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ORIGINAL RESEARCH

Preliminary Program Evaluation of *Pocket PE 3–5*™, A User-Friendly Digital Application for Teacher Skills Training and Physical Education Activities for Third- to Fifth-Grade Elementary Students

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Background: In the United States, many classroom teachers also teach physical education (PE). However, there is a dearth of evidence- and standard-based PE programs designed to support classroom teachers to deliver PE effectively in schools. ***Methods:*** The purpose of this study was to establish proof-of-concept for the *Pocket PE 3–5* digital app in school settings with 10 third- to fifth-grade classroom teachers. We assessed fidelity of program implementation, measured via observations of PE quality. Students used wrist-worn heart rate monitors during *Pocket PE 3–5* lessons to measure time spent in moderate to vigorous physical activity. Program feasibility was primarily assessed through teacher-reported surveys of usability, satisfaction, and acceptability and exit interviews. ***Results:*** Mean PE observation scores were 18.6 (SD = 1.5) on a scale of 5 to 20. On average, students spent 56.7% (SD = 13.1%) of class time engaging in moderate to vigorous physical activity. Mean survey scores, reported on a 5-point scale, were 4.5 (SD = 0.6) for acceptability, 4.8 (SD = 0.4) for usability, and 4.7 (SD = 0.7) for satisfaction. Teachers liked how easy the app was to use but mentioned some technological challenges. ***Conclusions:*** This program evaluation study established the proof-of-concept for the *Pocket PE 3–5* elementary school PE program.

Keywords: children, professional development, technology

Key Points

- The purpose of this study was to establish the proof-of-concept for the *Pocket PE 3–5* program.
- *Pocket PE 3–5* is a digital app that provides a simple, easy-to-use training program for classroom teachers to build and deliver standards-based PE lessons.
- Evaluation findings with classroom teachers support the proof-of-concept for the *Pocket PE 3–5* program.

Inadequate physical activity (PA) among children continues to be a major public health challenge, jeopardizing the healthy development of millions of American children every day.[1,2,3] For the majority of elementary school children across the nation, and particularly for low-income and minority children, schools are the primary environment providing them the opportunity for daily PA.[3] Data suggest that children receive insufficient physical education (PE) opportunities and/or low PE engagement,[3,4,5,6] which was exacerbated by the COVID-19 pandemic.[7,8,9,10] The benefits of regular PE participation among elementary school students are widespread, including improvements in physical and mental health and well-being.[11,12,13,14] In addition, student enjoyment during PE is associated with positive PA habits developed throughout childhood and maintained later in life.[15,16] While at least 40 states have laws mandating elementary school PE for students,[17,18] schools rarely achieve the nationally recommended 150 minutes of weekly PE instruction.[6,19,20,21] Factors at every level contribute to this shortfall, including the absence of state-level resources to ensure compliance with PE mandates, deficits in district-level budgeting and/or support to hire certified PE specialists to teach PE, and school-level barriers to effective PE implementation, such as lack of equipment, lack of facilities or access to facilities, and/or staffing limitations.[22,23,24]

Further, while it remains best practice to have certified PE specialists responsible for PE instruction, classroom (ie, generalist) teachers are increasingly assuming the instructional responsibilities of certified PE teachers with minimal training or supporting resources.[25,26] The most recent national data suggest that at least 68% of classroom teachers are permitted to teach PE.[15] Yet, the PE instructional landscape varies tremendously across states, districts, and schools. In some cases, classroom teachers may be responsible for all PE instruction without the guidance of a PE specialist or to teach in a hybrid model in which they share PE instructional responsibilities with certified PE specialists. While several existing programs are appropriate and available for PE specialists,[27,28] surprisingly few programs have targeted generalist classroom teachers to support delivery of effective PE.[28,29] PE is a field of education that provides developmental, structured, and systematic instruction to students on movement knowledge and skills in order to promote movement competency, personal health, and a propensity for life course PA. Unstructured "PA breaks"[30,31] commonly led by classroom teachers do not constitute PE, and ultimately, there is a growing need and demand for empirically developed, easy-to-use, programmatic resources for elementary school teachers to provide structured PE to their students that adheres to state or national PE standards.[32] To meet these requirements, the program must provide teacher

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training regarding how to teach students basic developmentally sequenced movement and equipment handling skills (ie, throwing, catching, jumping, and striking), how to meet PE standards, and how to effectively manage behavior for an active PE class.

Our formative work providing PE professional development to elementary school classroom teachers,[22] as well as work done by others,[4,5] indicates that teachers consistently experience PE instructional challenges due to inadequate facilities, planning and teaching time, equipment limitations, varied student skill levels, experience managing student engagement, and an overall lack of instructional knowledge and training in movement and activity skills for administering effective PE.[4] To mitigate teacher burden in delivering PE opportunities to students, innovative programming is needed that integrates teacher training with PE curriculum. This programming should appeal to teachers in simple, low-cost ways; be adaptable to student and teacher skill/knowledge level; and be practical for frequent use. Additionally, there are few resources that combine these characteristics while also targeting moderate to vigorous PA (MVPA) during PE, which is essential for facilitating PA health benefits among children.[33,34,35,36]

