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eCPAT: Development and Testing of Mobile Technology to Engage Youth in Active Living Policy, Systems, and Environmental Health Promotion Efforts

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eCPAT: DEVELOPMENT AND TESTING OF MOBILE TECHNOLOGY TO ENGAGE YOUTH IN ACTIVE LIVING POLICY, SYSTEMS, AND ENVIRONMENTAL HEALTH PROMOTION EFFORTS

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DEDICATION

To my husband Robert and my son Gavin, for believing in my and allowing me to follow my dreams. To my parents Mike and Karen, for their unconditional love and support.

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ABSTRACT

Modifying the built environment is a promising way to promote youth physical activity and reduce obesity. Parks, in particular, are key intervention venues given their low cost and legislated ubiquity. Creating healthy communities, including better parks, will require the interest and participation of multiple constituencies, including youth. Creation of mobile technology environmental audit tools can provide a more interactive way for youth to engage with communities and facilitate participation in participatory action research (PAR) and health promotion efforts.

The purpose of the first study was to describe the development and validity and reliability testing of an electronic version of the Community Park Audit Tool (eCPAT). The newly developed eCPAT app consisted of 149 items and incorporated a variety of technology benefits. Criterion-related validity and inter-rater reliability were evaluated using data from 52 youth across 47 parks in Greenville County, SC. A large portion of items (>70%) demonstrated moderate to perfect or fair validity and reliability. Many items demonstrated excellent percent agreement. The eCPAT app is a user-friendly tool that provides a comprehensive assessment of park environments.

The purpose of the second study was to explore the use of eCPAT mobile technology on youth empowerment and advocacy within a PAR framework and examined tool usability, effectiveness on youth empowerment and advocacy, interaction effects between tool format and regular technology use, and tool format preferences. A total of 124 youth were randomized into one of three study conditions (Control, Paper,

eCPAT). Intervention youth completed two park audits using paper-pencil or mobile technology tools. Youth completed pre and post surveys that measured tool usability and preferences, technology, empowerment, advocacy, and youth demographics. Youth indicated that the eCPAT tool had higher usability scores, was better liked, and was preferred over paper-pencil methods. No main or interaction effects were found for post levels of youth empowerment or advocacy between study conditions. Mobile technology should be viewed as a potential strategy for increasing youth empowerment and advocacy within PAR frameworks given its ubiquity, usability, and preference among youth. Future dissemination will integrate the eCPAT as a critical component of youth-led action oriented PAR projects to improve community health.

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List of Abbreviations

BMI ..... Body Mass Index

CPAT ..... Community Park Audit Tool

eCPAT.....electronic Community Park Audit Tool

HYPE .....Healthy Young People Empowerment

GIS ..... Geographic Information Systems

PA .....Physical Activity

PAR..... Participatory Action Research

PSE..... Policy Systems and Environment

CHAPTER 1: INTRODUCTION

1.1 Overview of Public Health Issue

Childhood obesity and physical inactivity have increased dramatically in recent years, with dire implications for the physical, emotional, and financial costs of a wide range of chronic diseases.[1] Modifying the built environment of neighborhoods and communities is recognized as one of the most promising solutions to these population-level crises.[2,3] In particular, parks are key venues for youth physical activity (PA), especially in low-income communities, given their low cost and legislated ubiquity.[4,5] However, parks often differ considerably with respect to their features and quality and therefore the degree to which they are inviting venues for PA and for building strong, healthy communities.[6,7] Indeed, improvements to parks, playgrounds, and other community resources can promote increased PA and other health outcomes among children and adults.[8,9]

Creating healthy communities, including better parks, will require the interest and participation of multiple constituencies.[10] For several reasons, youth can and should be an integral part of this change process. For example, youth voices can be especially powerful in influencing the priorities and decisions of policymakers[11,12] and engaging youth in advocacy and community change efforts has critical implications for the development of the youth themselves and for the future of our public leadership.[11-13]

Indeed, youth advocacy for obesity prevention has been called the next wave of social change for health.[14] However, youth are frequently under-represented in community policy, systems, and environmental (PSE) change efforts[11] and youth feel that adult community members don't see them as a legitimate voice.[12] Environmental justice principles argue that not only should youth have equitable access to health-promoting resources, they should be able to be part of the process that brings about such changes.[15,16]

While promising, advocacy for PSE change is an understudied and under evaluated approach.[17] The process of improving neighborhoods and parks will take time, but preparing today's youth to be the future leaders of healthy communities is a crucial first step.[12] Accomplishing this will require finding ways to involve youth in PSE change efforts in ways that are appealing and engaging to them.[12,14] One innovative technique involves youth using established audit tools to evaluate the health-promoting potential of community environments and then to work with this data to develop, implement, and evaluate a PSE action plan. However, initial experiences conducting park and neighborhood audit workshops with youth suggest that technology-based methods would be considerably more engaging than current paper-and-pencil tools.[18] Indeed, substantial research has shown that youth are frequently the earlier adopters of new technologies and that such technologies provide a more interactive and hands-on way for youth to engage with their local communities, thereby appealing to youth who might not normally take a leadership role in health promotion efforts.[19-22]

1.2 Preliminary Studies

The present study builds on two previous projects: the development of the Community Park Audit Tool[23] (CPAT; a park audit tool developed with community stakeholders to assess the potential of parks to promote physical activity; Appendix A), and the Healthy Young People Empowerment (HYPE) Project (a curriculum developed to enhance the capacity of adolescents to plan and implement PSE change projects).[18] The CPAT development project engaged 34 community stakeholders from diverse backgrounds (parks and recreation, health care, planning, education, private business, parents, teenagers, etc.) in a year-long study involving three workshops and testing of the CPAT in 66 parks across Kansas City, MO.[23] The resulting tool was six pages long, included four sections (park information, access and surrounding neighborhood, park activity areas, and park quality), and demonstrated strong inter-rater reliability. As described by participants, this process resulted in a variety of important secondary outcomes related to community building, awareness, advocacy, and substantially improved perceptions of the importance of parks for community health.[23]

The HYPE Project was developed to enhance the capacity of adolescents (12-17, especially from low income and minority backgrounds) to plan and implement PSE change projects centered around community healthy eating/active living needs.[18] HYPE was guided by the MATCH model of health promotion as well as empowerment/positive youth development theories within a social ecological framework.[14,24,25] The HYPE Project consists of facilitator-led, 60-minute sessions through five progressive stages (Think, Learn, Act, Share, Evaluate) and culminates in a youth-led community PSE change project.[18] As of today, the HYPE Project has been implemented with 258 youth

within 21 youth groups across 15 counties in South Carolina. Of these, several groups have utilized the CPAT tool as part of their action planning. Preliminary results of the HYPE Project indicate youth saw increases in community awareness, empowerment for, and engagement in youth-led action planning for healthy eating/active living.[18] Youth qualitative feedback indicated the CPAT was helpful in collecting and using important environmental data in their PSE change efforts. However they felt that mobile technology would be an easier and considerably more engaging format to collect park data than the current paper-and-pencil tool. Therefore, to further advance this research and practice agenda, developing and testing the viability of an electronic version of the community park audit tool (eCPAT) among youth is an important next step.

1.3 Specific Aims

This project is part of a broader research agenda to engage youth in becoming advocates for healthy community design. The CPAT is an essential data collection tool that can be utilized to engage and empower youth in healthy community change efforts; however preliminary studies indicate that mobile technology formats could be more appealing to youth. Accomplishment of the aims in this proposal represents an important next step in ongoing research about the role of technology in youth empowerment for and engagement in health promotion efforts. Upon completion of this project, the outcomes achieved will include 1) development of a youth-oriented eCPAT application, 2) reliability and validity tests of the eCPAT app with youth, and 3) collection of valuable preliminary data about the impacts of youth engaging in community resource audits using emerging technologies. Given the proliferation of smartphones and other electronic devices among both adolescents and adults,[26] the eCPAT app also has potential to be

distributed and used widely by the general public. Indeed, several progressive park agencies (e.g., Greenville, Kansas City) have shown an interest in developing a system whereby users could conduct park audits and upload data in real time for others to access and benefit from. An eCPAT app would significantly increase the value parks add to the realization of healthier and more just communities. Future dissemination of this research will integrate the eCPAT as a critical component of the Healthy Young People Empowerment (HYPE) Project[18] a broader youth-led, community-based participatory research project to improve youth and community health.

Aim 1: To develop and examine the reliability and validity of an electronic version of the Community Park Audit Tool for use by youth on mobile devices.

Hypothesis A1a: We expect moderate to high inter-rater reliability for eCPAT items when comparing youth audits for the same park environments.

Hypothesis A1b: We expect moderate to high validity for eCPAT items when compared to a trained researcher.

Aim 2: To test the effectiveness of eCPAT mobile technology on indicators of youth empowerment and advocacy for healthy community policy, systems, and environmental change efforts.

Hypothesis A2a: We expect that youth who completed the project using the eCPAT app will report high levels of tool usability, compared to youth who complete the project using the CPAT tool.

Hypothesis A2b: We expect that youth who complete the project using the eCPAT app will report greater levels of empowerment and advocacy as compared

to youth who completed the project using the CPAT tool or compared to control youth.

Hypothesis A2c: We predict that post levels of empowerment and advocacy for eCPAT users will be moderated by lower baseline levels of access to and usage of technology.

Hypothesis A2d: We predict that youth who completed the project using both the eCPAT app and the CPAT tool will prefer using the eCPAT over the CPAT tool for future advocacy efforts.

CHAPTER 2: BACKGROUND

2.1 Statement of the Problem

Childhood obesity is a significant public health issue with rates having doubled in children and quadrupled in adolescents over the past three decades. In 2011-2012, 17% or approximately 12.7 million American youth ages 2-19 years were obese, with obesity rates highest (20.5%) in 12 to 19 year olds.[27] Obesity is especially prominent in South Carolina where approximately 28% of children 2-5 years old and almost 1 in 3 high school students are overweight or obese.[27,28] This is particularly disconcerting because children who are overweight are 70% more likely to be overweight or obese as adults[29] and childhood obesity is significantly associated with increased risk for numerous health concerns such as high blood pressure, diabetes, high cholesterol, heart disease, depression, and premature mortality.[30,31]

Being physically active can significantly reduce the risk of childhood obesity and obesity-related chronic diseases.[32,33] However, youth physical activity (PA) participation declines with age[34,35] with only 27% of U.S. students in grades 9-12 achieving recommended levels in 2013.[36] Moreover, research indicates that girls are less physically active than boys[37] and show a more substantial decline in PA in early adolescence.[38]

Due to the substantial increase in childhood obesity rates and the decline in participation in PA over the past few decades, research paradigms have refocused from narrow individual or biological-based concepts to a more broad approach, encompassing

both social and environmental factors related to obesity and PA.[39] Indeed, many neighborhood environmental variables can affect PA.[40] This is especially apparent in children due to increased susceptibility to environmental mobility barriers and consistent concerns regarding parental and youth perceptions of safety, proximity, and access.[41] Neighborhood environmental factors thought to influence childhood PA and/or obesity levels include socioeconomic deprivation, inadequate housing, safety concerns, lack of street lights or sidewalks, land use diversity, street connectivity, residential density, and access to parks, playgrounds, and recreational facilities, to name a few.[39,42-45]

Developing neighborhood and community PSE improvements that support PA, including the creation or enhancement of parks and recreation resources, is a promising solution to the childhood obesity crisis.[2,3] However, creating healthy community PSE change requires a transdisciplinary approach, involving participation from multiple parties including community members.[10] Youth in particular, should be recognized as competent citizens and community builders that can contribute to municipal PSE change efforts because it draws upon their perspectives and improves municipal decision processes.[11,12] Further, engaging and empowering youth in healthy PSE change efforts contributes to positive youth development and prepares them for roles as active citizens and future public health leaders.[11-13] Indeed, some researchers have suggested that youth empowerment and advocacy for healthy communities should be considered a critical social health movement.[14] The use of innovative technology within a participatory action research (PAR) framework is a promising method to engage and empower youth participation in building healthy communities.[19] However, while promising, advocacy for PSE change is an understudied and under-evaluated approach[17] Further, a gap remains

between the development of youth-oriented technology tools and the inclusion of such tools within youth PAR frameworks.[46] The process of improving communities to promote PA will take time, but developing adequate technology tools and preparing today's youth to be the future leaders of healthy communities is a crucial first step.[12,46]

3b. Environmental Correlates of Physical Activity

One promising approach to reducing population-levels of childhood obesity is through modifying the environments we live in. According to ecological approaches to active living, multiple social and physical environmental variables influence our decisions to participate in PA.[10] Although individual behavior modification is widely studied, there is limited explanatory power of individual approaches to increasing PA.[47] Built environment research is a fairly new field of study, but has the potential to generate broader, more permanent effects.[48] Therefore, PA research paradigms have recently refocused from individual attributes and behavioral-based interventions to a broad ecological approach encompassing both social and environmental factors.[39]

A variety of neighborhood environmental variables are associated with childhood PA and hence obesity rates among youth.[42,49] In a study of neighborhood socioeconomic and built environment variables, Singh and colleagues[45] examined data from the 2007 National Survey for Children's Health for 91,642 children aged birth to seventeen years. They looked at the combinations of both social and physical environmental factors with childhood obesity rates and reported that children in neighborhoods lacking access to sidewalks, parks, playgrounds, and recreation centers were at 20-45% increased risk of overweight and obesity than children with such access. Furthermore, they found that these effects were greater for females and young children. Another study of 98 White or

Mexican-American adolescents, median age 16.2 years, evaluated neighborhood walkability characteristics within a half mile radius and found a positive association with minutes of moderate to vigorous PA.[50] However, this particular study did not find an association between environmental variables and body mass index, nor were specific recreation variables related to amount of PA. Different results were found by Roemmich et al.[44] who examined access to parks and recreational facilities and youth PA in 59 children aged four to seven years. In comparing objective accelerometer data from three weekdays and one weekend day with GIS measurements of neighborhood environmental variables, they found that both greater neighborhood park area and increased residential housing density were associated with increased child PA levels. Overall, a multitude of studies acknowledge that built environment factors (e.g., urban sprawl, land use, public resources) can play an influential role in youth PA and should be the focus of health promotion efforts and interventions.[51-53]

2.2 Parks and Youth Physical Activity

Within social ecological PA research and promotion, parks in particular have been viewed as potential built environment settings for PA that can have a positive impact on PA and reduction of obesity[4] due to their relatively low cost to maintain and use and their ability to reach a large number of youth.[54] Sallis and Glanz[48] concluded that to reduce or prevent childhood obesity, children need access to places where they can be physically active. Research indicates that the most important places are outdoors in neighborhoods, public parks, and commercial facilities.[48] Indeed, a review of physical environment literature concluded that multiple studies demonstrated a positive association between children's PA and public recreational infrastructure, including school yards, playgrounds,

and open space parks.[42] Another study found that having a recreational or open space within 1 km of home was the strongest variable across age groups related to increased walking amongst youth.[55] Epstein et al.[5] examined substituting PA behavior for sedentary behavior (screen time) and found that greater access to parks was associated with increased PA when screen time was limited.

