

PHYSICAL ACTIVITY

Active Families at Home: The Development of a Let's Wiggle With 5-2-1-0 App

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Abstract

Parents play a pivotal role in increasing children's physical activity levels and reducing time spent in sedentary activities. Positive role modeling of physical activity behaviors influences the amount of screen time use and engagement in at-home physical activity. This study aimed to determine the effectiveness and perceived usability of a physical activity app designed for children aged 3 to 5. Parents/guardians of preschool-age children were interviewed on the desired content of a physical activity app targeted at children. Following a review of the free physical activity app, participants were asked questions about the content, imagery, resources, and overall user friendliness. Parents suggested that the app be frequently updated with new videos and that more colorful icons that better represent the physical activity videos be added. In addition, they desired access to printable resources such as curriculum cards and coloring pages. Participants identified that the app was easy to follow and they would recommend the app to a friend. The majority of recommendations included improving the presentation of the app so that it looks more appealing and needing the app to be more preschool-age friendly. For the app to remain a resource for physical activity and not a source for sedentary activity, recommendations for more interactive games on the app were not included in the final version.

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Preventing childhood obesity is an important component for addressing the larger scale obesity epidemic (Pandita et al., 2016). Over the past 3 decades, childhood overweight and childhood obesity has tripled in the United States (Fryar, Carroll, & Ogden, 2014). Despite decreases in obesity among children aged 2 to 5, prevalence among preschool-age children remains high (Ogden et al., 2016). Children who are overweight and obese are developing health problems, such as diabetes and heart disease, previously only seen in adults (Pandita et al., 2016). Physical activity participation can help prevent these chronic disease associated with overweight and obesity. Preschool-age children who are active have less adiposity, improved motor skills, better psychosocial health (Timmons et al., 2012), and higher cognitive development (Carson, Rahman, & Wiebe, 2017). Despite these benefits, most children between 2 and 5 years old do not meet physical activity guidelines of 15 min of activity per hour (Pate et al., 2015).

Parents are important resources for demonstrating physical activity and for setting rules about how much access their children have to screen time (Spurrier, Magarey, Golley, Curnow, & Sawyer, 2008; Zecevic, Tremblay, Lovsin, & Michel, 2010). In addition, parental physical activity levels and availability of media in the home are predictors of sedentary time and physical activity in preschool-age children (Cislak, Safron, Pratt, Gaspar, & Luszczynska, 2012; O'Dwyer, Fairclough, Knowles, & Stratton, 2012; Pugliese & Tinsley, 2007; Zecevic et al., 2010). Children spend a significant amount of time in home environments, and parental role modeling of physical activity and parental control is associated with children demonstrating high-energy expenditure (Woon et al., 2014) and reduction in screen time use (Loprinzi, Cardinal, Kane, Lee, & Beets, 2014), respectively. Thus, childhood obesity prevention strategies that reach and educate parents on how to be active role models are paramount.

The World Health Organization (2012) recommends community-based interventions for population-based childhood obesity prevention strategies. Community-based obesity prevention programs already target increasing physical activity and reducing screen time use. One of which, Let's Go! 5-2-1-0, was developed by a health department in Maine to promote healthy messages in four key areas: "eat five or more fruits and vegetables each day"; "limit

daily recreational screen time to two hours or less”; “engage in one or more hours of physical activity per day”; and “consume zero sugary drinks, drink water or low fat milk” (Rogers et al., 2013). Therefore, identifying ways to effectively educate parents about obesity prevention messages and strategies is important.

Previous research suggests that successful parent education strategies include providing weekly newsletters with incentives (De Lepeleere, De Smet, Verloigne, Cardon, & De Bourdeaudhuij, 2013; Fitzgibbon et al., 2006), providing alternatives to screen time sedentary behavior (De Lepeleere et al., 2013), and allowing children to choose activities (Davis et al., 1999; De Lepeleere et al., 2013; Jones, Price, Okely, & Lockyer, 2009). In addition, parents need inexpensive suggestions and fun programs that are easy to implement with their children in their home (Dwyer, Needham, Simpson, & Heeney, 2008).

For an inexpensive resource for physical activity information to be provided, an app was developed for parents/guardians to promote the 5-2-1-0 message and encourage at-home engagement in nonsedentary activities. This study determined the effectiveness of a physical activity app for parents of preschool children aged 3 to 5 to use in home-based settings.