To address these needs, we developed the digital *Pocket PE 3–5* program application (app) prototype for third- to fifth-grade (ages 8–10 y) teachers and students (Figure 1). *Pocket PE 3–5* was developed using a participatory approach by conducting focus groups and user testing sessions with expert researchers, school administrators, PE specialists, and classroom teachers to ensure consumer needs and educational standards were met. *Pocket PE 3–5* provides a simple, easy-to-use training platform for classroom teachers aligned with the comprehensive school PA framework.[27,37,38,39,40,41,42] The program aims to promote the delivery of national standard-based (ie, Society of Health and Physical Educators America [SHAPE][32]) PE by classroom teachers by providing a curriculum targeting effective, inclusive, and evidence-based PE and supports the delivery of evidence-based SAAFE (Supportive, Active, Autonomous, Fair, Enjoyable) teaching principles to promote PE quality.[43] Each lesson includes activities developed by PE experts that target 1 to 2 grade-specific Society of Health and Physical Educators America national PE standards.[44] The primary format of activities included in the *Pocket PE 3–5* digital app prototype is rotating activity stations (ie, circuits) that students perform in small groups to promote variety, inclusivity, and development of key movement skills. Performing circuit-based lessons is an evidence-based strategy that promotes student MVPA, minimizes instructional time, and provides adjustable activity content to foster physical fitness and movement skill development.[37,38,39,40,41,42] *Pocket PE 3–5* works across common platforms and devices, both when online and offline, and provides simple, easy-to-use, standard-based PE lesson activities tailored by time, instructional setting (classroom and indoors/outdoors), grade, student skill level, and equipment resources. The app requires no in-person training commitment or expenses, and includes brief activity descriptions, and teacher skill demonstration videos for each activity, along with printable activity cards, music, and audio cues to signal transitions to assist teachers and students with classroom organization. A Bluetooth speaker is recommended to utilize the music and audio features. The program also includes lesson scheduling capabilities and embedded data tracking on PE minutes and completed national instructional standards to assist with school- and/or state-mandated reporting.

The purpose of this study was to evaluate the fidelity of program implementation and student MVPA during *Pocket PE 3–5* classes, as well as assess the usability, satisfaction, and acceptability of the *Pocket PE 3–5* digital app prototype in school settings.

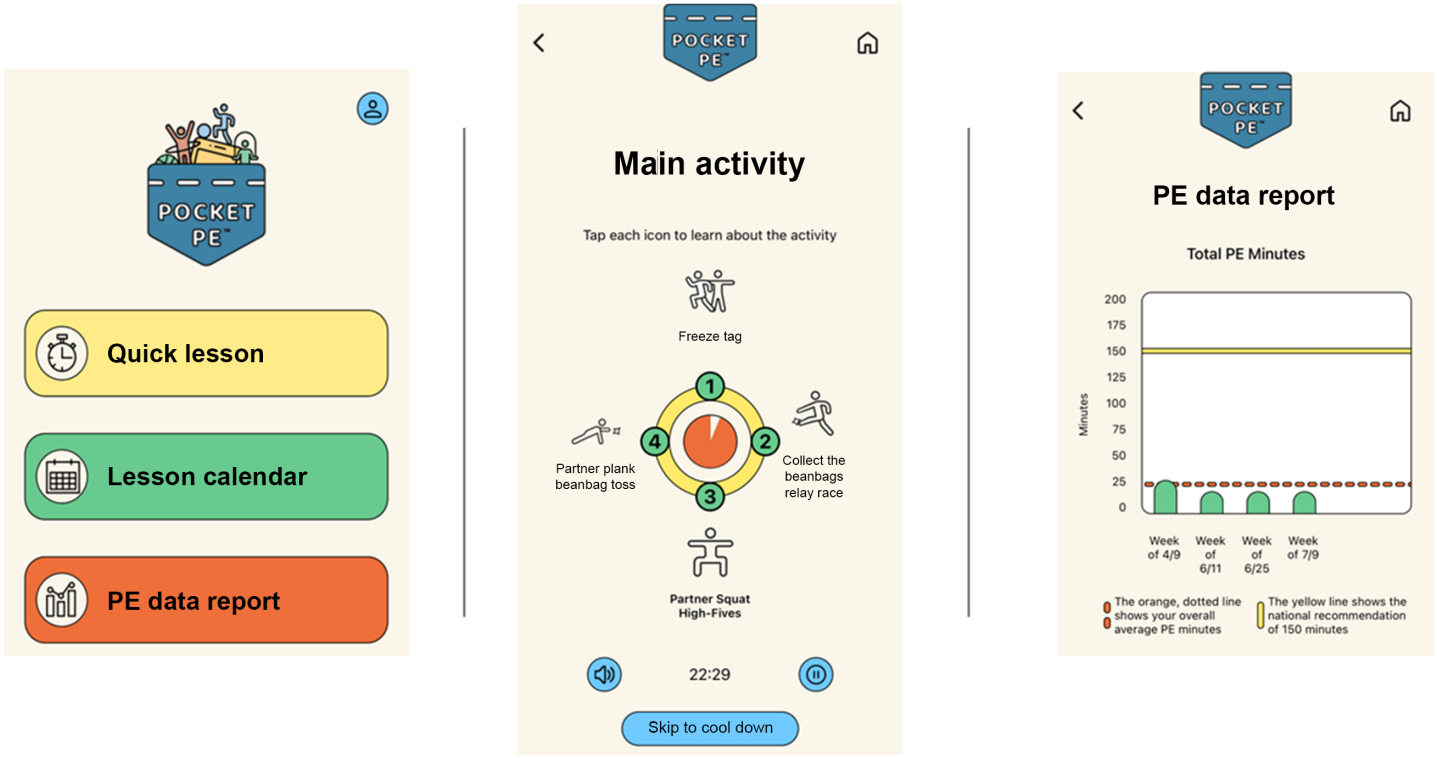

Figure 1 — Select screenshots from the *Pocket PE 3–5* digital application (app) prototype. The orange, dotted line shows your overall average PE minutes. The yellow line shows the national recommendation of 150 minutes. PE indicates physical education.