A variety of park variables, including proximity, access, features, condition, and safety, have been shown to be associated with youth PA participation. For example, with respect to proximity, in a comprehensive examination of 191 youth and 146 parks in Kansas City, Besenyi and colleagues[56] found that youth who had a park within one mile of their home were more two and a half times more likely to achieve a greater amount of PA than those without a park. As well, youth who had three or more parks within one mile of their home were almost five times more likely to engage in a greater amount of PA.[56] Likewise, one study found that a greater proportion of park area within a half mile of a youth's residence was associated with increased levels of child PA,[44] while another study found that park area was positively related to children's park usage.[57]

Perceptions of park accessibility appear to be just as important for influencing youth PA. For example, Timperio and colleagues[58] concluded that perceptions regarding existence of nearby parks were associated with increased youth PA. Scott et al.[59] also found that perceived ease of access to recreational facilities (e.g., playing fields, tennis courts, etc) was positively correlated with increased PA among adolescent girls. Another study of adolescent girls found that a greater number of nearby parks was associated with increased levels of PA.[60] However, in contrast, qualitative studies of places that children play found that parents were willing to drive to parks farther away if they had appealing

qualities or features.[61,62] Park access also may be associated with youth park-based PA, possibly due to mobility barriers that children face. For example, parents may have concerns in letting their child access a park if it is too far from home or if they have to cross a busy intersection to get there.[62] Overall, research indicates that both proximity and access to parks augment nearby youth PA.

Research also shows that specific park characteristics such as facilities and amenities are associated with youth PA. Besenyi and colleagues[56] found that youth who had a park offering a playground within ½ mile were two and a half times more likely to engage in a greater amount of moderate-to-vigorous PA than those without a playground, while youth who had a park with a baseball field within 1 mile were almost 3 times as likely to engage in a greater amount of moderate-to-vigorous PA. They also found that having a park with particular amenities within 1 mile from home (i.e., transit stops, traffic signals, picnic tables, grills, trash cans, shade, and roads through the park) was associated with higher odds of achieving a greater amount of PA. Similarly, Potwarka, Kaczynski, & Flack[63] found that children with a playground within 1 km of their home were significantly more likely to be a healthier weight status, while Cohen et al.[64] concluded that adolescent girls were more likely to participate in moderate to vigorous PA if they lived near parks with amenities that encourage walking. Another study found that active recreation facilities, sports programs, presence of natural features, and good maintenance and cleanliness were the most important factors attracting children to parks.[57]

Park quality and safety are also important park characteristics that can influence PA. For example, one study of over 893 households in Kansas City explored perceptions of neighborhood park quality and found significant relationships between park quality

scores and overall moderate to vigorous PA, park-based PA, and body mass index (BMI).[65] Additionally, both parent and child safety concerns present a barrier to youth PA. Another study found that amongst urban youth, perceptions of park quality, and utilization by friends were significant determinants for park-based PA.[66] In relation to PA and safety, one study of Mexican-American girls found that violent crime in the neighborhood could be a significant barrier to outdoor PA,[50] while another found that having access to a safe park was positively correlated with regular PA among adolescents in urban areas.[67] A more recent study by Slater et al.[68] explored the relationship between neighborhood built environments and adolescent PA and found that lower levels of neighborhood safety were associated with decreased PA, higher prevalence of obesity, and higher BMI.

Another significant issue impacting utilization of parks may be demographic and socioeconomic inequalities in access to environmental resources that facilitate PA. Specifically, disparities in availability and access to parks and recreation areas have been recognized as an important research endeavor.[69] Indeed, several studies have concluded that areas with higher minority and/or low income populations generally have fewer parks and recreation spaces, are less likely to have PA promoting features, and those that are present are generally of poorer quality.[70-72] For example, an analysis of parks across 174 census tracks in Kansas City found that lower income areas had significantly fewer parks with playgrounds or aesthetic features while high minority areas had fewer parks with trails.[73] Likewise, several other studies have examined disadvantaged neighborhood environments and park accessibility and have reported similar trends.[6,74] Beyond inequalities in park availability and access, research indicates disparities in the

neighborhoods surrounding parks. For example, one study explored the neighborhoods around 165 urban parks and found that parks in low or medium income areas were more likely to be surrounded by neighborhoods with higher densities of incivilities (e.g. graffiti, litter, vandalism).[75] Further, this study found that parks in high minority areas were more likely to have high densities of unhealthy neighborhood establishments such as fast food restaurants, bars, and tobacco outlets.

Overall, a growing body of evidence suggests that a variety of neighborhood and park variables, especially the availability and condition of features within parks (e.g., playgrounds, trails, lighting, landscaping) are strongly related to their use for physical activity, especially among youth.[56,57] Therefore, detailed measurement of park and neighborhood environments, best conducted through on-site, observational audits, is an important first step in creating sustainable PSE changes that will improve these vital neighborhood resources and impact population levels of PA. [46]

2.3 Community Advocacy and Action for Parks

Modifying or improving parks, playground, and other community resources can promote increased PA and other health outcomes among both children and adults.[2,3] For instance, one study conducted a natural experiment exploring the effects of environmental renovations in an intervention park compared with a control park and found that after park improvements, the intervention park saw significant increases in the number of park users, people observed walking, and people observed being vigorously active.[76] Similarly, another study of renovated and control parks in San Francisco found that intervention park playfields saw an average of a fourfold increase in visitation as well as significant increases in sedentary, moderate, and vigorously activity.[9]

Accomplishing healthy community PSE change within and around parks will require the interest and participation of multiple constituencies.[10] Indeed, parks and recreation researchers agree that there is a need for ongoing community engagement in advocacy efforts for parks and recreation resources.[77,78] Participatory action research (PAR) is a common approach among social science and public health researchers that emphasizes community participation through collective inquiry, data collection, and action to address community-based issues.[79,80] Vital to the achievement of successful PAR are the concepts of community engagement, participation, and most importantly empowerment.[79] Derose and colleagues[78] concluded that engaging citizens was crucial to successfully making healthy community park changes. In their randomized control trial using community-based participatory research to increase park use and PA across 33 diverse neighborhoods in Los Angeles, they found that working with community stakeholders allowed them to tailor park interventions and improve impact, while enhancing the capacity of local community members to address community health improved project sustainability.[78]

While promising, engaging and empowering citizens to advocate for healthy environments is an understudied and under-evaluated approach.[17] The key to effectively empowering citizens in PAR often hinges on having informed citizens.[77] However, in the their discussion of engaging community members in environmental stewardship Shandas and Messer[81] found that citizens often do not have the knowledge or preparation to make meaningful contributions. They suggested encouraging ownership by involving citizens early in the process and noted that engaged and educated community members are more likely to be successful in improving their environment.

One method of simultaneously improving citizen knowledge and engagement in healthy community PSE change is through the use of environmental audit tools. Environmental audit tools involve systematically observing the physical setting of the community including the presence and quality of features thought to affect PA.[82] Over the past decade, researchers have increasingly sought to develop user-friendly environmental audit tools as a way to engage community members in collecting data that will be used to better understand environmental PA needs and aid local decision making processes. For example, Hoehner and colleagues[83] developed and tested the Active Neighborhood Checklist, a user-friendly tool designed to assess neighborhood environmental support for PA, and found that with minimal training, community stakeholders could reliably collect neighborhood information. Similarly, the Physical Activity Resource Assessment (PARA)[84] was developed as a brief, one-page instrument to capture publicly available PA resources in urban areas. However, when using the PARA to explore child PA resources and conduct intervention planning, DeBate and colleagues[85] found that supplementing PARA data with community-based input helped to reduce contextual error in program development.

Specific to parks and recreation resources, the Community Park Audit Tool (CPAT) was designed to aid citizens and community groups in planning and advocating for parks that promote PA, prevent childhood obesity, and contribute to overall healthy community design.[23] The CPAT was developed as a user-friendly tool that enables diverse community stakeholders to quickly and reliably audit community parks for their potential to promote PA, especially among youth. The CPAT contains four sections: park information, access and surrounding neighborhood, park activity areas, and park quality

and safety. It provides in-depth information regarding the presence/absence of 14 park facilities and 25 amenities as well as park quality and safety characteristics. It has demonstrated strong content validity and inter-rater reliability, with percent agreement for the vast majority of the items in the tool between 80%-90%. However, to date it has primarily been tested and used among adults[23] (see appendices A and B for the CPAT tool and more information about its development and psychometric properties).

2.4 Youth Empowerment through Participatory Action Research

Youth voices, in particular, have been shown to be especially powerful in influencing the priorities and decisions of policymakers related to healthy environments.[11,12] For example, in one prominent study, youth engaged in several activities to advocate for tobacco-free schools (e.g., testifying at board meetings, petitioning other youth) and of the seven schools that passed such policies, five had substantial evidence of youth involvement or initiation.[12] Moreover, "adults readily acknowledged both the importance of having youth support and the leadership roles youth played in gaining support for the policy."[12] Similarly, Checkoway et al.[11] described how members of the San Francisco Youth Commission have an increasing amount of influence in public policy at the municipal level and these efforts contribute to the youth's political and social development. They also stated that the youth "gain substantial knowledge of the community, practical skills in political advocacy and community organizing, and civic competencies for civil society."[11] Likewise, in another project, high school students who received advocacy training and conducted school-based and community activities designed to create awareness, educate others, and institute

environmental and policy changes showed significant increases in knowledge about, positive attitudes toward, and behaviors related to physical activity and nutrition.[86]

Early involvement of youth in community-based participatory research/PAR health efforts tended to focus on preventing youth from engaging in risky or negative health behaviors.[87] However, in the early 1990s, youth participatory models shifted away from preventing negative health behaviors to a new paradigm, which "emphasizes the need to promote positive youth development via youth empowerment."[87] This paradigm focused on promoting greater youth engagement in socioeconomic, public, and political community processes so that youth may be seen as valued community resources. Checkoway and colleagues[88] agreed, stating that youth PAR is valuable because it can develop youth knowledge and perspectives on sociopolitical issues, encourage youth to exercise political rights, give a voice to an under-represented group, prepare youth for active democratic participation, and increase youth's ability to create community change. They suggest that youth PAR should be viewed as part of the "social research" movement that focuses on community-based action for health.[88] Likewise, Millstein and Sallis[14] noted that involving youth in community PSE change efforts for the prevention of obesity can produce ownership and future involvement in sustainable changes and they referred to youth advocacy for obesity prevention as the next social movement for improving public health.

2.4.1 Defining Youth Empowerment. Although empowerment has been well studied, in the context of health promotion, it is rarely outright defined as it can take on different definitions in different settings.[89] Some youth-oriented researchers have defined empowerment as "a social action process that can occur at multiple levels,"[90] including

individual,[91] organizational,[92] and community levels.[89] Within the realm of youth PAR for healthy environments, a recent conceptualization of youth empowerment for tobacco control highlights it as a process by which youth collectively participate in the planning and implementation of [health promotion activities] in their communities.[93] Understanding empowerment as a *process* is critical to comprehending how to achieve youth empowerment through PAR. The following section reviews several theoretical frameworks that have explored the youth empowerment process through action.

2.4.2 Youth Empowerment Theoretical Frameworks. A variety of youth empowerment approaches and frameworks have been used over the years. A review of the literature found several common youth PAR empowerment frameworks for community health promotion. As mentioned above, early youth empowerment PAR models were created in conjunction with youth risk behavior interventions. For example, the Youth Development and Empowerment Model developed by Kim et al.[87] sought to explore youth empowerment as an innovative approach to substance abuse prevention. This model highlighted youth as valuable assets and community resources rather than social issues and incorporated meaningful participation of youth in community projects as a method to engage and empower youth. Similarly, the Adolescent Empowerment Cycle created by Chinman and Linney[94] focused on developing youth skills through positive social bonding and meaningful participation in community action. Additionally, this model emphasized positive reinforcement and recognition from adults. Over the past two decades, research has increasingly involved youth in a variety of PAR for health promotion related to community environments. For example, the Empowerment Education Model[95-98] was originally based on Paulo Freire's work with community adult

literacy programs in Brazil[99] which highlighted a listening-dialogue-action-reflection cycle. In modifying Freire's work for youth empowerment, Wallerstein, Sanchez-Merki, & Velarde[100] linked Freire's theory of critical social praxis with concepts from the protection motivation change theory. The resulting model focused on education to increase youth knowledge and skills but emphasized creating community change as a way to empower youth. Likewise, the Transactional Partnering Model developed by Cargo and colleagues[101] empowered youth to take action by providing a welcoming social environment and enabling youth to create change. This process emphasized youth as equal partners (i.e., power sharing between youth and adults) and included engaging youth, allowing them to take responsibility and control the process, actualizing youth potential, and cultivating constructive change. In summarizing multiple youth empowerment models for health promotion, Jennings et al.,[90] noted six common dimensions of youth empowerment, as shown in Figure 2.1, that contribute to the empowerment process. The resulting model of Critical Youth Empowerment highlights all six dimensions as a way to achieve individual (i.e., self-efficacy, self-awareness, social bonding) and community (i.e., collective efficacy, political efficacy, sociopolitical change) benefits.