Method

App Development

The research team met with app developers to determine the overall needs for the app. Storyboards for 20 video vignettes were developed by the research team in accordance with physical activity curriculum cards for *Let's Wiggle With 5-2-1-0* message that had been developed for childcare centers in a previous study (Vinci, Whitt-Glover, Wirth, Kraus, & Venezia, 2016). Each activity includes an instructional component provided by a charismatic adult wearing 5-2-1-0 attire followed by pre-k children demonstrating the physical activities. The backdrop for the filming also carried the 5-2-1-0 message, and the three children included in the videos wore 5-2-1-0 t-shirts. Parental consent was obtained prior to their participation in the videos. The 20 videos were filmed in a 3-hr period with appropriate break time for the child participants. Following the completion of the videos, the research team met with the app developers

to make recommendations about sound and animation additions to each video. Six videos were created for the initial app development.

Design and Sample

To assess the quality of a physical activity app, the research team used a 12-item demographic questionnaire and a 12-item semistructured interview (see Table 1) to ask questions about the app content. The interview questions were open ended and included seven questions specific to the parent and child user-friendliness. In addition, five questions were asked about the content of the physical activity video vignettes. Prior to the study, the demographic questionnaire and interview questions were approved by the institutional review board. Demographic items included age, gender, marital status, education, race/ethnicity, employment, number of children living at home, and adult/child screen time/physical activity hours.

Table 1

Interview Questions for Parents About the App Presentation and App Videos

App Feedback Questions

1. Would your children be able to use the app without you?
 2. How easy is it to use?
 3. Would you recommend this app to a friend?
 4. If you could change one thing about this app, what would it be?
 5. What do you like best about the app?
 6. What do you like least about the app?
 7. How can we improve our app?
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Video Feedback Questions

8. Do the videos provide clear instruction?
 9. Would your child be able to follow along with the activities?
 10. PROBE: Are the activities too long? Too short?
 11. Would your child participate in these activities along with the video?
 12. PROBE: Would they simply watch the video?
 13. Do you feel you could participate in these activities with your children?
 14. Is there anything else you can think of that would help us improve the quality of our app?
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A study recruitment flyer was developed and distributed to childcare center directors who had established relationships with the research team. Parents/guardians who responded to the flyer were identified by center directors and were then contacted by a member of the research team. In addition, some participants directly contacted the research team to set up an interview. Participants were also recruited from a home-school physical education program at the research institution conducting the study. The interviews were conducted at a time and place most convenient for the subject. These interviews took place from July to September 2016 and were conducted until the research team achieved data saturation.

Following consent, participants were asked to complete the 12-item demographic questionnaire and were allowed to access the Let's Wiggle With 5-2-1-0 app for 10 min prior to the semistructured interview, with instructions to click on the pages and videos. Following the 10-min period, an approximately 20-min interview was conducted and participants were given a \$10 Walmart gift card for their time.

Statistical Analysis

The interviews were audiotaped using two Olympus digital voice recorders (WS-400S) that were placed between the participant and research team. In addition, field notes were recorded by two members of the research team. The audiotapes were uploaded to the computer and transcribed using Express Scribe Professional NCH software. The audiotapes were used as a supplement to the answers provided in the field notes.

The transcription data were analyzed through a conventional content analysis of coding categories directly from the transcripts (Hsieh & Shannon, 2005). A primary coder and a secondary coder coded the interview transcripts. Coders first read through the transcripts to analyze the transcript as a whole. Data were coded through first cycle (single word) and second cycle (longer sentences) coding processes (Saldana, 2009). The primary and secondary coder met to discuss key coding terms and combine codes or eliminate redundant codes. They then used the codes to identify emerging themes (Morse & Field, 1995).

Results

Demographics

Eight parents participated in the pilot study. All participants were female and were married. Seven were aged 30 to 39 years old, and one participant was 40 to 49 years old. Six participants were Caucasian/White and two were Asian American/Pacific Islander. Five identified as stay-at-home parents, and three were employed full time. Seven reported watching 3 hr or less of screen time each day and six identified being active at least 4 days/week.

Themes

Following thematic analysis, eight themes emerged that were agreed upon by the primary and secondary coder. Themes were specific to the app overall, the videos vignettes included on the app, and suggestions for improvement. Verbatim quotes were pulled that best support the identified themes and are included in the text.

App is easy to use. The majority of participants indicated that the app was easy to use and that their children would be able to use the app with minimal assistance.