Methods

Study Design

Following development of the *Pocket PE 3–5* digital app prototype, we conducted a proof-of-concept evaluation of the program with 10 third- to fifth-grade teachers to assess fidelity as well as feasibility of the program. Participants were responsible for using the *Pocket PE 3–5* digital app during their weekly scheduled PE classes over a 3-week period. Researchers conducted in-person teacher observations of *Pocket PE 3–5* sessions to measure PE lesson quality and delivery of SAAFE teaching principles, and student MVPA engagement was measured (anonymously) via wrist-worn heart rate (HR) monitors. Students also completed brief, anonymous PE class satisfaction ratings after each *Pocket PE 3–5* lesson. Following the 3-week evaluation period, teachers completed a usability, satisfaction, and acceptability survey as well as a semistructured interview. To assist with adoption of *Pocket PE 3–5*, prior to the evaluation, participants received a short virtual training on app features and received access to a website with an additional app tutorial and best practice videos. This evaluation was deemed Human Subjects exempt through the study's Institutional Review Board (under Exemption Category 45 CFR 46.104 (d)1).

Participants

Ten third-, fourth-, or fifth-grade classroom teachers from 4 suburban and rural elementary schools who taught all or half of the required PE instruction to their students participated in the study. Informational flyers were posted at local schools or sent in online school newsletters and requested that teachers contact the study team if interested in participating. Demographic information for the teachers is provided in Table 1. Students remained anonymous, and no demographic information was collected from them.

Table 1 Teacher Demographic Information (N = 10)

	N (%) or mean (SD)	Range
Female	9 (90)	
Race/ethnicity		
Hispanic/Latina	1 (10)	
White	10 (100)	
Years working as a teacher	13.8 (9.8)	2–28 y
Grade taught		
Third	4 (40)	
Fourth	3 (30)	
Fifth	3 (30)	
Professional training in PE		
Continuing Ed in PE	2 (22.2)	
Workshops in PE	2 (22.2)	
Teach PE to your students		
Sometimes	5 (50)	
All the time	5 (50)	
Have an iPad/iPhone		
Yes	7 (70)	
No, would borrow one	3 (30)	

Abbreviation: PE, physical education.

Measures

Program Fidelity

Fidelity of the *Pocket PE 3–5* program, or the extent to which the program was delivered as intended within the context of *Pocket PE 3–5* program objectives (ie, promoting SAAFE teaching principles and student MVPA), was operationalized with 3 measures[45]: (1) quality of PE lessons delivered using the *Pocket PE 3–5* digital app, rated by trained observers; (2) objectively measured student PA duration and intensity achieved during *Pocket PE 3–5* lessons; and (3) *Pocket PE 3–5* digital app usage metrics collected within the app.

Teacher Observations. In-person observations of PE classes taught using *Pocket PE 3–5* were done using the validated SAAFE observation form for effective instructional PE delivery principles (Supplementary Material [available online]).[43,46] Raters were trained for the SAAFE measure using online public videos of elementary school PE classes until interrater reliability reached at least 80% agreement with other observers and the trainer for each item. Raters, including at least one research assistant and one or more undergraduate student interns, assessed teachers on 5 items on a 4-point scale (ie, 1 = strongly disagree to 4 = strongly agree), with a higher score indicating the presence of SAAFE teaching principles (eg, teacher was supportive and promoted positive student interactions), and ultimately higher PE quality. One to 3 observation sessions were conducted for each teacher throughout the evaluation period. For each observed *Pocket PE 3–5* lesson, an average SAAFE observation score was calculated across raters. Rating discrepancies of >2 points per SAAFE principle were re-evaluated and re-scored via consensus at weekly meetings of all observers. This rarely occurred.

Student Minutes of MVPA. The average amount of MVPA students achieved during *Pocket PE 3–5* lessons was assessed using wrist-worn HR monitors (Interactive Health Technologies).[47] Students wore the HR monitors during each observed *Pocket PE 3–5* lesson (1–3 lessons per teacher, 22 lessons total), and anonymous HR data were exported and averaged in 5-second intervals. The predetermined MVPA intensity threshold of ≥ 60% of participants' estimated age-predicted peak HR was used to calculate minutes of MVPA.[48] To account for small differences in wear time between classes, total minutes of MVPA per class were calculated as a percentage of total class time using researcher-recorded lesson start and stop times.

Program Engagement and Usage. The *Pocket PE 3–5* digital app functionality permitted the collection of app usage metric data. Activity log reports of how many times the PE lesson generator feature was used (ie, the number of lessons completed) by teachers during the evaluation period, the length of time used, the setting of use (eg, gym, outdoor hard surface, outdoor field, and classroom), and the number of times the lesson scheduler feature was used were calculated to measure program usage.