In summary, youth empowerment models have evolved throughout the years in several ways. First and foremost is the recognition of youth as vital assets that can foster socio-political change within the community. This component emphasizes the need for adults to accept youth as community change agents and provide a supportive environment that challenges youth to take leadership roles. Second, is the understanding that as part of the empowerment process youth must achieve critical awareness of community issues

Dimensions	AEC	YDE	Transactional Partner	Empowering Education	**Critical Youth Empowerment**
Safe, supportive environment	Adults provide positive reinforcement.	**Adults, family support via high expectations, positive reinforcement.**	**"Welcoming social climate" emphasized.**	**Supportive environment emphasized.**	**Environment must be safe, supportive, fun, caring, challenging.**
Meaningful Participation	**Meaningful participation is critical for positive social bonding.**	**Opportunity to learn skills, assume responsibility, participate in public affairs.**	**Structured process to develop and implement a youth-defined, community-based agenda**	**Structured experience includes interviewing, critically reflecting, and social action project.**	**Opportunities for youth to develop capacities in meaningful forum with youth responsibility and decision-making.**
Shared Power	Shared power mentioned but not included in model.	Shared power mentioned but not included in model.	**Incremental transfer of power to youth as they gain competence and confidence.**	Adults and youths are co-learners; shared leadership discussed but not emphasized in model.	**Shared power critical, incremental transfer of power to youth as they gain capacity.**
Individual- and Community-level oriented		Focused on individual-level development through participation in community affairs.	**Individual- and community-level goals of esteem and capacity building.**	**Individual- and community-empowerment viewed as interwoven.**	**Individual- and community-empowerment viewed as interwoven.**
Socio-political change goals		Contribute to community affairs but not for goals of social change.	Contribute to community affairs but not for goals of social change.	**Dialogue stage includes societal analysis and leads into social action projects.**	**Programs emphasize societal analysis and encourage social change goals.**
Critical Reflection	Critical awareness mentioned but not demonstrated.		Critical awareness and reflection mentioned but not demonstrated.	**Dialogue stage includes societal analysis through structured questions.**	**Critical reflection integral to CYE through varied youth-based approaches.**

Figure 2.1 Dimensions of Critical Youth Empowerment

through some sort of knowledge/education component. Often, this requires the collection of information to better understand community needs and socio-political goals. Last, is the inclusion of youth in meaningful participation in action-oriented projects or PAR. This step highlights the transfer of power from adults to youth to give youth a greater level of control as a critical component to increasing youth empowerment.

2.4.3 Evaluating Youth Empowerment. Empowerment evaluation is strongly influenced by PAR methodologies due to participants' increased control over outcomes.[102] Evaluation of empowerment within community settings is often founded on self-determination theory which explores individual-level motivations and control over one's life[102] but can also include group or community-level empowerment measures.[103]

Evaluating empowerment as it relates to community change efforts, Kasmel and Tanggaard[104] explored five domains of individual community-related empowerment (ICRE) including: 1) self-efficacy, 2) intention, 3) participation, 4) motivation, and 5) critical awareness. The resulting empowerment scale had a total internal consistency (α) of 0.86 with subscales ranging from α = 0.69 to 0.88. This scale is distinctive in that it includes assessment of the empowerment *processes* (e.g., competence building, skills training, community activation) as a way to achieve expected outcomes. In a further effort to operationalize the empowerment process for youth, Millstein and Sallis[14] created a conceptual model to guide intervention and evaluation of youth advocacy specifically for obesity prevention (Figure 2.2). Their model represents multiple overlapping influences (i.e. individual, social environment, built environment, policy) as well as inputs, processes, and outcomes of youth obesity prevention efforts. Pulling from this model, Millstein and Sallis developed a set of items measuring youth advocacy for obesity prevention that focused on six domains including youth attitudes and beliefs (i.e., self-efficacy for health advocacy, perceived socio-political control), knowledge and skills (i.e., knowledge, assertiveness), physical activity and nutrition behaviors (e.g., meeting recommendations), collective participation (e.g., youth roles, benefits of participation), group characteristics (e.g., opportunities for control), and group climate (e.g., group cohesion, coordinator characteristics). Internal consistency reliability of subscales was evaluated with Cronbach's alpha with inter-item correlations ranging from 0.27 to 0.89.[105] These models provided the foundation for evaluating the youth empowerment

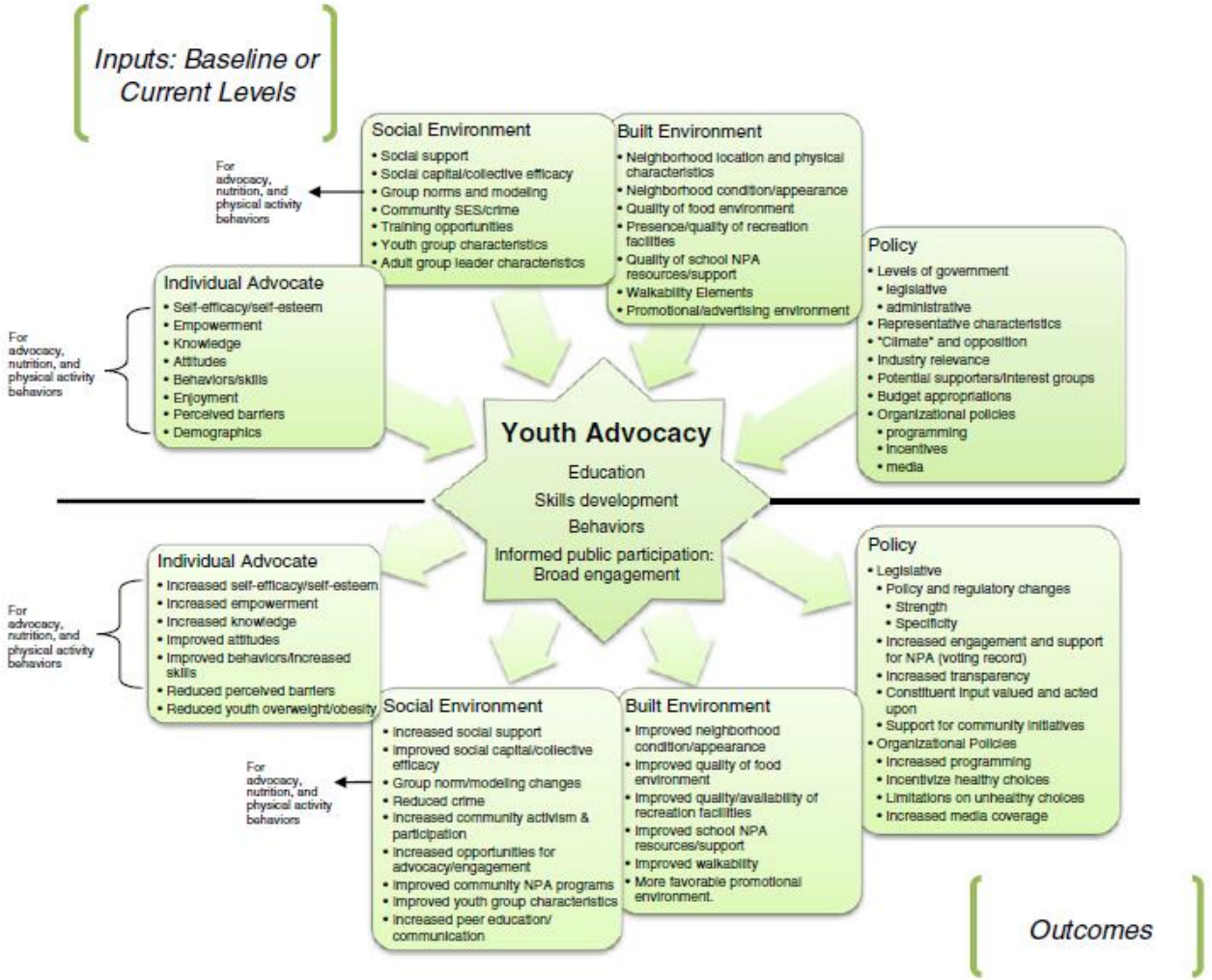

Figure 2.2 Youth Advocacy for Obesity Prevention Model

process in the context of community PSE change efforts for health.

2.5 Youth Empowerment through Technology

The prevalence of teen use of mobile technology has rapidly increased in recent years making it a potential medium for improving youth engagement in PAR. According to a 2013 PEW survey, 78% of teens ages 12-17 indicated they have a cell phone and that almost half (47%) are smartphones.[26] Similarly, 9 out of 10 (93%) teens have access to a computer and almost one fourth (23%) have a tablet. Following this mobile trend, 3 out of 4 teens say they can access the internet using mobile devices, 58% of teens have downloaded apps to their cell phone or tablet, and 81% use social networking sites.[106] The dramatic increase in teen use of technology has not only changed how teens communicate, but also how they gather information and participate. For example, an online survey of over 2000 middle and high school teachers revealed that internet and digital technologies are significantly impacting how students conduct research, with 99% of teachers agreeing that internet technology enables students to access a wider range of resources and 65% agreeing that internet technology makes students more self-sufficient researchers.[107] Similarly, a recent study at Purdue University revealed that students strongly preferred to access course information and complete quizzes and assignments through native mobile applications versus a web browser.[108] They concluded that mobile technology offers profound opportunities to deliver new services and engage students where they are already spending their time.

A growing body of literature confirms that technology can be a vital part of youth engagement in PAR for creating healthy community environments.[19,46,109-113] For example, the Youth Empowerment Strategies (YES) Project focused on the use of

Photovoice as a way to engage youth in social change efforts by capturing photos of strengths and issues within their environments.[114] Their work with 122 youth ages 9-12 years old within 13 afterschool groups successfully fostered both individual and group-level empowerment through social action projects aimed at improving neighborhood conditions. Similarly, the Youth Neighborhood Mapping Initiative[115] involved youth mapping neighborhood assets and liabilities and voicing their perspectives through the use of geographic information systems (GIS), photography, internet blogs, and other digital medias. The use of technology facilitated youth's ability to express their perspectives, thereby engaging them in efforts to increase knowledge of community issues, raise community awareness, and advocate to affect change within their communities. Another study of 57 youth and five community partners through seven projects developed a conceptual model for using technology and PAR to engage youth in community health promotion (e-PAR Model discussed further below).[19] These projects engaged youth with a variety of digital media (e.g., photography, videos, music, websites) to increase self-expression, communication, and skill building to improve youth empowerment, address community health issues, and create positive change.

Technology can be utilized in health-related PAR in a variety of ways to improve youth empowerment. A comprehensive review of the use of information technology in health promotion efforts summarized four broad uses of technology: 1) as an intervention medium, 2) as a research focus, 3) as a research instrument, and 4) for professional development.[116] Likewise, Thackeray & Hunter[111] noted that technology can aid youth advocacy by recruiting people to join the cause, organize collective action, raise awareness and shape attitudes, and communicate with decision makers. Such uses of

technology can facilitate dimensions of youth empowerment previously discussed in Figure 2.1 (e.g., create a welcoming and safe environment, generate equitable power sharing, encourage participation in sociopolitical processes to effect change) by helping us to better understand how youth interact with their environment,[22] offer new ways and formats for youth to engage civically,[117] and provide meaningful participation in the community.[109,118]

A summary of benefits of technology within youth PAR frameworks is shown in Table 2.1. Specifically, the use of technology in youth PAR offers several essential benefits that can improve indicators of youth empowerment. For example, technology has been shown to increase youth self-efficacy (overall[119] and explicitly for health-related PAR[109]), improve youth motivation for PAR,[117] increase youth voice in the community (assertiveness),[109] and provide political or social agency.[20,117] Technology can also improve youth empowerment by combating common issues with PAR. For example, Amsden and VanWynberghe,[120] note that youth typically fail to understand what PAR really is. However, use of technology within youth PAR efforts can fight apathy,[117] support reflective thought,[121] make them more self-sufficient researchers,[107] and increase youth civic engagement.[109,122] Additionally, youth PAR is often fraught with issues of lack of trust and power sharing between adults and youth,[123] yet technology can improve relationships with adults through increased efficacy,[109] reduced youth anxiety,[109] improved communication,[124] and promotion of equitable power sharing through increased youth control.[109,118]

Overall, technology is becoming a staple among teens that cannot be ignored. Rather, researchers should capitalize on the proliferation of mobile devices to meet youth

on digital platforms where they are spending their time. A growing body of research indicates that technology supports essential dimensions of youth empowerment models while combating common PAR issues such as apathy, lack of trust, and power-sharing.[109,117,118] Therefore, technology should be viewed as a vital strategy for increasing youth engagement and empowerment in PAR for health promotion.[46,111]

Table 2.1 Summary of Benefits of Technology within Youth PAR Frameworks

- Increases self-efficacy
- Fights apathy/improves motivation
- Facilitates youth self-expression
- Provides meaningful participation
- Increases youth voice within the community
- Improves youth-adult communication
- Promotes equitable power sharing (increased youth control)
- Provides political or social agency
- Improves access to resources
- Improves research capabilities
- Increases civic engagement

References [19,20,107,109,115,117-119,121,124]

2.6 Theoretical Framework:

This project was guided by technology user engagement, youth empowerment, and technology PAR frameworks.[14,19,104,125] Specific Aim 1 of this project focused on the development and testing of mobile application technology to engage youth in the collection of observational park audit data. While the technical aspects of eCPAT application development were not the focus of this project, it was important to understand what technology characteristics contributed to a person's experiences and engagement with the eCPAT app. O'Brien and Toms[125] completed an extensive literature review of

human-technology interaction studies and proposed a model of technology user engagement (Figure 2.3). This theoretical framework summarizes four distinct stages of technology engagement (point of engagement, engagement, disengagement, and reengagement) and mobile application attributes corresponding with each stage (e.g. interface aesthetics, sensory appeal, control, usability, positive/negative affect). These attributes formed the foundation of application development and capacity testing and aided author interactions with project IT personnel. Additionally, this framework was used to develop the beta testing focus group guide (Appendix C) with youth (further information regarding eCPAT app development and beta testing can be found in section 3.3.3 below).