It wasn't overwhelming to use with all these features and all these aspects. It was click on the little activity card and it went straight there. Very basic, which for me was a benefit because it got right to what I needed it to get to.

They identified the video icons being easy to navigate and something that the children watch again and again on their own. "You have it set up where they just have to tap the icon for the one [video] that they want." Participants noted that some of the educational materials targeted to adults would be beyond a 3- to 5-year-olds reading level. "They could use the videos without me, but I mean, my five year old isn't quite at this reading level. So this would be something that I would have to assist her with."

Improvements needed to overall presentation and videos. The majority of changes that were recommended involved overall formatting of the app. The curriculum provided for parents led to suggestions for icons on the main screen for children content and adult content. "The links that take you to stuff that's more geared

toward parents should be somewhere separate than what the kids are getting access to.” In addition, participants made suggestions with regard to the videos, including increasing the length and improving the video presentation. One participants said, “The videos themselves could be slightly longer.” Another noted,

I think I would have liked to see her face [instructor on video] a little bit more, like when you had them on the floor with the beach scene. Like pan into their faces when she is asking them questions.

One participant expressed concern about the filming format of the video. The videos were filmed with the children moving toward the camera so that a face-to-face demonstration could be provided; however, it was suggested that moving across the screen might deter children from moving toward the screen.

I think on the video where the kids are doing the jumping they move toward the camera so you can't see their movement. They should be moving across the video from left to right instead of toward the viewer. So if they are jumping like a bunny you can't really see that. Because they move close to you so all you see are their arms in bunny position, but you can't see their feet. So it's hard to mimic a movement that you can't visualize. And it will also make the kid jump toward the screen which you probably don't want. You want them to jump across the room.

Enjoyed children, activities, and instructor in video. Overall, participants highlighted the choice of the instructor and children who were used for the videos. “I think the colors are great and the little kids that you guys got are adorable. And they are different ages and sizes which is kind of nice to see.” “I like that there’s a girl in there [the video] too.” “The kids are really cute.” There were multiple comments pertaining to the effectiveness of the video instructor’s teaching skills and enthusiasm. “The instructor was very interesting, and exciting, and engaging.” “I like the energy of the girl. She’s very engaging to kids that age.” “The person speaking does a really good job of being interactive and entertaining.” Participants also valued incorporation of activities that tie to learning. “I like the activities

that she gives to combine exercise with learning.” “I think [the videos are] really attractive to kids.” “I liked the videos very much. I thought they were endearing.”

Provide printables. Several of the participants indicated that they wanted to use the activities outside of the electronic presentation and felt they would have greater opportunities to use them if they could print them. “Being able to easily print the activity cards would be great.” “Printables are always great, they’re always a benefit and they are always a big reason why we will continue to use a different app. If we continue the activity outside of it just being electronics.”

Adult encouragement needed to ensure video participation. Participants felt that while children could and would participate with the videos, parents/guardians needed to be involved with the app rather than simply having the children use the app by themselves. “They wouldn’t do it [participate] by themselves.” The participants discussed that activity could differ from child to child and felt if the parent/guardian encouraged physical activity with the app that would ensure the children would move along with the videos. “I think that a parent involvement would definitely need to happen.” However, a few parents indicated that the children would eventually engage in the physical activities being presented. “Maybe not at first because he would be watching it to see what happened, but then he would, especially the jumping one.” “I think they would watch it [first], then they would do it.”

More videos, push notifications, and challenges. Several comments centered on ensuring the app would be used by children and suggested motivational components such as challenges and rewards.

Maybe you could do a challenge, just off the top of my head.
“Can you do five?” “Can you jump like a frog 10 times?”
“Oh that’s great.” Something very coachy, you know those exercises coaches: “Can you do one more?”

All participants agreed the app needed to be updated frequently to be kept fresh. “Adding, like you know, every three weeks adding a video or a new activity card so it keeps the app new and refreshed and encourages people to come back to get more ideas for activities.”

Increase the visibility of the 5-2-1-0 message. Several participants wanted more information on the 5-2-1-0 message. Specifically, they wanted to know about the breakdown of each of the daily recommendations. “Is that like 5 fruits and vegetables a day and zero soda? I was trying to figure that out. Is that explained somewhere on there?” Suggestions were also made about providing information about the organization providing the app. “I think there could be more to the ‘about us’ screen.”

Add interactive games. A few parents suggested adding more interactive components to the app such as video games that could continue to hold the child’s attention. “Something interactive that they could play on there would probably be good.”