Program Feasibility

Feasibility of the *Pocket PE 3–5* program was measured using teacher-reported survey metrics of usability, satisfaction, and acceptability, as well as with themes derived from semistructured interviews conducted with each teacher. To supplement these measures, teachers had the option to answer 3 exit questions immediately after each *Pocket PE 3–5* lesson to further assess program feasibility. Last, students completed a brief, 5-item Likert survey, rating the acceptability of the *Pocket PE 3–5* lessons.

Teacher Usability, Satisfaction, and Acceptability. Following their 3-week *Pocket PE 3–5* evaluation period, teachers completed a survey assessing their perceived usability, satisfaction, and acceptability of the *Pocket PE 3–5* digital app. All questions were rated on a 5-point scale. We assessed *usability* of the *Pocket PE 3–5* program with 10 items adapted from the validated Systems Usability Scale, evaluating program enjoyment, organization, and ease of use, rated from 1 (strongly disagree) to 5 (strongly agree).[49] Half of the items were reverse scored to ensure a higher score indicated greater usability. We also created an additional usability subscale derived from the SAAFE teaching principles[43,46] that assessed teacher-perceived helpfulness of the *Pocket PE 3–5* program for addressing various aspects of PE lesson delivery, including introducing new movement and increasing active PE time. Last, we assessed the usefulness of *Pocket PE 3–5* app functionality in the survey, including the ability of users to select a variety of environmental inputs when generating a lesson such as available equipment and PE location. To operationalize *teacher satisfaction* of *Pocket PE 3–5*, we adapted previously established consumer satisfaction items to assess teacher satisfaction, teacher perceptions of student satisfaction, likability, and ease of use.[50] We assessed *teacher acceptability* with the 7-item Acceptability subscale of the Behavior Intervention Rating Scale, to measure perceptions of treatment acceptability of behavioral interventions.[51] Items assessed acceptability, appropriateness, liking of the program functionality, and overall perceived benefit of the program for student health. We also measured teacher acceptability with a subscale of the perceived effectiveness of *Pocket PE 3–5* for adhering to SAAFE teaching principles,[43,46] including encouraging students to exercise at a high intensity and minimizing instruction time.

Teacher Exit Interviews. A research assistant conducted 20- to 30-minute interviews with participating teachers at the conclusion of the evaluation using semistructured questions aimed at assessing the usability and functionality of the *Pocket PE 3–5* program.

PE Lesson Exit Questions. Three exit questions were built into the *Pocket PE 3–5* app, for users to answer immediately following each delivered lesson. All questions were scored on a simple 5-star rating scale. Question 1 was "How much did your students enjoy this lesson?" (1 = not at all; 5 = very), question 2 was "How easy was this lesson to deliver?" (1 = not easy; 5 = very easy), and question 3 was "How active were your students during the lesson?" (1 = not at all; 5 = very).

Student Acceptability Scores. Students participating in the observed teacher-led *Pocket PE 3–5* classes (N = 376) completed a short, 5-item Likert scale survey immediately following each PE class. Students rated the acceptability of the *Pocket PE 3–5* activities on a 5-point scale (1 = disagree a lot; 5 = agree a lot). Questions included: (1) I liked the activities we did during the fitness stations, (2) the fitness stations were fun, (3) the fitness stations helped me increase my PA levels during PE, (4) I felt good when I was doing the exercise stations, and (5) I would like to do the fitness stations again during PE in the future.

Statistical Analysis

Since this study focused on the formative creation of *Pocket PE 3–5* and a preliminary evaluation to assess program fidelity and usability, acceptability, and satisfaction, statistical tests were not applicable. Instead, we determined a priori benchmarks for program fidelity and feasibility and analyzed descriptive statistics for each measure. We also did a thematic analysis of teacher interviews about *Pocket PE 3–5.*

Program Fidelity Benchmarks

The first fidelity benchmark was an average PE quality observation score for each teacher ≥16 out of 20, indicating acceptable demonstration of evidence-based PE best practices and levels of adherence to delivering lesson content as planned. The second fidelity benchmark was that at least an average of 50% of PE lesson time was spent with students in MVPA across all teacher-observed lessons, the national recommendation for PE, and the goal of the program.[52] Descriptive statistics derived from the app activity logs for the total number of *Pocket PE 3–5* lessons delivered, the average lesson duration, and the location of delivered lessons were also analyzed.

Program Feasibility Benchmarks

This benchmark was a mean score of at least 4 on the 5-point ratings of teacher-reported usability, satisfaction, and acceptability. Means and distributions for each subscale item and overall scores for each subscale are reported. Alpha values for each subscale ranged from $\alpha = .77$ to $\alpha = .97$; thus, no survey items were excluded from analysis.

Teacher Exit Interviews

The qualitative data acquired from the semistructured interviews were audio recorded and transcribed. Transcriptions were analyzed using standard thematic coding procedures and compared across 2 investigators, with major themes reported.[53] We rank ordered coded themes on teacher responses to questions about what they liked most about the program, what were their greatest challenges with *Pocket PE 3–5*, what features of the program were most helpful, what barriers they experienced in using the program, and what teachers would suggest for changing *Pocket PE 3–5*. A student acceptability score was calculated as the average of the 5 survey questions scored on a 5-point scale (min = 1; max = 5).

Results

Program Fidelity

Teacher Observations

A total of 22 PE classes taught by 10 participating teachers using *Pocket PE 3–5* were observed by 1 to 4 observers. The mean score of the 22 observations was 18.6 (max possible score = 20), and scores ranged from 14.7 to 20.0. The average SAAFE observation ratings by teacher are displayed in Figure 2.