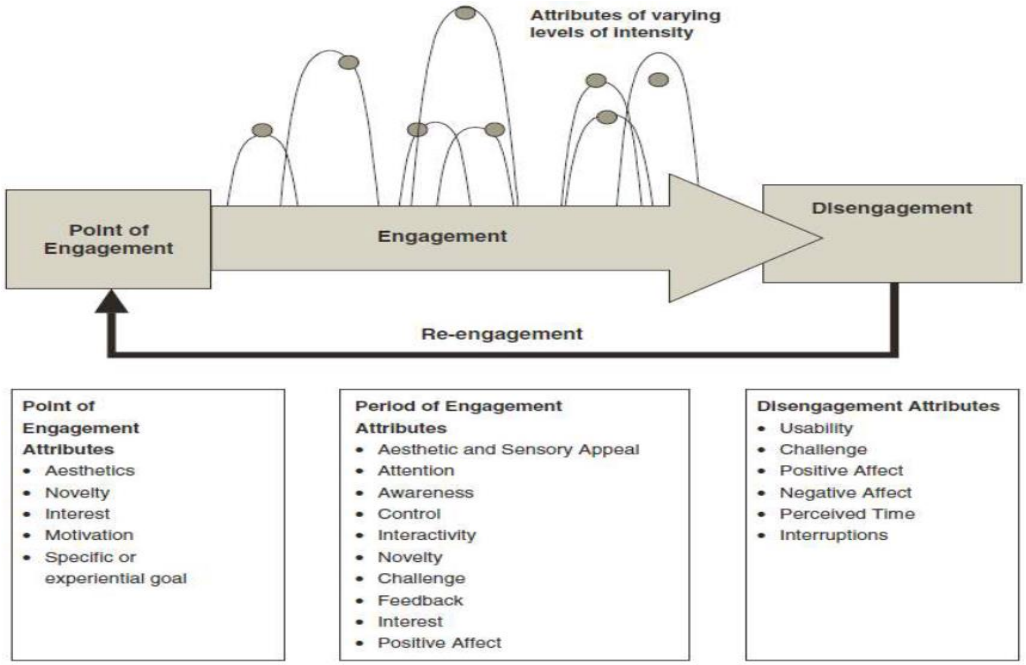

Figure 2.3 Model of User Engagement with Technology

Specific Aim 2 of this project sought to test the effectiveness of engaging with eCPAT mobile technology on youth empowerment and advocacy for healthy

communities through youth PAR efforts. To this end, this proposal combines theoretical underpinnings from Millstein and Sallis'[14] model of youth empowerment and advocacy for obesity prevention (Figure 2.2) with the e-PAR framework[19] (Figure 2.4) that highlights technology as a way to empower youth through PAR. At the crux of both of these models is the concept that youth are valuable resources that can create healthy social and environmental change in their communities. The combination of these frameworks highlights the use of technology as a format that in and of itself can increase youth engagement in PAR, which in turn improves youth levels of empowerment and advocacy for PSE change efforts. Therefore, in this project, we expect that youth who use the newly developed eCPAT mobile application to collect park audit data will have higher levels of engagement and empowerment indicators.

Figure 2.4 ePAR Model: Using Technology in Youth PAR

2.7 Gaps in Research

A review of the literature revealed several gaps that this study endeavors to address. First, despite the existence of several types of environmental data collection tools, few have been developed and tested with diverse populations in mind, especially youth.[126] For example, DeBate and colleagues[85] evaluated the utility of the Physical Activity Resource Assessment tool[127] to assess child PA intervention environments and found that while useful, not all issues were not captured with the tool. Additionally, they suggested supplementing the tool with community-based input to improve child PA interventions by reducing contextually based design errors.[85] Similarly, Kaczynski and colleagues[23] summarized existing park audit tools (Figure 2.5) and noted that few were youth-oriented, and those that did exist were less user-friendly (i.e., longer completion time, more items). Further, limited research has explored the reliability and validity of environmental data collection tools with community stakeholders.[128,129]

Audit tool	Use setting	Length (pages [items])	Completion time (minutes)	Park quality	Youth-oriented	Developed with stakeholders	Tested with stakeholders
BRAT-DO	Parks	16 (181)	Not available	Yes	Somewhat	Some	No
EAPRS	Parks	47 (646)	M: 67 Range: 10–258	Yes	Somewhat	Some	No
PARA	Various resources	1 (49)	M: 10 Range: up to 30	Limited	No	No	No
POST	Parks, ovals	2.5 (88)	Not available	Limited	No	Some	No
RFET	Various facilities	5 (61)	M: 20	Limited	No	No	No
SAGE	Various green spaces	2.5 (96)	Not available	Limited	No	No	No
SHAPE	Parks	1 (20)	Not available	Yes	No	Some	No

BRAT-DO, Bedimo–Rung Assessment Tools–Direct Observation[21]; EAPRS, Environmental Assessment of Public Recreation Spaces[23]; PARA, Physical Activity Resource Assessment[22]; POST, Public Open Space Audit Tool[13]; RFET, Recreation Facility Evaluation Tool[25]; SAGE, Systematic Audit of Green Space Environments[24]; SHAPE, Safe, Healthy, and Attractive Public Environments (unpublished Kansas City MO Parks and Recreation Department park maintenance audit tool)

Figure 2.5 Summary of Existing Park Audit Tools

For example, Moudon and Lee[130] noted that many tools designed for community stakeholder assessment of walking and bicycling environments are typically less detailed

than those designed for research purposes and many have not been assessed for reliability. Moreover, while several researchers have developed tools intended to audit environmental characteristics that support youth PA.[23,131] the reliability and validity of these tools have not been assessed with youth populations. Finally, to date, none of the existing park audit tools are available in an electronic format. Therefore, additional development and testing of electronic data collection tools for use by youth is warranted.

Second, despite the preceding discussion of the utility of technology in youth empowerment models for PAR, this field of research is still growing. There is a mounting need for appropriate technology tools that can improve youth engagement in and empowerment for healthy PSE change efforts.[19,46,111] For example, in discussing technology initiatives that can civically engage youth, Burd[46] states that "although such uses of technology are becoming more popular, the gap between online tools and offline work remains large, especially when it comes to helping young people engage with and have a voice in the places where they live."[46] Likewise, although recent advances in mobile technologies such as digital photography, geographic information systems (GIS), and social media are changing the way that community engagement and empowerment occur, few studies have specifically tested the effectiveness of these technologies for improving indicators of youth empowerment and advocacy.[111]

Finally, accomplishment of the specific aims in this study represents a unique opportunity to combine multiple technology attributes (e.g., photography, GIS, social networking) into one user-friendly mobile environmental data collection tool validated for use with youth populations. To the author's knowledge, no such mobile applications currently exist. Therefore, potential exists to not only create a vehicle for youth to participate in

and shape healthy community PSE change efforts, but adaptation of the eCPAT app for use by local planning officials could allow agencies to collect and make data-driven decisions based on specific community needs, as well as assist with standardization of aggregated nationwide parks and recreation resource data (a priority identified by diverse agencies across the U.S).[132,133]

CHAPTER 3: RESEARCH PLAN AND METHODS

3.1 Significance

Sufficient PA is critical to overall health, including the prevention of obesity, diabetes, cardiovascular disease, and several forms of cancer.[134-136] However, to impact PA, obesity, and health at the population level, creative solutions are necessary, including modifications to neighborhood and community settings.[47,137] Parks provide numerous opportunities for physical activity – especially in low-income communities where health disparities exist and other low-cost resources may not be available – and they are widely acknowledged as vital components of healthy communities.[4,138,139] Research suggests that the availability and condition of features within parks (e.g., playgrounds, trails, lighting, landscaping) are strongly related to their use for physical activity, especially among youth.[7,57,140-142] Therefore, detailed measurement of park environments, best conducted through on-site, observational audits, is an important first step in improving these vital neighborhood resources.[143] This study builds on previous research and capacity-building efforts using the Community Park Audit Tool (CPAT),[23] which was designed to aid citizens and community groups in planning and advocating for parks that promote physical activity, prevent childhood obesity, and contribute to overall healthy community design.

Engaging youth in health promotion efforts can produce diverse positive outcomes within both the youth and their communities, including a greater likelihood of changing school and community policies and environments,[11,12] increased political and

social development,[11] enhanced knowledge, skills, and attitudes towards civic involvement and health,[11] and improved personal and community healthy behaviors (e.g., physical activity, nutrition).[86] To this end, the purpose of the Health Young People Empowerment (HYPE) Project, recently developed in South Carolina, is to enhance the capacity of adolescents (12-17 years; especially from low-income and minority backgrounds) to plan and implement PSE change projects centered around healthy eating and active living in their communities.[18] This innovative program was created in 2012 through a collaboration between the SC Department of Health and Environmental Control, Eat Smart Move More South Carolina, and the University of South Carolina, Arnold School of Public Health. The HYPE curriculum is organized into five progressive stages – Think, Learn, Act, Share, and Evaluate – that each incorporate theory- and evidence-based, age-appropriate lessons and activities. The objective of the lengthiest phase, Act, is to allow participants to identify, plan, and actively engage in a youth-led HYPE project to create PSE change. As part of this phase, the youth identify a problem theme and *learn, conduct and analyze a community assessment using established audit tools* in order to identify sustainable PSE solution(s) and create and implement an action plan.

Our experiences and emerging research suggest that engaging youth in audits using technology would substantially enhance the uptake and success of key components of youth empowerment and advocacy initiatives such as the HYPE Project and would also make the CPAT more valuable and appealing to youth and adult community partners. Technology-based methods permit youth to engage in community action using means they are competent and familiar with and that they value and enjoy.[20] For example,

in one study, youth in Memphis engaged in a neighborhood mapping initiative to identify assets and liabilities and told their stories through maps, photographs, blogs and other media.[115] This provided a deeper appreciation of and connection with their community and practical skills in planning, community development, and democracy.[115] An eCPAT app would also permit the collection and use of data in real-time, including, for example, communicating a safety issue to the local parks department or sharing with peers via social media.[144] In general, development of an eCPAT app represents a significant step toward better engaging youth in efforts to create and become present and future leaders of healthy communities. Moreover, the present study represents a trial of incorporating technology into the process of community measurement and data collection with youth that can eventually be expanded to other audit tools and environments and community-based interventions.

3.2 Innovation

The proposed project to develop an eCPAT app is innovative for at least three important and related reasons. First, we aim to evaluate the outcomes of engaging youth in resource audits using technology and eventually to integrate this into our broader, well-conceived youth advocacy curriculum. Few other studies have involved youth in evaluating active living environments[115] (and none have incorporated systematic audits) and these efforts have rarely been part of a broader initiative to create long-term enthusiasm and skills for civic engagement and action. Second, the eCPAT app has the potential to be widely distributed and accessed by citizens to increase interest in and advocacy for policy and environmental changes to promote physical activity (indeed, the paper version is being used as such by groups across the U.S. and our detailed

experiences in Kansas City found increased awareness of local resources and greater networking and community building among CPAT users[23]). Given the increasing use of smartphones and other electronic devices (e.g., tablets), especially among adolescents and racial/ethnic minorities,[26,145] **leveraging this growth in technology to engage the broader public in creating healthy communities is imperative**. Finally, finding innovative ways to involve citizens in community planning efforts, especially youth who will one day lead our neighborhoods and communities, has important implications for both the procedural and distributive aspects of environmental justice. Environmental justice involves not only equal access to health-promoting resources, but also ensuring that those affected have the skills, motivation, and opportunity to participate in the processes that bring about such equality.[15,16] Engagement in advocacy and action efforts (letters to officials, grant proposals, community projects) among youth and their adult counterparts would be greatly facilitated by development of the eCPAT app. As such, this project represents an important stage in our efforts to involve youth in healthy community design initiatives and a key instrument to facilitate larger-scale public health interventions.

3.3 Approach

3.3.1 Overview. The eCPAT Project is a part of a broader research agenda to engage youth in becoming advocates for healthy community design through innovative technology. Accomplishment of the aims in this proposal represents an important next step in ongoing research about the role of technology in youth civic engagement for PSE health promotion efforts. Upon project completion, the outcomes achieved included: 1) development of a youth-oriented eCPAT mobile application, 2) reliability and validity

testing of the eCPAT app with youth, and 3) collection of valuable preliminary data about youth technology access, youth advocacy, and the impacts of youth engaging in community resource audits using emerging technologies. This project examined the reliability and validity of the proposed eCPAT tool for use with youth. As well, this study tested the effectiveness of conducting electronic park audits on resulting levels of youth empowerment and advocacy. Additionally, this study examined the potential moderating effect of technology access and use on post-project levels of empowerment and advocacy. Finally, this study explored youth preferences for technology as a tool to improve youth engagement in healthy community PSE efforts.

3.3.2 Conceptual Model. This study was guided by technology user engagement and youth empowerment theories.[14,19,104,125] The conceptual model in Figure 3.1 depicts how the specific aims of this study was accomplished through the development and testing of mobile application technology to increase indicators of youth empowerment for healthy PSE change efforts (e.g., self-efficacy, motivation, critical awareness, perceived sociopolitical control). As shown in the left side of the model, development of the eCPAT mobile application was accomplished by incorporating key attributes of technology that influence user engagement (or disengagement) such as interface aesthetics, sensory appeal, control, and interactivity as well as improvement of functionality through application features such as instructions, definitions, examples, and photo capabilities.[125] Interface attributes and application features, along with previously validated CPAT content[23] provided the foundation to create a highly usable eCPAT application for use by youth, thereby accomplishing specific aim one.