Discussion

In accordance with the identified themes, the research team met with app developers to make changes to the app based on the parent feedback in three key areas: video/activity cards, app presentation, and 5-2-1-0 information.

Video/Activity Card Availability

With respect to the suggestion of keeping the app fresh, the video allotment was limited to five videos with the corresponding activity cards. Ten activity cards were included with projections to add two additional videos and 10 additional cards every few weeks within the app updates. A Flickr account was created for activity cards to be accessed and printed. In addition, 5-2-1-0 color printables were developed and added to the Flickr account.

App Presentation

The icons on the main page of the app were changed to be more eye appealing, and the video icon was changed so that it included children playing, which increased the likelihood that children would click on the icon. The video icons were changed from colorful boxes to pictures that represented the activity, such as a rocket ship icon for the activity Blast Off (see Figure 1).

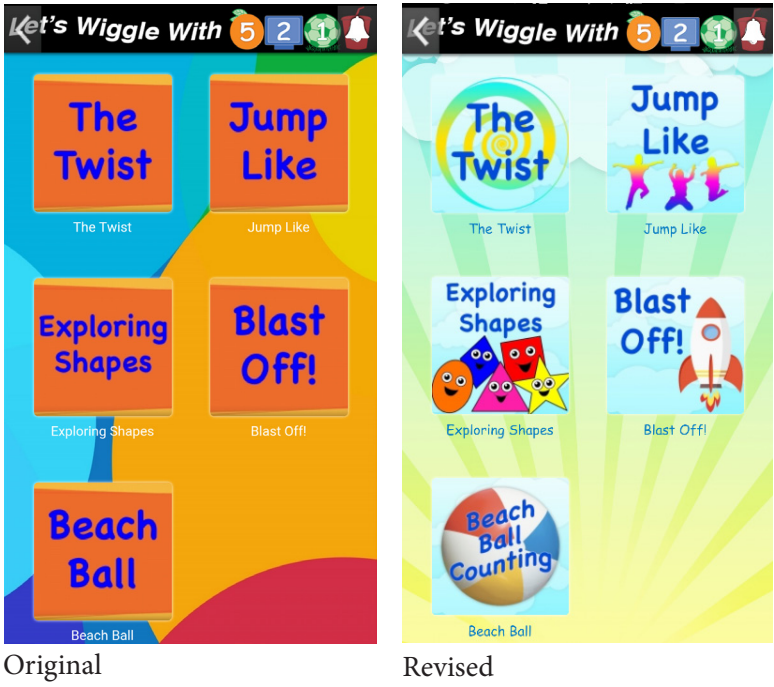


Figure 1. Original and revised formats for the video icons.

5-2-1-0 Information

Information regarding the 5-2-1-0 campaign was added with an informational poster that describes the program and the mission statement of the program. An icon for upcoming events was added so that information about local physical activity training opportunities in the community can be provided. A “Wiggle Media” icon was added to link the app to Flickr, Facebook, Twitter, Instagram, and the Let’s Wiggle With 5-2-1-0 website.

Conclusions, Limitations, and Future Research

The results from the interviews were overwhelmingly in favor of the app and participants positively reacted to the app. The app

was reported to be easy to follow and appealing. All participants felt that they would recommend the app to a friend, would participate in the videos with their children, and would use the app as an educational tool for ideas. The majority of recommendations focused on the presentation of the app, the visual appeal of the icons, and making changes that make the app easier for young children to navigate. Participants were mixed on the duration length of the videos, but all found the instructor on the videos to be highly captivating and engaging.

A major takeaway from the interviews for the research team was the app being used by parents as a resource for ideas. The initial goal was to create an app that allows children to participate along with a video with limited assistance. After the app was created and pilot tested, it became clear to the research team that the app would best be utilized as an educational tool for parents to promote home-based physical activity with their children.

This study had several limitations. Recruitment of this population was difficult given limited time available to meet with the research team. In addition, the majority of participants were stay-at-home parents and were highly active, and the sample was not diverse. Finally, the app development software purchased restricted the research team on formatting, video delivery, and updateability of the app.

Moving forward, additional videos and activity cards will be added. Push notifications will be sent out each week, which will encourage users to check in with the app, check for updates, and remain active. An informational card that promotes the app will be developed and distributed to childcare centers and parent community events. Future research is needed on the effectiveness of the app on influencing parent and child physical activity engagement.

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