Student Minutes of MVPA

Of the 22 observed *Pocket PE 3–5* lessons, students spent an average of 56.7% (SD = 3.1%) of class time engaging in MVPA. The average percentage of class time spent by students in MVPA, by teacher, is displayed in Figure 3. By grade level, third-grade students spent an average of 54.9% (SD = 12.4%) of class time engaging in MVPA, with 50.9% (SD = 9.7%) for fourth-grade students and 65.4% (SD = 15.1%) for fifth-grade students. By location, students spent an average of 57.4% (SD = 9.6%) of class time engaged in MVPA during gym-based PE lessons and 46.9% (SD = 20.8%) during outdoor lessons.

Program Engagement and Usage

According to app usage metric data, a total of 41 *Pocket PE 3–5* lessons were delivered by 10 teachers over the evaluation period, totaling 14 hours and 13 minutes of instruction. An average of 1 to 2 lessons per week were delivered by each teacher. The average length of delivered gym- or outdoor-based *Pocket PE 3–5* lessons was 25 minutes and 12 seconds, and the average length of delivered classroom lessons was 7 minutes and 6 seconds. Of the 41 lessons delivered, 41% (n = 17) of PE lessons were conducted in a gymnasium, 27% (n = 11) in the classroom, 22% (n = 9) on an outdoor paved surface, and 10% (n = 4) in an outdoor field. The lesson scheduler feature was used on 9 occasions by 4 different teachers over the evaluation period.

Program Feasibility

Teacher Usability, Satisfaction, and Acceptability

A total of 9 out of 10 teachers completed a survey following the 3-week evaluation. Teacher usability and acceptability survey scores by item and subscales are displayed in Tables 2 and 3, respectively. Four survey items assessed teacher ("consumer") satisfaction, each on 5-point scales: (1) teacher overall satisfaction with *Pocket PE 3–5*, 1 = extremely dissatisfied to 5 = extremely satisfied (mean = 4.7, SD = 0.7); (2) teacher rating of student satisfaction, 1 = extremely dissatisfied to 5 = extremely satisfied (mean = 4.0, SD = 1.0); (3) likeliness of using the app if available, 1 = extremely unlikely to 5= extremely likely (mean = 4.6, SD = 1.0); and (4) ease of use of *Pocket PE 3–5*, 1 = extremely difficult to 5 = extremely easy (mean = 4.0, SD = 1.0).

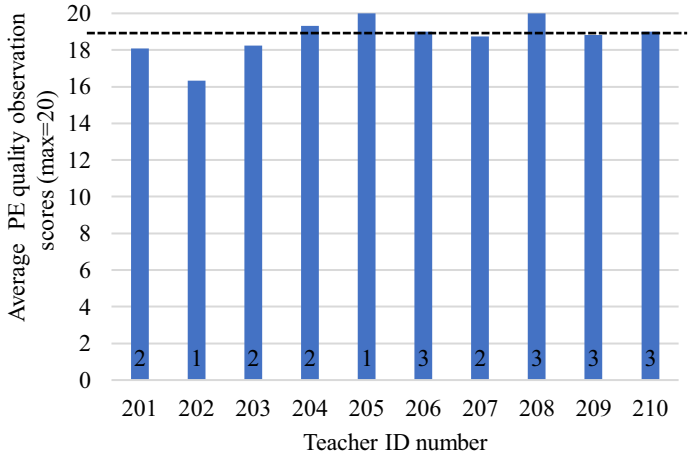

Figure 2 — Average PE quality observation scores by teacher (N = 10) as a measure of *Pocket PE 3–5* implementation fidelity. Number of observations for each teacher are displayed within the columns. The dashed line represents the average overall observation score among teachers. PE indicates physical education.

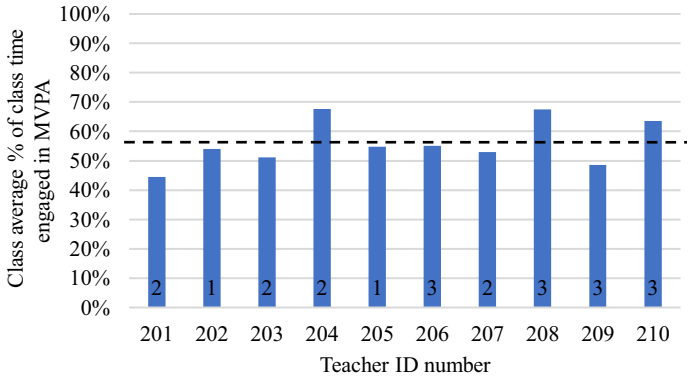

Figure 3 — Class average percent of time spent engaging in MVPA during *Pocket PE 3–5* lessons as a measure of program fidelity. Number of classes assessed for each teacher are displayed within the columns. The dashed line represents the overall class average of the percent of class time engaged in MVPA. MVPA indicates moderate to vigorous physical activity.