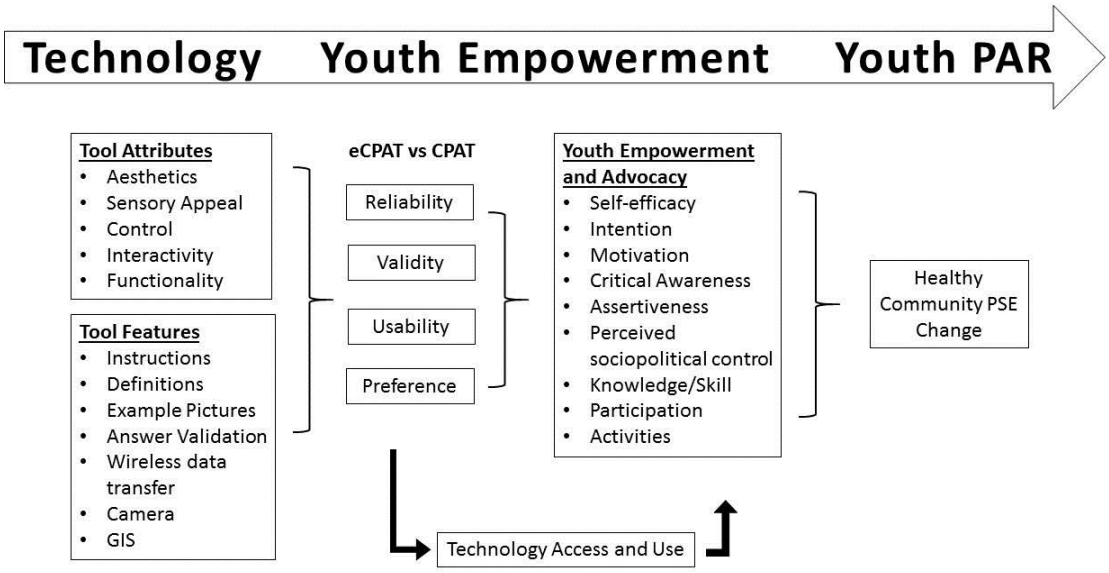

Figure 3.1 Technology and Youth Empowerment Conceptual Model

In regards to specific aim two, it was expected that through use of the eCPAT mobile application, youth would experience enhanced technology benefits for participating in PAR efforts such as improved communication and efficacy, increased social or political agency, and provision of meaningful participation.[109,117,118] Technology benefits are expected to lead to improvement in dimensions of youth empowerment such as increased youth self-efficacy and motivation for becoming involved in community-based efforts, increased youth's knowledge and critical awareness of community issues, and heightened perceptions of sociopolitical control and assertiveness a for making healthy community changes.[19,46,111] As indicated in the model, some research has found that youth's access and use of technology can impact resulting levels of civic engagement.[146] Likewise, in one study of adults, mobile technology use was shown to be a positive predictor of civic participation, but this effect was moderated by mobile technology competence.[147] Therefore, as part of the conceptual model, this study explored the potential moderating effect that technology access and use might have on

post-project levels of empowerment and advocacy. Finally, improvements in youth empowerment are expected to positively influence youth advocacy and participation in healthy community PSE change efforts in the future.[14,104,111] While the conceptual model above represents the entire process from technology development, to youth engagement with technology, to actual participation in PSE change efforts, it should be noted that this study did not be conducting a full intervention that addresses all of these stages. Rather, this study represents a key stage of the conceptual model including the development and testing of the innovative technology vital for successful youth empowerment as well as gaining a preliminary understanding of the effect of engaging in data collection with the eCPAT app. It is the author's goal to incorporate findings of this study into a grant proposal to develop and implement a full intervention to engage and empower youth for park-related PSE changes in their community.

3.3.3 eCPAT Development and Beta Testing. Technical development and testing of the eCPAT app itself was not the main focus of this proposal. However, as these were critical steps in accomplishing the specific aims of this project, a general overview of the process is presented here. Multiple iterative stages were used to comprehensively develop and test the eCPAT app. A systematic literature review of youth, technology, and health advocacy identified theoretical frameworks and key methodologies for developing mobile applications to engage youth in health promotion efforts.[14,19,104,125] To further inform application development, key informant interview (n=5) were conducted with experts in youth advocacy for obesity prevention, health information technology, and technology within parks and recreation settings. Linking this information to technical programming design, a team of health promotion and computer

science academics used PhoneGap (a cross-platform framework that allows application design for both Android and iOS platforms) to create the eCPAT application for use on Android Google Nexus 10 tablets. Technical application development phases followed standard system design protocol and included: a system requirement analysis, software design, program coding, and unit alpha (capacity) testing by computer programmers. Concurrently, a Microsoft SQL database on the ItechCarolina web server was designed to house wireless data transfer from the eCPAT upon park audit data submission. Upon application and server design completion, a second round of extensive capacity field testing of both the eCPAT application and wireless data transfer and storage were conducted. A comparison between CPAT and the newly developed eCPAT formats can be found in Table 3.1.

Table 3.1 Comparison of Audit Tool Formats

	CPAT	**eCPAT**
Format	Paper	Electronic
Interface Attributes		
Aesthetics	Black and white paper	Color with graphics
Sensory appeal	No	Touchscreen
Control	Limited	Yes
Interactivity	No	Yes
Functionality	Limited	Yes
Features		
Instructions	Limited within tool (Separate training manual)	Yes
Definitions	Limited within tool (Separate training manual)	Yes
Example pictures	None within tool (Separate training manual)	Yes
Camera	No	Yes
GIS	No	Yes
Answer validation	No	Yes
Wireless data transfer	No	Yes

Beta testing, a period of software trial and feedback by intended users,[148] occurred in February 2014 at the Bobby Pearse Community Center (and adjacent North Main Park) in Greenville, SC. A diverse group of youth ages 12-18 were recruited through the local parks and recreation department. Beta testing included giving the youth a brief project overview (15 minutes), audit tool training for both the paper and eCPAT tools (15 minutes) that consisted of basic instructions, definitions, and information about how to answer questions, and completion of a practice park audit (30 minutes) in a park adjacent to the community center using both the eCPAT app and the paper CPAT tool.

A mixed methods approach was used to gather detailed information about user experiences with the eCPAT application specifically. Modified versions of two technology usability scales (Appendix D; 5pt and 6pt Likert, 1=strongly disagree to 5/6=strongly agree) were used to quantitatively assess youth's perceptions of the eCPAT app's usability (e.g., functionality, effectiveness), efficacy, and preferences.[149 150] As well, qualitative data was collected via youth focus groups (see Appendix C for guide) guided by O'Brien & Toms[125] technology and user engagement framework shown on the left side of the conceptual model above (Figure 3.1). Descriptive statistics for quantitative usability data were analyzed in SPSS 20. Using grounded theory, the focus groups were transcribed verbatim, coded, and analyzed with NVivo10 following established procedures to extract key themes.[151,152] Interviewer field notes were also aggregated and analyzed.

Beta testing youth (n=19) ranged from 12-18 years old with mean age of 14.4 years, who were mostly female (58%), and African American (53%). Overall, 89.5% of youth felt that they had successfully completed all components of the eCPAT app. Based

on the System Usability Scale (1=strongly disagree, 5=strongly agree), youth felt the eCPAT app was easy to use (M=3.95, SD=1.22), that most people would learn to use it very quickly (M=4.00, SD=0.75), and that they would use the app frequently (M=3.74, SD=0.93). Likewise, youth reported feeling confident using the app (M=4.42, SD=0.77) and felt that app functions were well integrated (M=4.26, SD=0.87). On the other hand, youth disagreed to strongly disagreed that the app was inconsistent (M=1.89, SD=1.20), cumbersome (M=2.16, SD=0.83), unnecessarily complex (M=2.32, SD=1.19), felt that they would need technical support (M=1.50, SD=0.86), or have to learn a lot before they could use the app (M=1.37, SD=1.01). Based on the IT usability scale, youth felt that the eCPAT application was well organized (M=5.26, SD=0.99), all functions they expected were present (M=5.37, SD=0.90), and that they immediately understood the function of each item in the app (M=4.74, SD=1.20). More specifically, youth felt that the *buttons* in the app were well organized and easy to find (M=5.26, SD=1.15), that they immediately understood the function of each *button* (M=5.42, SD=1.02), and all functions they expected to find were present on the *menu bar* (M=4.53, SD=1.23). In general, youth found navigating the eCPAT app to be easy to very easy (M=4.79, SD=1.23) and their overall impression of the eCPAT app was positive to very positive (M=4.74, SD=1.10). Finally, in comparison to the paper CPAT, youth felt that the app was easier to use (M=4.84, SD=1.17).

Results of the focus groups were organized into four conceptually-based categories focused on refining the eCPAT app: aesthetics, interactivity, expectations, and positive affect. Within these categories, six major themes emerged from the data analysis: appearance (color, font), functionality (scrolling, lag time), usability (cognitive load,

intuitiveness), challenges (efficiency, glitches), novelty (capabilities, features), and preference. The results of beta testing provided information used to revise the app and resulted in version 1.0 of the eCPAT app viable for reliability and validity testing as part of the main data collection phase in this study.

3.3.4 Study Setting. The main data collection stage of this project occurred in 47 parks in Greenville County, SC, with all project workshops completed at the Bobby Pearse Community Center adjacent to North Main Park in Greenville, SC. This study occurred as part of a collaboration with Greenville County Parks, Recreation, and Tourism and LiveWell Greenville. Greenville County, South Carolina is an important population for this study due to significantly high rates of obesity. The state is ranked 42nd in the nation for obesity, with 30.8% of the population having a BMI of 30 or more. Among youth in South Carolina, almost 1 in 3 high school students is overweight or obese.[153] Likewise, in South Carolina almost 60% of high school students and almost 50% of middle school students are not physically active at least 60 min/day on five or more days/week.[153] These problems are prominent in Greenville County, where 41% of students are overweight (19%) or obese (22%).[154] Additionally, Greenville County was determined as the ideal location for this study given that it leveraged the study team's prior partnerships with parks and youth agencies and extended previous research efforts with the Greenville County community. Project parks were selected to represent a diverse mix of quality, size, features, and geographic dispersion while staying within a 30 mile radius from the City of Greenville center to alleviate travel concerns.

3.3.5 Recruitment/Retention. With the assistance of Greenville County Parks, Recreation, and Tourism and LiveWell Greenville, 150 youth ages 12-18 years of age

were recruited through existing youth groups and programs to garner a broad cross-section of youth. Recruitment methods included distribution of a recruitment flyer (Appendix E) through email and hard copies to Greenville County schools, after school groups, and parks and recreation programs as well as a recruitment booth at the opening ceremony of the Park Hop summer program. All recruitment materials (emails, flyers, QR code) directed parents and youth to an event planning website (EventBrite) for project registration. The website included an overview and specific aims of the project, youth project requirements and incentives, anticipated project data collection dates, and a link to the Built Environment and Community Health (BEACH) Laboratory website with a full project description. This study was open to youth of all racial and ethnic groups between the ages of 12 and 18 years of age residing in Greenville County or attending a Greenville County school. The inclusion criteria included being ages 12-18, living in Greenville County or attending a Greenville County school, and being able to hear, speak, and comprehend English.

3.3.6 Study Design. This study utilized a randomized untreated control group design using pre-test/posttest (Figure 3.2) with delayed treatment for the Control group. In this case, the "intervention" included a brief training workshop and youth collection of park data using their assigned tool. Blocked randomization using a random number generator in Microsoft Excel was used to allocate youth into one of three conditions (control, paper version, and eCPAT) ensuring similar group sizes. However, to help reduce contamination between conditions, youth within the same family were assigned to the same condition.

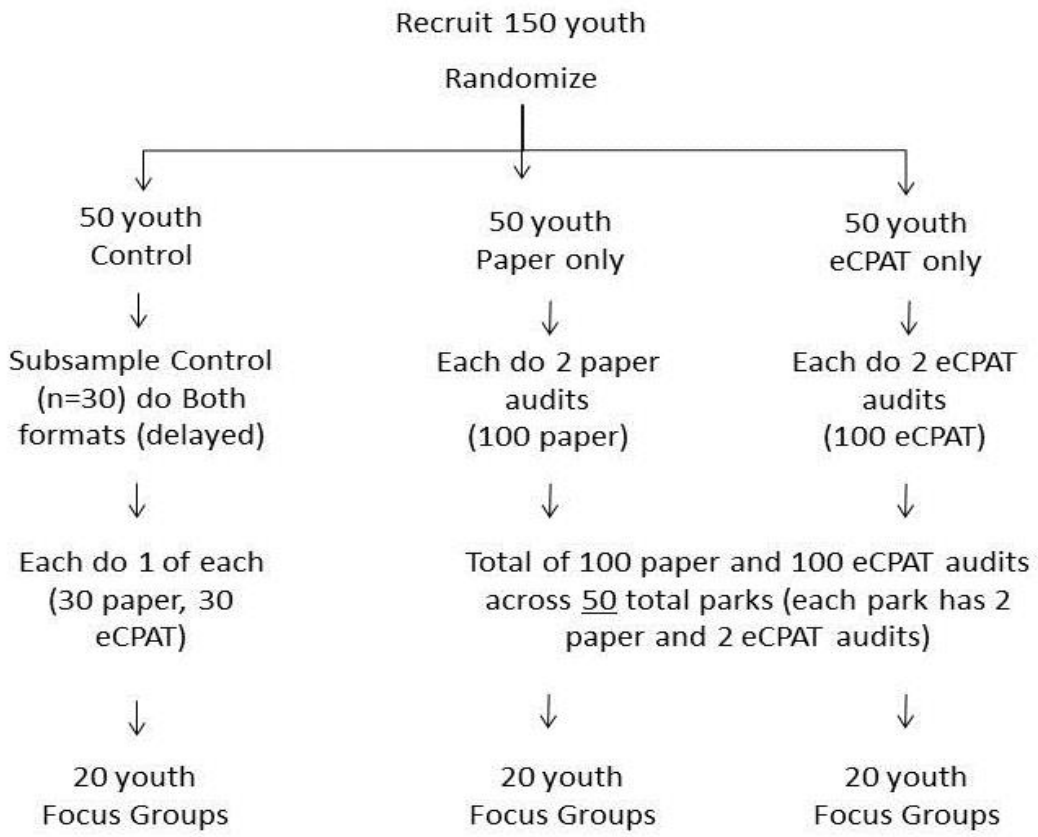

Figure 3.2 eCPAT Project Design with Intended Participant Numbers

Prior to project participation, all youth were given a pre-test that gathered baseline information about youth health and park-based PA behaviors, empowerment and advocacy indicators, technology access and use, and demographics. Youth in the Paper and eCPAT conditions were assigned to corresponding training workshops. Youth workshops consisted of indoor training including a brief overview of the project (15 minutes) and audit tool training for their assigned tool (15 minutes) that consisted of basic instructions, definitions, and information about how to answer questions. As part of the workshop, youth also completed an on-site practice park audit (30 minutes) with their assigned tool at a park adjacent to the community center. Youth in the Paper and eCPAT groups were then assigned the name of two parks and asked to complete a park audit at

each one using their assigned audit format. All park audits were completed at assigned times and under research staff supervision. Youth completing the park audit using the eCPAT app were provided Google Nexus 10 tablets onsite. After completion of assigned park audits, youth in the Paper and eCPAT conditions completed the posttest survey.

