 2010) adds value to an existing service with little additional burden. Though results did not indicate significant changes in caregiver characteristics (e.g., knowledge, practices), introducing these techniques within the scope of a well-child visit may be a 'foot in the door' to further inquiry of these evidence-based practices with a trusted provider. This potential is reflected in our findings as parents in both the PAZ condition (48%) and the control condition (58%) reported that they planned to talk to their medical provider about parenting following their participation at the well-child visit. Ongoing efforts are underway to study behavioral changes (e.g., asking providers about parenting, seeking referrals for behavioral health) following participation in this brief intervention.

4.1.3. Self-administered, single-session digital delivery

The intervention approach in this study diverged from traditional models of mental health service delivery (i.e., multiple sessions delivered in person) by delivering the intervention digitally in a self-administered, single-session format. The use of tablets in the clinic appeared to be feasible and acceptable, and follow up surveys sent via text message to personal devices resulted in high participant retention at one-month follow up and high levels of satisfaction. These results dovetail with evidence that families who identify as ethnic minorities and have low income, like those represented in the current sample, have access to handheld devices with Internet connectivity (Ryan & Lewis, 2015), and that digitally-based interventions have the potential to reach a greater proportion of the population (Kazdin, 2015). Acceptability was comparable across conditions at post-intervention during the well-child visits, but higher for the control condition at follow up. Perhaps reading a brief handout was preferable to participants outside of the clinic setting, although repeated viewing was low for both conditions. Still, models of adult learning suggest that declarative knowledge and behavior change is supported by observational learning (Kolb, 1984) and thus viewing an intervention that teaches and models effective parenting practices may facilitate change over and above a brief handout. Further investigation is needed to explore preferences and access to viewing video interventions at home.

Single-session interventions (SSIs) for youth behavior problems have been shown to be beneficial with medium effect sizes (Schleider & Weisz, 2017). This study contributes to the growing evidence base on SSIs on positive parenting. While many of the existing SSIs require provider inputs (e.g., Joachim et al., 2010; Sanders, 2012), PAZ is a fully automated behavioral technology intervention. The effect sizes of PAZ, however, are smaller than in some other interventions (e.g., Joachim et al., 2010), perhaps due to the limited dosage and short length of this intervention. Other effective single-session positive parenting interventions are longer than PAZ, such as Triple P Level 2 (90-minute group seminar, Sanders, 2012) and Play Nicely (20–30 min, Scholer et al., 2007). Additionally, PAZ content included positive attention and differential reinforcement, two high-frequency practices that appear in parenting interventions (Chorpita & Daleiden, 2009), but did not include other high-frequency evidence-based practices that address managing rule-breaking behavior and are included in other interventions, such as redirecting (e.g., Scholer et al., 2007), effective commands, and time out (e.g., Ehrensaft et al., 2016), which may be integral components for impacting outcomes.

4.2. Limitations

A number of limitations to the study should be noted. First, the extent to which the adapted intervention is generalizable to other populations

outside of these three primary care clinics is unknown. While adapting interventions is suggested to enhance the setting- and person-specific fit (Resnicow et al., 2000), it may limit reach to other populations that differ in ethnicity, culture, race, and socioeconomic status. Although the parenting strategies recommended in the intervention are applicable across the age range of our study (Sanders et al., 2014; Smedler et al., 2015), it is also possible that the video modeling was most salient for those with children the same age as the child in the video. Additionally, because this study was conducted as a beta-testing pilot trial, we were limited with regard to sample size and length of follow-up assessment time points. Another limitation of the current study was that acceptability, along with parent and child outcome data, relied on self-report from caregivers. Other means of data collection, including behavioral observation (e.g., parenting practices), may extend our current findings and reduce potential barriers associated with self-reporting that may result from low levels of literacy. Additionally, several of our measurement tools had low to moderate internal consistency, perhaps due to adaptations made to fit the current study (e.g., content of knowledge questionnaire, Spanish translations), which may have impacted our ability to reliably assess outcomes. Lastly, due to resource and time constraints, we were unable to assess important racial, ethnic, and cultural factors such as cultural values, acculturation, and generational status that may contribute to the development of a culturally sensitive intervention. These limitations (e.g., sample size, follow-up time points, measurement tools) will be addressed in an upcoming RCT. Lastly, it should be noted that the current study is limited by the scope of the intervention—specifically, a very brief (~6 min), self-directed preventive intervention focused on two frequently occurring strategies from the literature on positive parenting for a broad age range. Efforts are underway to develop and test derivations of the intervention, including delivery to a more targeted age demographic, using additional evidence-based practices, and exploring delivery in combination with adjunctive provider support. Such efforts will help us to understand how this intervention may be leveraged for optimal implementation and delivery.

4.3. Conclusions

In the current study, aligning the intervention with the objectives of a preventive well-child visit in primary care and adapting the intervention to the setting and end-user population allowed for families who may be at risk for parental stress and its related outcomes to access preventive behavioral health services. Current results suggest that self-directed, brief digital positive parenting interventions have the potential to expand the behavioral health service capacity in pediatric primary care with minimal burden to providers. Such preventive interventions have the potential to reach vulnerable families prior to the onset of child behavioral problems who may otherwise have limited access to behavioral health services and interventions.

CRedit authorship contribution statement

Abby Bailin: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration, Funding acquisition. **Sarah Kate Bearman:** Conceptualization, Methodology, Resources, Writing – original draft, Writing – review & editing, Supervision, Project administration, Funding acquisition.

Declaration of Competing Interest

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

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