Teacher Exit Interviews

We conducted interviews with 9 of the 10 teachers, as 1 teacher only used the app for 1 week and felt they did not have enough experience with the program to be interviewed. Rank ordered coded themes for key interview questions are shown in Table 4. The aspect that teachers liked most was how easy the program was to use and that it minimized their PE teaching burden, with 1 teacher sharing "it is a really easy way to have a PE curriculum that's standard aligned instead of just looking at YouTube videos." Another teacher

Table 2 Means of the Teacher Usability Survey by Item and Subscale (N = 9)

	Mean (SD)	Range
SUS		
Would like to use app regularly	4.33 (1.00)	2–5
Pocket PE app too complex (R)	4.22 (0.97)	2–5
Pocket PE app easy to use	4.33 (0.71)	3–5
Would need tech support (R)	4.44 (0.73)	3–5
Various functions well integrated	4.11 (0.60)	3–5
Too much variability (R)	4.33 (0.71)	3–5
Most people would learn app quickly	4.56 (0.53)	4–5
App cumbersome to use (R)	4.22 (0.97)	2–5
Felt confident using the app	4.33 (0.87)	3–5
Needed to learn a lot before got going (R)	4.44 (0.53)	4–5
Total scale (α = .94) mean: (1 = strongly disagree to 5 = strongly agree)	4.33 (0.62)	3–5
Helpfulness of *Pocket PE 3–5* for:		
Planning PE classes	4.56 (0.73)	3–5
Managing student activity	4.11 (1.1)	2–5
Introducing new movement	4.56 (0.53)	4–5
Maintaining student interest	3.78 (0.83)	2–5
Increasing active PE time	4.44 (0.53)	4–5
Having fun in PE	4.00 (0.71)	3–5
Learning new teacher skills	4.11 (1.2)	2–5
Total scale (α = .87) mean: (1 = not at all helpful to 5 = extremely helpful)	4.22 (0.62)	3.14–5
Usefulness of *Pocket PE 3–5* for:		
Selecting amount of PE time	4.78 (0.44)	4–5
Selecting grade of class	4.57 (0.71)	3–5
Selecting available equipment	4.89 (0.33)	4–5
Selecting different locations	4.78 (0.44)	4–5
Total scale (α = .77) mean: (1 = not at all useful to 5 = extremely useful)	4.78 (0.38)	4–5

Abbreviations: PE, physical education; SUS, Systems Usability Scale. Note: R indicates item reverse-coded.

Table 3 Means of the Teacher Acceptability Survey by Item and Subscale (N = 9)

	Mean (SD)	Range
BIRS		
App would be acceptable for most teachers	4.67 (0.50)	4–5
Most teachers would find app appropriate	4.44 (0.73)	3–5
Would suggest use of app to other teachers	4.56 (0.73)	3–5
Would recommend to other schools	4.56 (0.73)	3–5
Pocket PE would be beneficial to students	4.56 (0.53)	3–5
Pocket PE would improve PA student levels	4.56 (0.53)	4–5
Like the functions in Pocket PE	4.33 (0.71)	3–5
Total scale ($\alpha = .97$) mean: (1 = strongly disagree to 5 = strongly agree)	4.52 (0.61)	3.29–5
Effectiveness of *Pocket PE 3–5* at:		
Starting PE quickly	4.22 (0.67)	3–5
Minimizing instruction time	3.78 (0.97)	2–5
Encouraging high-intensity exercise	4.33 (0.50)	4–5
Making lesson planning easier/faster	4.67 (0.71)	3–5
Making class setup, cleanup easier/faster	4.56 (0.73)	3–5
Providing diverse activities for students	3.67 (1.00)	2–5
Providing diverse movement skills	4.11 (0.93)	2–5
Improving student physical health	4.44 (0.53)	4–5
Total scale ($\alpha = .84$) mean: (1 = strongly disagree to 5 = strongly agree)	4.22 (0.53)	3.25–4.88

Abbreviations: BIRS, Behavior Intervention Rating Scale; PA, physical activity; PE, physical education.

described *Pocket PE 3–5* as "it's just magic PE basically. You don't have to think about it. You don't have to do anything."

We also asked teachers whether they felt student satisfaction surveys accurately represented student experiences with the *Pocket PE 3–5* program. Five of the 9 teachers indicated that student survey responses did reflect their experience, 2 teachers were neutral, and 2 teachers felt the student surveys did not reflect their experiences. For example, teachers of fifth-grade students thought negative ratings were more a reflection of age bias in not admitting to positive feelings. One teacher stated, "students are typically neutral or negative because it's cool ... but they were more engaged than I've seen them at PE this entire year [during *Pocket PE 3–5* lessons]. I would say they complained a lot about it, but they were more engaged than ever." This question also generated discussion by the teachers about the benefits of the program for their students. Teachers stated that *Pocket PE 3–5* provided students more active PE time that got them working harder, exposed students to different activities and skill building, and better engaged less-active students compared to their involvement in non-*Pocket PE 3–5*-facilitated PE classes. One teacher shared that with *Pocket PE 3–5* "they are getting a lot more quality physical activity."

All teachers indicated that *Pocket PE 3–5* resulted in better student behavior or class management compared with when they were not using the program. Two teachers felt they would need to have done the program longer to be confident of better class management via *Pocket PE 3–5,* especially in 1 classroom that reported issues with student behaviors. For example, a teacher shared the comment "if we had started [*Pocket PE 3–5*] at the beginning of the school year together, it very well could be a piece of the behavior management plan." Teachers said the *Pocket PE 3–5* music made it difficult for students to talk as much or get distracted during an activity, the rotational aspects and mini-groups of the program (ie, circuit-based lessons) kept students involved, that *Pocket PE 3–5* engaged typically uninvolved students more than usual, and that doing small groups gave teachers a method for keeping troubling peer relationships apart and made managing behavior easier for them. Also, the fast pace and changing activity helped eliminate conflict, the activities provided an alternative to games which can create class management issues for teachers, and there was generally less squabbling and arguing during *Pocket PE 3–5* classes.