Youth in the Control group received no treatment. After completion of the project posttest, a subsample of youth (n=31) from the Control group were recruited to participate in a "Both" group. Similar to the Paper and eCPAT conditions, youth in the Both group completed a workshop were they received training and audit tool practice, with the exception that this condition was trained on both audit tool formats (Paper and eCPAT). Youth in the Both group were then assigned two park names and asked to complete one park audit using the eCPAT and one using the Paper tool. After completing assigned park audits, youth in the Both group completed a project posttest.

Once the pretest, park audit data collection, and posttest had occurred, a subsample of 20 youth from each condition (Paper, eCPAT, Both) were recruited to participate in focus group discussions to explore youth perceptions of their assigned audit tool, uses for data park audit data collected, future advocacy participation, and if in the Both condition, audit tool format preferences.

3.3.7 Data Collection. Data for the main part of this study were collected in June 2014. A mixed methods approach was used to evaluate accomplishment of specific aims of this study. To accomplish Specific Aim 1 (i.e., examine the reliability and validity of the eCPAT tool), quantitative park audit data were captured with both the paper CPAT and the eCPAT app tools. As shown in the study design (Figure 3.2), youth assigned to the Paper and eCPAT groups were responsible for completing two park audits each for an

estimated total of 100 paper audits and 100 eCPAT audits across an estimated 50 parks. In addition, a trained researcher (the author) completed a gold standard audit using both the CPAT and eCPAT tools in all study parks.

To test the effectiveness of eCPAT mobile technology on youth empowerment and advocacy (Specific Aim 2), youth levels of PA, park use, technology use, empowerment, and advocacy quantitative data were collected with a pre survey (Appendix F) given to youth in all conditions prior to project workshops. After park audit data collection, youth in the Paper and eCPAT groups were given a posttest survey specific to their experimental condition (Appendices G, H). After a period of no treatment, youth in the Control group were also given a posttest (Appendix I). As noted above, from the Control group, a subsample of youth were recruited to participate in the Both condition. After park audit data collection, youth in the Both group were given a posttest survey (Appendix J; Note: the posttest from the Control group served as the pretest for the Both group)

After all park audit data collection had occurred, a subsample of 20 youth from each of the Paper, eCPAT, and Both conditions were recruited for small focus groups specific to their experimental condition (see Appendices K, L, M for focus group guides). Qualitative assessment included understanding youth project experiences including likes and dislikes of their respective audit tool, preferences, and future participation in youth participatory action research (note: it is the author's hope to use qualitative data within future grant writing and manuscripts; however, these data were not considered the primary focus of this proposal and therefore not included in the measures or data analysis sections that follow).

3.3.8 Measures. Several methods were used to measure the key variables in this study. To answer Specific Aim 1, all park audit data were collected with the newly developed eCPAT application as well as the original paper CPAT tool. The CPAT and eCPAT tools contain 38 questions within four sections: park information (10 questions), access and surrounding neighborhood (11 questions), park activity areas (1 question about 14 different activity areas), and park quality and safety (16 questions). The tools provide in-depth information regarding the presence/absence, usability, and condition of park facilities and amenities, as well as overall park quality and safety characteristics. The CPAT has demonstrated strong content validity and inter-rater reliability, with percent agreement for the vast majority of the items in the tool between 80%-90% (see appendices A and B for the CPAT tool and more information about its development and psychometric properties).[23]

To answer Specific Aim 2, youth in all conditions completed paper surveys prior to and immediately following park audit data collection. All youth completed the same pre-survey and condition-specific post surveys which included measures that captured constructs related to youth health behavior, empowerment, advocacy, technology, and demographics. Table 3.2 below shows the construct name, measurement source, dimension, survey item, and response format for all the key variables in the surveys. The health behavior construct assessed information about two dimensions: i) overall PA and ii) park use and PA. The PA variable consisted of five validated items from the 2013 Youth Risk Behavior Surveillance System (YRBSS) high school questionnaire[155] that asked about average PA minutes per day (1 item), average screen time per day (2 items), number of days youth attended physical education classes (1 item), and sport team

participation (1 item). The park usage and PA dimension consisted of seven items modified from the Physical Activity in Park Settings PA-PS questionnaire[156] and one item from the Neighborhood Environment Walkability Scale (NEWS)[128] that captured information about park visitation (3 items), PA in the park (4 items item), and travel to the park (1 item).

Empowerment as a construct was captured using the Individual Community-Related Empowerment (ICRE) scale[104] shown to have high content validity (Lawshe's formula, 0.98) and high internal consistency ($\alpha = 0.86$) overall. The scale consists of five dimensions that measure self-efficacy (e.g., knowledge, skills, confidence) for making changes in the community (7 items, $\alpha = 0.88$), intention of getting involved in the community (4 items, $\alpha = 0.83$), motivation to get involved in the community (3 items, $\alpha = 0.69$), participation in community activities (3 items, $\alpha = 0.81$), and critical awareness of issues in the community (1 item). Additionally, youth advocacy was captured using the Youth Engagement and Action for Health (e-Yeah) Scale[105] based on the conceptual model in Figure 2.2[14] which were found to have moderate to good internal consistency reliability.[105] The four dimensions related to youth advocacy for obesity prevention and included assertiveness for being a leader in the community (3 items), perceived sociopolitical control for making changes in the community (4 items), history of advocacy activity (3 items), and knowledge of resources (1 item) with ICCs ranging from 0.154-1.0.[105]

Table 3.2 eCPAT Study Measurement Alignment

Conceptual Theoretical	Measure/ Tool	Outcome	Item(s)	Answer Format
Health Behavior	YRBS 2013 Standard High School Questions	Physical Activity	1) During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.) 2) On an average school day, how many hours do you watch TV 3) On an average school day, how many hours do you play video or computer games or use a computer for something that is not school work? (Count time spent on things such as Xbox, PlayStation, an iPod, an iPad or other tablet, a smartphone, YouTube, Facebook or other social networking tools, and the Internet.) 4) In an average week when you are in school, on how many days do you go to physical education (PE) classes? 5) During the past 12 months, on how many sports teams did you play? (Count any teams run by your school or community groups.)	Select 0-7 days Select 0 ->5 hours/day Select 0 ->5 hours/ day Select 0-5 days Select 0- >3 teams
		Physical Activity	1) In a usual week, how many days do you walk or bike to school 2) In a usual week, how many days do you walk or bike from school	# of days
	PA-PS Walker et al, 2009	Park Usage and Activity	1) Within the last month (i.e., last 30 days), did you visit a park? 2) How many days in the last month (i.e., last 30 days) did you visit a park? 3) During your last park visit, how much time did you spend in the park? 4) Of that time you said you spent in a park during your last park visit, how much time did you spend being physically active? By physically active we mean doing any physical movement rather than sitting (e.g., walking, biking). 5) Which of the following best describes your activity level during the last park visit? 6) What activities did you do during the last park visit? 7) What facility areas did you use during your last park visit?	Yes/No Fill in blank Fill in blank Fill in blank 5 options 5 options List List
		Active Transport	8) When you travel to a park, how do you usually get there?	Check one

Table 3.2 eCPAT Study Measurement Alignment (Cont)

Conceptual Theoretical	Measure/ Tool	Outcome	Item(s)	Answer Format
Empowerment	ICRE Kasmel & Tanggaard 2011	Self-Efficacy	1) I have the knowledge and skills to influence my community. 2) I have the ability to impact my community in important ways. 3) I have confidence in my capabilities to make needed changes in my community. 4) I am able to affect the area in which I live. 5) I can influence community members to take actions on important issues. 6) I have the knowledge and skills to gather information relevant to my community. 7) I know I can make a difference in my community.	5 Point Likert Scale Strongly agree (5) Agree (4) Neither (3) Disagree (2) Strongly disagree (1)
		Intention	1) I want to get involved in my community. 2) I am willing to get involved in my community. 3) I am going to get involved in my community. 4) I intend to take action in my community.	5 Point Likert Scale
		Motivation	1) I think it is important for me to get involved in my community. 2) I feel that efforts to address community issues are worthwhile. 3) I am motivated to get involved in my community.	5 Point Likert Scale
		Critical Awareness	1) I think that the problems in my community are serious.	5 Point Likert Scale
		Participation	1) I participate in community activities. 2) I am involved in my community. 3) I volunteer for community projects.	5 Point Likert Scale
		Future Participation	1) I am interested in participating in future research projects similar to this one	5 Point Likert Scale

Table 3.2 eCPAT Study Measurement Alignment (Cont)

Conceptual Theoretical	Measure/ Tool	Outcome	Item(s)	Answer Format
Youth Advocacy	Millstein & Sallis 2011	Assertiveness	1) I can talk with adults about issues I believe in 2) I can ask others to help work on making our school or community healthier 3) I can start discussions with others about how to change our school or community to make it healthier	5 Point Likert Scale
		Perceived socio-political control	1) I like to wait and see if someone else is going to solve a problem 2) I find it very hard to talk in front of a group (rev scored) 3) If I tell someone "in charge," like a leader, about my opinions, they will listen to me 4) I enjoy participation because I want to have as much say as possible in my school or community	5 Point Likert Scale
		Advocacy activity	1) In the last year, how many times have you tried to tell school leaders, people in your community, or politicians to be more interested in making your school or community a better place for being physically active and eating healthy? 2) In the last year, I have talked to my parents or family members about changes needed to make my school or community a better place for being physically active and eating healthy.	5 Point Likert Scale
		Knowledge	1) I know how to get information about ways to make my school or community a better place for being physically active and eating healthy	5 Point Likert Scale
General Tool Information		Likes/ Dislikes Impression	1) Do you feel that you successfully completed the CPAT/eCPAT app during your park visits? 2) The thing I liked the most about the CPAT/eCPAT app was 3) The thing I liked the least about the CPAT/eCPAT app was 4) My overall impression of the CPAT/eCPAT app is	Yes/No Open ended Open ended 5 Point Likert Scale
		Preference	1) Which format was easier to use? 2) Which format did you enjoy using the most? 3) Which format would you want to use in future projects? 4) Overall, which format did you like the best?	Check one

Table 3. 2eCPAT Study Measurement Alignment (Cont)

Conceptual Theoretical	Measure/ Tool	Measure/ Tool	Measure/ Tool	Measure/ Tool
Technology	System Usability Survey Cockton, 2013	Usability	1) I think that I would like to use this CPAT/eCPAT app frequently. 2) I found the CPAT/eCPAT app unnecessarily complex. 3) I thought the CPAT/eCPAT app was easy to use. 4) I think that I would need the support of a technical person to be able to use the CPAT/eCPAT app. 5) I found the various functions in the CPAT/eCPAT app were well integrated. 6) I thought there was too much inconsistency in the CPAT/eCPAT app. 7) I would imagine that most people would learn to use the CPAT/eCPAT app very quickly. 8) I found the CPAT/eCPAT app very awkward to use. 9) I felt very confident using the CPAT/eCPAT app. 10) I needed to learn a lot of things before I could get going with the CPAT/eCPAT app	5 Point Likert Scale
		App Usability	1) The eCPAT app was well organized 2) I immediately understood the function of each item in the eCPAT app 3) All of the functions I expected to find in the eCPAT app were present 4) The buttons in the eCPAT app were well organized and easy to find 5) I immediately understood the function of each button in the eCPAT app 6) All of the functions I expected to find on the menu bar in the eCPAT app were present	5 Point Likert Scale
	Created for this survey based on other similar surveys	Mobile Technology Access	1) What types of mobile technology do you have access to? Cell phone Smartphone Tablet or iPad Laptop Nook/Kindle Other (please list)_____ 2) What types of social network accounts do you have? Facebook Pinterest Instagram Google + Twitter ask.fm Snapchat tumbler Vine flickr KIK messaging Other (please list)_____	Check all that apply Check all that apply

Technology as a construct within this study consisted of six dimensions, including: technology usability, mobile technology access, mobile technology usage, social media usage, attitudes toward technology, and social media and technology for advocacy. Technology usability (for eCPAT and Both conditions) was captured with a modified version of the System Usability Scale[157] that was comprised of 10 items. Across all conditions, the Media and Technology Usage and Attitudes Scale (MTUAS) [158] measured information related to mobile technology usage and included subscales that measured smartphone usage (8 items, $\alpha = 0.93$), text messaging (3 items, $\alpha = 0.84$), and phone calling (2 items, $\alpha = 0.71$). Youth media sharing behavior specific to mobile technology was captured with modified items from MTUAS interchanging the word 'computer' for 'mobile technology' and included subscales that measured internet searching (4 items, $\alpha = 0.91$), emailing (2 items, $\alpha = 0.91$), video gaming (2 items, $\alpha = 0.83$), and television viewing (2 items, $\alpha = 0.61$). Additionally, the MTUAS collected information related to social media usage (9 items, $\alpha = 0.97$) and attitudes towards technology (6 positive items, $\alpha = 0.87$; 3 negative items, $\alpha = 0.80$). As well, four items were specifically created within the context of this project to better understand the intersection between technology and empowerment/advocacy. Finally, youth demographic information was collected, including: gender, date of birth, height, weight, race, ethnicity, number of cars in the household, bike ownership, and whether or not the youth received free or reduced lunch at school.