Teachers identified some challenges to using the app during the exit interviews. For example, some teachers had difficulty following the visual/audio cues for transitioning between activities during circuit-based lessons, and others felt there was not adequate time for student demonstration built into the total lesson time. Teachers unanimously expressed that they would prefer a school device on which to run the app, even if that was not currently available to them. Those who used their iPhones during user testing, instead of the iPads made available by researchers, still felt the school should provide a device for using *Pocket PE 3–5*. Additionally, a few teachers who used their own iPhones reported problems in communicating with administrators while simultaneously operating the program in PE class.

PE Lesson Exit Questions

A total of 22 in-app *Pocket PE 3–5* lesson exit surveys were collected across the evaluation period, equating to 54% of total delivered lessons. On average, scores were 4.1 (SD = 0.9) out of 5 for teacher-perceived student enjoyment, 4.4 (SD = 0.8) out of 5 for ease of lesson delivery, and 4.2 (SD = 0.8) out of 5 for teacher-perceived student activity levels.

Student Acceptability Scores: A total of 376 student acceptability surveys were collected throughout the evaluation period. Average student acceptability of *Pocket PE 3–5* was 3.5 (SD = 1.3) out of 5.

Discussion

In a 3-week *Pocket PE 3–5* school-based evaluation, the *Pocket PE 3–5* program was implemented with high fidelity of evidence-based teaching practices, with teachers receiving an average observer rating score of 18.6 out of 20 and students engaging in MVPA for an average of 57% of class time. In addition, all project benchmarks on program usability, acceptability, user satisfaction, and consumer satisfaction were met (ie, all mean scores >4 on a 5-point scale). While designing and delivering effective PE programming to students are an integral component of school-based PA health promotion research,[54,55,56,57] few programs are designed specifically for generalist teachers who are responsible for delivering PE in schools, but who are not PE specialists.[15,27,28] The *Pocket PE 3–5* digital app program addresses the unique needs of classroom teachers with a digital, easy-to-use teacher training and standard-based PE lesson delivery solution that appears to be feasible and has fidelity of implementation based on this small evaluation.

Regarding fidelity, teachers were observed utilizing the *Pocket PE 3–5* app to effectively implement high-quality and evidence-based PE instructional practices, including having minimal

Table 4 Ranked Order of Coded Thematic Responses of Teachers to *Pocket PE 3–5* Interview Questions

Coded responses	# of responses
What did teachers like most about the program?	
How easy it is to use.	6
Quickness of it to plan ahead or on the fly.	4
Taking PE planning off their plate.	4
The included activities.	2
Class organization that includes warm-up, main activities, and cool down.	2
Videos which helped understand the activities.	2
Adapts for use in different settings.	1
Provided clear instructions on activities.	1
The option of "no equipment."	1
What were the greatest challenges with the program?	
Initially setting up Bluetooth speaker when the school's block rocker went out.	3
Following transition times on the app.	3
No built-in time to explain the stations or activities to students.	3
Kids liking the activities when they were used to playing games they liked.	2
The issue of school space for PE.	1
Problem with logging in after updating the app.	1
Program crashed.	1
The music was too repetitive and the kids didn't like it.	1
What features of the app were most helpful?	
Idea generation for PE for ease of lesson planning.	3
The shuffle feature to select an alternative activity.	3
The videos.	2
Audible directions for students to follow.	1
All the features were great.	1
Choosing the equipment for each day.	1
Classroom activity breaks	1
The cool down component to calm kids down.	1
Being able to plan ahead and store lessons on a calendar that can also be revised.	1
Minute selection.	1
What barriers did teachers experience in using the program?	
The inability to use an android phone/devise/something other than their phone.	4
Students adjusting to the program compared to their established routine (ie, games).	2
Problem in updating the app.	1
Setting up the class stations.	1
What are your suggestions for changing the program?	
Provide different music, vary for transitions/activities, make voice heard above music.	4
Balance upper and lower body activity and make exercises realistic in length.	2
Resolve issue of devices available for teacher to use for the app.	2
Ensure adequate variability off activities for stations to maintain student interest.	2
Ensure the timer visual aids to voice commands for transitions to new stations/activities.	2
Provide resource to show students activities and movement before class.	1
Support specialization of app by teachers (ie, identifying all equipment available for use).	1
Have the app say out loud what the activities are.	1
Make classroom-based lessons able to be long enough for a full PE class (ie, 40 min)	1
Add more activities.	1
Incorporate positive mediations in cool downs to support student well-being for day.	1
Make app provide a preview of next activity without interfering with the current one.	1
Adjust transition times for settings (gym/classroom/outside).	1
Provide a good Bluetooth speaker/rock blocker for indoor/outdoor use with chords.	1

Abbreviation: PE, physical education.

instructional time, promoting student engagement in MVPA and PE enjoyment, and providing opportunities for students to practice national PE standards by grade level (ie, throwing, catching, and jumping). Our observed fidelity scores are slightly greater than those reported in previous PE-based interventions.[46,47] A potential explanation for the high observed fidelity in this study is that the functionality of the *Pocket PE 3–5* digital app, including on-the-spot PE audible instructions and visual cues to manage classroom activity, allowed teachers to minimize instructional time and promote PA. As evident in the semistructured interview findings, the circuit-based activities provided a practical, foundational instructional approach for classroom teacher-led PE. Teachers noted that the circuit-based lessons kept students involved and engaged and gave teachers a method for keeping students with behavioral issues apart from each other via formation of the small groups.

Regarding feasibility of the *Pocket PE 3–5* app, in both surveys and interviews, teachers indicated that the *Pocket PE 3–5* program would be acceptable for most teachers and reported that they would suggest the use of the app to other teachers and schools. Teachers reported that the app is very easy to use, and appreciated how quickly they could either plan a lesson and schedule it for a later date or create a PE lesson "on the fly." Each *Pocket PE 3–5* activity is simple in design, requires minimal setup/cleanup, and is paired with a brief, 30-second to 1-minute "teach the teacher" video on how to set up and instruct the activity. These features were highlighted in the teacher interviews, as they noted that *Pocket PE 3–5* took the burden of planning PE lessons off their plate and provided instructions for each activity that were very clear and easy to follow. Teachers also perceived the *Pocket PE 3–5* app to be a helpful resource for planning PE activities, managing student activity, maintaining student interest, and learning new teacher skills. The *Pocket PE 3–5* app was seen by teachers as acceptable, usable, satisfactory, and feasible. *Pocket PE 3–5* provides lessons for a variety of instructional contexts, making it more applicable than programs that do not consider common space and equipment limitations, which likely contributes to these high usability and acceptability scores.

While the *Pocket PE 3–5* program was designed as a programmatic solution to meet the needs of teachers, it was also important to assess student's perceptions of the PE activities included within the program. Students rated their satisfaction with *Pocket PE 3–5* activities immediately after each *Pocket PE 3–5* lesson, with an average of 3.5 on a 5-point scale. Student satisfaction scores with *Pocket PE 3–5* are similar to those published in previous studies.[47] While teacher interviews indicated that student survey responses did not always reflect their true experiences with the program, there are likely strategies to promote student enjoyment in future *Pocket PE 3–5* studies. For example, the integration of games in addition to the circuit-based activities will provide more variety and could increase student enjoyment.[58]

For generalist classroom teachers who are responsible for teaching PE, there is a significant need for accessible and practical PE professional development and training on fundamental, age-appropriate child movement skill development, handling of manipulative equipment, and easy-to-implement evidence- and standard-based PE programming that also assists with classroom management. As existing programs developed for PE specialists do not address these needs,[59,60] a primary goal of the *Pocket PE 3–5* program was to incorporate these features to facilitate teacher-led high-quality PE for elementary students, as classroom teachers do not have the formal training, knowledge, and expertise of PE specialists. *Pocket PE 3–5* was uniquely designed to integrate teacher training with PE curriculum with audio cues and visual supports, and appealed to teachers as a simple, practical, easy-to-use program that is amenable to the various barriers and constraints teachers have reported in delivering PE to their students.[3,4,5]

While findings from this preliminary evaluation of *Pocket PE 3–5* were positive, teachers highlighted some challenges with program use and suggested changes for future program development. Teacher challenges included difficulty following the visual/audio cues for transitioning between activities during circuit-based lessons, the minimal time or resources (ie, screen sharing to a larger monitor) provided to explain class activities and movements to students, and that some students were resistant to circuit-based activities because they were used to playing games in PE. Given this feedback, we intend to incorporate additional games into future *Pocket PE 3–5* lessons, to increase student satisfaction. Further, app programming enhancements can be made to provide additional time for teachers to share instructional videos with students in their classrooms prior to beginning activities, and to incorporate additional timer and lesson preview visuals during PE sessions to help teachers more easily follow lesson transitions. Technology was another barrier, as during this prototype phase, the app was not available on school devices, so participating teachers used either their personal iPhones or a loaned iPad. Using the app on a personal phone was particularly problematic at 1 school as teacher phones were also used to communicate with administrators regarding student needs (eg, appointments). Some teachers also did not have an available Bluetooth speaker to use for the program. These findings highlight the importance in responding to end user needs of teachers for technology platforms that are diverse, flexible, and cost-effective in developing a full-featured version of *Pocket PE 3–5* for broad-scale dissemination in schools.

Strengths and Limitations

Pocket PE 3–5 has the potential to significantly increase participation in standard-based PE for teachers and students in elementary schools. This comprehensive, evidence-based, cost-effective, and easy-to-use approach could provide a foundational resource to implement comprehensive school PA to promote more effective and rigorous school-based PA.[2,3,13] We successfully met our fidelity and usability, satisfaction, and acceptability benchmarks, supporting the viability of this digital program. While this preliminary program evaluation study established the proof-of-concept for the *Pocket PE 3–5* digital app in a small sample of teachers, it did not speak to efficacy. After *Pocket PE 3–5* is developed beyond the prototype phase, incorporating findings from the current study, a school-based randomized control trial should be conducted to evaluate efficacy.

Conclusions

Overall, teachers were enthusiastic about the *Pocket PE 3–5* app, and the program was feasible and implemented with fidelity. These preliminary findings support further development of the program. As schools are increasingly relying on classroom teachers to meet state PE mandates, the scalability of the evidence-based *Pocket PE 3–5* app as a commercially available product will support PE goals.

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