3.3.9 Data Analysis. Several analyses were used to evaluate project aims. For Specific Aim 1, examining the validity and reliability of the newly developed eCPAT mobile application, Cohen's kappa[159] and percent agreement[160] statistics were to examine

i) criterion-related validity when youth audits for a park were compared to those of a gold standard researcher, and ii) inter-rater reliability among paired youth eCPAT ratings of the same park (note: youth were randomly chosen as the validity comparison for each park) (Hypothesis A1b).[161,162] Both kappa and percent agreement are valuable measures for environmental audits because percent agreement statistics are robust when there is little variability in ratings by auditors, while kappa statistics account for chance agreement between raters.[4,137] Further, it has been suggested that reporting the proportion of agreement alongside kappa values could help the reader understand possible prevalence or bias effects in the data.[163-165] Validity and reliability ratings were only calculated for items for which at least three pairs of ratings were available across the sample of parks.[166] Percent agreement statistics were evaluated using the following established criteria: 75-100%=excellent; 60-74%=moderate; and less than 60%=poor.[143] Observed kappa statistics were interpreted using guidelines provided by Landis and Koch: 0.80-1.00=almost perfect to perfect agreement; 0.600.79=substantial agreement; 0.40-0.59=moderate agreement; 0.20-0.39=fair agreement; and 0.00-0.19=poor agreement.[159]

To examine Specific Aim 2, a variety of analyses were conducted. To understand differences in tool usability, an independent samples t-tests was used to examine differences in mean usability scores between Paper and eCPAT conditions. To examine differences in post-project levels of youth empowerment and advocacy, factorial multivariate analyses of covariance (MANCOVAs) compared the mean posttest empowerment and advocacy dimension scores across the Control, Paper, and eCPAT conditions controlling for respective baseline levels of each construct. Separate models

were conducted for youth empowerment (5 variables) and youth advocacy (4 variables) scales. Skewness and kurtosis values as well as box plots were obtained to examine the distributions of youth empowerment and youth advocacy variables. Outliers as identified by SPSS (i.e. interquartile range multiplied by 1.5) were removed prior to analyses.[167] To understand potential moderating effects of regular technology use on the relationship between group condition and post-project levels of youth empowerment and advocacy, multivariate linear regression analyses explored the interaction between Control, Paper, or eCPAT group membership and mean technology use. Finally, descriptive statistics, including frequencies and percentages, explored preferences for the Paper or eCPAT tools among youth in the Both group that utilized both versions. All analyses were performed in SPSS 22.

3.3.10 Sample Size and Power Calculation. For aim 1, kappa[159] and percent agreement[160] statistics were used to examine inter-rater reliability among i) criterion-related validity when youth audits for a park were compared to those of a gold standard researcher, and ii) inter-rater reliability among paired youth eCPAT ratings of the same park.[161,162] To detect agreement of at least 0.80 for a dichotomous item at power=.90, 22 parks would need to be examined.[168] Therefore, the projected sample of 50 parks should provide adequate statistical power for the proposed analyses. For aim 2, little evidence exists that would suggest the level of expected change from an intervention such as this, but the sample size of 50 youth per condition would allow the detection of a moderate (0.60) effect size (at alpha=0.05 and power=0.80), which is a reasonable expectation for this pilot study.[169]

3.3.11 Data Management. Survey and interview data is completely anonymous at the individual level. Pre/post survey data were collected and entered into SPSS by trained research staff. Focus groups were facilitated by project researchers experienced with youth focus groups, and were audio recorded and transcribed verbatim. Data collected by USC's Arnold School of Public Health is highly secure with limited access. The evaluation dataset was only shared with the investigative team through a password protected server on a secure computer network. The dataset was backed up on an external hard drive maintained within the BEACH Laboratory. Hard copies of the dataset are stored in a locked cabinet in a locked office when not in use. The names and addresses of participants were never linked to the dataset nor were any attempts made to link the information.

3.4 Logistics

3.4.1 Overview. South Carolina is an important population for the proposed study due the drastically increasing rates of obesity. South Carolina is ranked 42nd in the nation for obesity with 30.8% of the population having a BMI of 30 or more. For youth, almost 1 in 3 high school students is overweight or obese.[153] Youth participants were residents of Greenville County or attended a school within Greenville County. The study population included youth of all racial and ethnic groups between the ages of 12 and 18 years of age. Inclusion criteria:

- Youth aged 12-18
- Living in Greenville County OR attending a Greenville County School
- Hear, speak, and comprehend English

3.4.2 Protection of Human Subjects. The proposed study involves youth visiting two study parks within Greenville County, completing two park audits (depending on assigned condition), and completing pre-post questionnaires and post focus groups that cause no more than minimal risk. The park visits, associated park audits, and questionnaires and focus groups had low potential to cause any physical harm. The major risk was that participants may have become confused or frustrated trying to complete a park audit, or embarrassed by some of the questions asked during the focus groups. A secondary minimal risk was the potential for youth to get lost trying to find study parks, or become sunburnt, dehydrated or injured during their park audit.

3.4.3 Adequacy of protection against risks. Due to the involvement of youth under the age of 18, both parental consent and youth assent was required for all youth prior to participation in the eCPAT Project (Appendix N). Participation in the eCPAT Project, pre-post surveys and post focus groups was voluntary and youth participants and their parents were informed of the option to stop involvement at any point. To reduce the potential for confusion or frustration during park visits, all youth were required to participate in a training session to learn about the purpose of the project and how to conduct a park audit (including a practice park audit with a question and answer session upon completion). To limit the potential for youth to be embarrassed, only trained researchers conducted youth focus groups where all youth remained anonymous. To minimize potential risks to youth during park audits, all study participants were sent a reminder email of the date and time of their assigned park audit that included an address and google map of the park and a reminder to bring a bottle of water, wear sunscreen or protective clothing, and adequate footwear (Appendix O). Additionally, park visits were

supervised by a trained researcher that carried a cell phone, and a supply kit that contained additional water bottles and a first aid and safety kit.

3.4.4 Potential benefits to the subjects and others. There were several potential benefits for youth participating in the eCPAT Project. Youth were reimbursed with Target gift cards of varying amounts depending on participation in specific project components including: $20 for participating in eCPAT beta testing, $50 for completing pre-post surveys and eCPAT park audits, and $20 for participating in a post focus group. In addition to monetary compensation, all youth were given a certificate of participation and community service hours (Appendix P). As an indirect benefit from participating in the eCPAT Project, all youth had the potential to be exposed to at least one form of park audit, and had the opportunity to visit at least two parks in Greenville County. As a result, youth may have learned more about park availability, felt more confident in their ability to complete park audits, and have increased feelings of empowerment for making healthy changes to parks in their community.

3.4.5 Data and safety monitoring. Survey and interview data was completely anonymous at the individual level. Participating youth were assigned an ID number and names or contact information collected for evaluation purposes were stored separately from survey data. Additionally, the names and addresses of participants were never linked within the survey dataset. Survey and focus group data collected by trained researchers were backed up on a highly secure network drive maintained by the Arnold School of Public Health with access limited to study personnel. Hard copies of the datasets were stored in a locked cabinet in a locked office when not in use. The evaluation datasets were only shared with the investigative team through a password

protected server on a secure computer network. Youth entered their ID when completing eCPAT park audit data which were then wirelessly transmitted to a secure server (itechcarolina) maintained by IT-ology and the Department of Integrated Information Technology at the University of South Carolina.

3.4.6 Documentation of CITI Training. All project personnel involved with data collection were required to successfully complete CITI training for social and behavioral research including ethics of human subject research, informed consent, and privacy and confidentiality. Verification of completion of CITI training for each researcher can be found in Appendix Q

CHAPTER 4: MANUSCRIPT 1

DEVELOPMENT AND TESTING OF MOBILE TECHNOLOGY FOR COMMUNITY PARK IMPROVEMENTS: VALIDITY AND RELIABILITY OF THE ECPAT APPLICATION WITH YOUTH[1]

[1]Besenyi, GM, Diehl, P, Schooley, BL, Turner-McGrievy, G, Wilcox, S, Wilhelm Stanis, SA, Kaczynski, AT. To be submitted to *Translational Behavioral Medicine*

Abstract

Creation of mobile technology environmental audit tools can provide a more interactive way for youth to engage with communities and facilitate participation in health promotion efforts. This study describes the development and validity and reliability testing of an electronic version of the Community Park Audit Tool (eCPAT). The eCPAT app consists of 149 items and incorporates a variety of technology benefits. Criterion-related validity and inter-rater reliability were evaluated using data from 52 youth across 47 parks in Greenville County, SC. A large portion of items (>70%) demonstrated moderate to perfect or fair validity and reliability. Many items demonstrated excellent percent agreement. The eCPAT app is a user-friendly tool that provides a comprehensive assessment of park environments. Given the proliferation of smartphones, tablets, and other electronic devices among both adolescents and adults, the eCPAT app has potential to be distributed and used widely for a variety of health promotion purposes.

Keywords: parks, youth, technology, environment, audit, eCPAT, application

Childhood obesity is a significant public health issue with rates having doubled in children and quadrupled in adolescents over the past three decades.[27] In 2011-2012, 17% or approximately 12.7 million American youth ages 2-19 years were obese, with rates highest in 12 to 19 year olds (20.5%).[27] This is particularly disconcerting because children who are overweight are 70% more likely to be overweight or obese as adults and childhood obesity is significantly associated with increased risk for numerous health concerns such as high blood pressure, diabetes, high cholesterol, heart disease, depression, and premature mortality.[29] Being physically active can significantly reduce the risk of childhood obesity and obesity-related chronic diseases.[32,33] However, youth physical activity (PA) participation declines with age,[34,35] with only 27% of U.S. students in grades 9-12 achieving recommended levels in 2013.[36]

Modifying the built environment of neighborhoods and communities is recognized as one of the most promising solutions to these population-level crises.[2,3] In particular, parks are key venues for youth PA, given their low cost and legislated ubiquity.[4,5] A growing body of evidence suggests that a variety of park variables, especially the availability and condition of features within parks (e.g., playgrounds, trails, lighting, landscaping) are strongly related to their use for physical activity.[56,63-65] Further, research suggests environmental improvements to parks, playgrounds, and other community resources can promote increased PA and other health outcomes among children and adults.[8,9]

Creating healthy communities, including better parks, will require the interest and participation of multiple constituencies.[10] For several reasons, youth can and should be an integral part of this change process. For example, youth voices can be especially

powerful in influencing the priorities and decisions of policymakers[11,12] and engaging youth in advocacy and community change efforts has critical implications for the development of the youth themselves and for the future of our public leadership.[11-13] Indeed, Millstein and Sallis referred to youth advocacy for obesity prevention as the next wave of social change for health.[14]

While promising, advocacy for PSE change is an understudied and under evaluated approach.[17] The process of improving neighborhoods and parks will take time, but preparing today's youth to be the future leaders of healthy communities is a crucial first step.[12] Accomplishing this will require finding ways to involve youth in PSE change efforts in ways that are appealing and engaging to them.[12,14] One innovative technique involves using established audit tools to evaluate the health-promoting potential of community environments and then to work with this data to develop, implement, and evaluate a PSE action plan to create healthy community changes.[78,80] Specific to parks and recreation resources, the Community Park Audit Tool (CPAT) was designed to aid citizens and community groups in planning and advocating for parks that promote PA, prevent childhood obesity, and contribute to overall healthy community design.[23] The CPAT was developed as a user-friendly tool that enables diverse community stakeholders to quickly and reliably audit community parks for their potential to promote PA, especially among youth. The CPAT contains four sections: park information, access and surrounding neighborhood, park activity areas, and park quality and safety. It provides in-depth information regarding the presence/absence of 14 park facilities and 25 amenities as well as park quality and safety characteristics. It has demonstrated strong content validity and inter-rater reliability, with percent agreement for the vast majority of the

items in the tool between 80%-90%.[23] However, initial experiences conducting park and neighborhood audit workshops with youth suggest that technology-based methods would be considerably more engaging than current paper-and-pencil tools.[18] Indeed, substantial research has shown that youth are frequently the earlier adopters of new technologies and that such technologies provide a more interactive and hands-on way for youth to engage with their local communities, thereby appealing to youth who might not normally take a leadership role in health promotion efforts.[19-22]

This study addresses several gaps in the literature on youth, technology, and environmental audit tools to date. First, despite the existence of several types of environmental data collection tools, few have been developed and tested with diverse populations in mind, especially youth.[126] For example, DeBate and colleagues[85] evaluated the utility of the Physical Activity Resource Assessment tool[127] to assess child PA intervention environments and found that while useful, not all child-related environmental issues were captured with the tool. Additionally, they noted that the tool was biased toward larger resources and undervalued small, but safe locations for youth PA.[85] Similarly, Kaczynski and colleagues[23] summarized existing park audit tools and noted that few were youth-oriented, and those that did exist were less user-friendly (i.e., longer completion time/length, more complicated). Further, limited research has explored the reliability and validity of environmental data collection tools with community stakeholders.[128,129] For example, Moudon and Lee[130] noted that many tools designed for community stakeholder assessment of walking and bicycling environments are typically less detailed than those designed for research purposes and many have not been assessed for reliability. Moreover, while several researchers have developed tools intended to audit

environmental characteristics that support youth PA,[23,131] the reliability and validity of these tools have not been assessed with youth populations. Finally, to date, none of the existing park audit tools are available in an electronic format. Consequently, additional development and testing of electronic data collection tools for use by youth is warranted. Therefore, to further advance this research and practice agenda, the purpose of this paper is to describe the development and validity and reliability testing of an electronic version of the Community Park Audit Tool (eCPAT) for use by youth.

Methods

eCPAT App Development

Multiple iterative stages were used to comprehensively develop and test the eCPAT app. Initially, a comprehensive literature review of youth, technology, and health advocacy identified theoretical frameworks and key methodologies for developing mobile applications to engage youth in health promotion efforts.[14,19,104,125] To further inform application development, key informant interviews (n=5) were conducted with experts in youth advocacy for obesity prevention, health information technology, and technology within parks and recreation settings. Key informants commented on application format, design, functionality, and preferred operating systems and mobile devices. As well, key informants offered advice regarding what should be considered important when designing an electronic tool that is 1) focused on park-based PA, 2) user-friendly, and 3) engaging to youth. Linking this information to technical programming design, a team of health promotion and computer science academics used PhoneGap (a cross-platform framework that allows application design for both Android and iOS platforms) to create the eCPAT application for use on Android tablets. Technical

application development phases followed standard system design protocol and included: a system requirement analysis, software design, program coding, and unit alpha (capacity) testing by computer programmers.[170] Concurrently, a Microsoft SQL database on the ItechCarolina web server at the University of South Carolina was designed to house wireless data transfer from the eCPAT app upon data submission, as shown in Figure 4.1.

Upon application and server design completion, a second round of extensive capacity field testing of both the eCPAT app and wireless data transfer and storage were conducted and used to improve and refine the application. The resulting eCPAT app consisted of two main interface screens, including a home page with park auditing instructions, icon legend, and login button, as well as a single, scrolling data entry screen of 149 items under four main headings that contained all items from the original CPAT tool (Figure 4.2). As indicated on the home screen (left image), the eCPAT app incorporated text instructions and definitions (e.g., a description an activity area such as a splash pad) as well as example pictures (e.g., photos of a splash pad) directly into the data entry interface in an effort to improve tool validity. Answer validation (as indicated by the red x's shown in the right image of Figure 4.2) and wireless data transfer were also included as a way to ensure complete data collection and reduce data entry error. The eCPAT app also included enhanced data collection technology capabilities. For example, the eCPAT app integrated a camera function that can take photos within items assessed to provide supplemental detail. Additionally, using the global positioning system (GPS) within the device, the eCPAT application can effectively collect latitude and longitude coordinates for items assessed which can then be exported into geographic information

systems (GIS) software. All of these eCPAT app features were designed to improve functionality and enhance interpretation of data collected as well as increase tool reliability and validity which is the focus of this study.

Study Setting and Data Collection

This study occurred in June 2014 in Greenville County, SC. Greenville County has a total of 103 parks that vary with respect to size (0.1–293.2 acres), quality, features, neighborhood composition, and geographic dispersion. A sample of 50 parks was chosen to represent a diverse mix of park and neighborhood characteristics while staying within a 30 mile radius from the City of Greenville center to alleviate travel concerns (Figure 4.3).

This study was conducted in collaboration with Greenville County Parks, Recreation, and Tourism, the City of Greenville Parks and Recreation Department, and LiveWell Greenville in Greenville County, SC. As part of a larger eCPAT project exploring the use of technology to improve youth empowerment and advocacy for community health promotion efforts, 150 youth ages 12-18 years of age were recruited through existing youth groups and programs to garner a broad cross-section of participants. Recruitment methods included distribution of a recruitment flyer through email and hard copies to Greenville County schools, after school groups, and parks and recreation programs, as well as a recruitment booth at a local youth summer park program event. For the larger study, blocked randomization using a random number generator was used to allocate youth into one of three park audit conditions ensuring similar group sizes (approximately 50 per group). The Control group or no treatment group did not complete any park audits, the Paper group completed park audits using the original paper CPAT,

and the eCPAT group completed park audits using the eCPAT tablet application. Subsequently, a subsample of the Control group completed park audits using both the CPAT and eCPAT formats (Both group). This paper reports on data collected from youth using the eCPAT application (eCPAT and Both groups) during the project. Both parental consent and youth assent were obtained prior to youth participation in the project and this study was approved by the Institutional Review Board (IRB) at the University of South Carolina.

All youth participants attended an hour-long project meeting that included a brief overview of the project (15 minutes) and audit tool training (15 minutes) that consisted of basic instructions, definitions, and an app navigation demonstration. As part of the meeting, youth also completed an on-site practice park audit with the eCPAT app (30 minutes) at an adjacent park. Youth were then randomly-assigned two parks each (paired with a different youth for each park) and completed their park audits independently. Youth park visits occurred over the course of one week and were supervised by project staff. Quantitative park audit data were captured in each park by youth using the newly developed eCPAT application on Google Nexus 10 tablets provided for them. In addition, a trained researcher (the lead author) completed a gold standard audit using the eCPAT application in all study parks. All eCPAT park audit data was transferred wirelessly to an encrypted server for data analysis upon audit completion. Youth received a $50 gift card for attending the initial project meeting and submitting their two park audits and completing brief pre- and post-project surveys (not described here).

Analysis

To examine eCPAT tool validity and reliability, this study utilized data from youth who conducted park audits using the newly developed eCPAT application. Cohen's kappa[159] and percent agreement[160] statistics were used to examine i) criterion-related validity when youth audits for a park were compared to those of a gold standard researcher, and ii) inter-rater reliability among paired youth eCPAT ratings of the same park (note: youth were randomly chosen as the validity comparison for each park).[161,162] Both kappa and percent agreement are valuable measures for environmental audits because percent agreement statistics are robust when there is little variability in features being rated or ratings by auditors, while kappa statistics account for chance agreement between raters.[4,137] Further, it has been suggested that reporting the proportion of agreement alongside kappa values could help the reader understand possible prevalence or bias effects in the data.[163-165] Validity and reliability ratings were only calculated for items for which at least three pairs of ratings were available across the sample of parks.[166] Percent agreement statistics were evaluated using the following established criteria: 75-100%=excellent; 60-74%=moderate; and less than 60%=poor.[143] Observed kappa statistics were interpreted using guidelines provided by Landis and Koch: 0.80-1.00=almost perfect to perfect agreement; 0.60-0.79=substantial agreement; 0.40-0.59=moderate agreement; 0.20-0.39=fair agreement; and 0.00-0.19=poor agreement.[159]

Results

Data from a total of 52 youth were used in the present analyses. Youth participant characteristics are shown in Table 4.1. Youth ranged from 11 to 18 years of age (M=14.0, SD=1.6). Youth participants were split between middle and high school grades, with just

over half (58%) in or starting high school. The majority of youth were female (63.5%), white (63.5%) or African American (26.9%), and had a normal body mass index (BMI; 84.0%).

Originally, a sample of 50 parks was selected for this study. However, due to attrition, a lesser number of paired auditors existed for some parks. Three parks lacked paired validity ratings, while four parks lacked paired inter-rater reliability ratings. This resulted in a final sample of 47 parks with validity ratings and 46 parks with reliability ratings used in the present analyses. Selected characteristics of the 47 parks are shown in Table 4.2. Parks ranged in size from 0.3 to 36.7 acres (M=9.8, SD=10.0) and had a diversity of features ranging from 1 to 26 activity areas per park, with an average of almost 6 activity areas per park (M=5.9, SD= 4.1). Parks were geographically dispersed across five park and recreation districts throughout Greenville County, with the majority (53.2%) located in the City of Greenville. Parks were located across neighborhoods (census block groups) that were diverse with respect to household income and racial composition. On average, park neighborhoods had a mean household income of $44,900 and were composed of an average of 40.6% racial minority population.

The eCPAT application collected information regarding 149 distinct items, of which 18 items had an insufficient number of ratings (i.e., less than 3 pairs) for accurate validity or reliability to be determined.[166] Further, for 41 items, kappa statistics could not be calculated or were inappropriate due to insufficient item variability, in which case percent agreement was used. This resulted in 90 items examined using Cohen's kappa, while the remaining 41 items were examined using percent agreement. Validity and reliability results are shown in Table 4.3. With respect to criterion validity, kappa

statistics between the trained researcher and youth auditors demonstrated moderate to perfect kappas for 40.0% of items, while 32.2% of the items demonstrated fair validity. In the items that explored validity using percent agreement between the trained researcher and the youth auditor, all but two items demonstrated excellent agreement exceeding 75%, with most items well above 90%.

With respect to inter-rater reliability between youth auditors, kappa analysis demonstrated a moderate to perfect degree of reliability for 41.1% of the items, and a fair degree of reliability for 30.0% of the items. In the remaining tool items explored by percent agreement between the youth auditors, all but four items demonstrated moderate to excellent reliability exceeding 70% agreement, with most items well above 80%. eCPAT items that had worse validity and reliability were commonly related to sub-elements of park activity areas or safety concerns that were more subjective in nature (i.e., Does the playground have separation from the road?, How much of the park could be lit?), had temporal variability (i.e., Are there signs that state park event/ program information?), or consisted of abstract or challenging concepts and definitions (i.e., lack of eyes on the street, wooded area vs trees throughout the park).

Discussion

Modifying park and neighborhood environments is a promising strategy for improving community health.[2,3] A growing body of literature reveals that park characteristics are important predictors of youth park-based PA.[42,56] Creation of a user-friendly electronic park audit tool can provide a more interactive and hands-on way for youth to engage with their local communities and facilitate participation in park-related health promotion and advocacy efforts.[18,78,80] However, understanding the ability of youth

to obtain valid and reliable information via technology is an important first step in this process. This study described the development and validity and reliability testing of the eCPAT application for use by youth.

Comprising two main application screens (i.e., home screen and data entry screen), the eCPAT app consisted of 149 items under 4 headings and incorporated a variety of technology benefits such as a touch screen interface, improved functionality and usability, integrated camera and GPS/GIS capabilities, answer validation, and wireless data transfer. Items used in the eCPAT app originated from the paper CPAT tool that previously established content validity for a variety of park characteristics (e.g., park quality, youth-oriented features) frequently not rated in other audit tools.[23] Additionally, the eCPAT app incorporated technology design and functionality elements suggested by key informants (e.g., colorful game-like appearance, simple and intuitive, built-in instructions/help) to make the app more user-friendly for use with youth.

A large portion of the eCPAT items demonstrated moderate to perfect validity and reliability demonstrated by Cohen's kappa. As well, almost all of the items assessed using percent agreement demonstrated excellent validity and reliability. These findings are similar to those of the original CPAT tool indicating strong inter-rater reliability when tested among a diverse group of community stakeholders.[23] The most consistently valid and reliable items assessed the presence/absence of common activity areas (e.g., playgrounds, baseball fields) and supporting park amenities (e.g., restrooms, drinking fountains). This finding is not surprising as previous research has found that environmental audits have greater accuracy and consistency for items related to the

presence or number of park characteristics due to a reduced amount of subjective influence on such ratings.[23,166]

Less than one third of eCPAT items demonstrated poor validity and reliability with youth. Items that had lower kappa or percent agreement scores tended to be more subjective, temporal, or abstract in nature. Subjective items often required youth to make decisions about the adequacy of distances (i.e., Does the playground have *separation* from the road?, Are there drinking fountains *near* activity areas?). More detailed explanations of ambiguous spatial terms or use of specified distances could improve the precision and accuracy of youth answers. Additionally, items that consisted of abstract concepts (i.e., Are there lack of eyes on the street?) were more difficult for youth to answer accurately. While these items typically included additional cues (e.g., absence of people, no houses or store fronts), the use of a sub-question within the item or instructions (i.e., If you needed help, would someone see/notice you?) might help youth to better understand the concept being rated. As well, for several items, youth demonstrated a lack of consistency in rating in whether something was in "good condition". This result may have been due to the overall lack of variability in condition among study parks combined with the dichotomous nature of the answer option (yes/no) that potentially encouraged a skewed interpretation of what comprised good condition (i.e., because most of the study park elements were in good condition, youth may have noted very minor differences as being in not good condition). On the other hand, this result may have been indicative of an insufficient operational definition of "good condition" incorporated into the tool. Future versions of the eCPAT could further define a system for understanding this concept, such as standardized relational examples (e.g.,

guidelines as to what constitutes good/not good condition across any park) or a discussion of how to interpret condition variability within defined parameters (e.g., within a set of very good parks, x, y, or z should constitute not good condition). Finally, beyond the aforementioned suggestions regarding improving the validity and reliability of the eCPAT app, enhanced integration of basic tips or reminders about how to correctly conduct observational audits (i.e., review all instructions and examples prior to conducting an audit, direct observation of each item required) within the app could generally improve youth assessment of park characteristics.

Strengths of this study include the use of an innovative mobile technology data collection tool that incorporated answer validation and wireless data submission that ensured complete park audit data and reduction of data entry errors. Additional technology benefits included improved usability, functionality, and the integration of instructions, definitions, and example pictures. As well, data for this study were collected by a diverse group of youth ages 11-18 that were sampled within the context of a larger randomized study which improves generalizability of the tool's use among other youth populations. Likewise, this study sampled a large number of parks in Greenville County, SC that represented a diverse mix of park and neighborhood characteristics.

This study also had several limitations. For example, although directions for how to appropriately answer all items were included in the instruction and example photo sections of the application, data on whether or not youth accessed these features were not captured in this study. Future evaluation of the eCPAT app should include collection and analysis of touch screen metrics and log files to understand application features accessed to compare against validity and reliability results to ensure adequate interpretation and

operationalization is occurring. If warranted, future versions of the eCPAT tool could incorporate more pronounced reminders of instructional features to ensure their use by youth auditors. Additionally, this study included cross-sectional data from one only county in South Carolina. Despite our large sample of parks, for certain items within the eCPAT app, there was insufficient variability across parks to adequately calculate a kappa statistic. Further, certain items (e.g., skate parks, splash pads) did not occur in enough parks (or at all) which prevented collection of an adequate number of pairs of ratings to conduct reliability or validity analyses on those items.[166] Kappa statistics are also limited in their ability distinguish among various types and sources of agreement and they are influenced by prevalence and bias making it difficult to compare results across studies or populations.[171] Further, it is possible that kappa statistics may be low even when there are high levels of percent agreement.[172] However, several researchers note that reporting the proportion of agreement alongside kappa values augments the understanding of results and facilitates enhanced decision making regarding the quality of data.[163,164] Finally, while all youth attended the one-hour project meeting that included a brief tool training, youth characteristics such as technology competency or experience in parks could have influenced the validity or reliability of results.

Implications

The results of this study have several implications for practice, policy, and research. First, there is a growing need for valid and reliable mobile technology tools for use by youth within participatory action research.[19,46] Our results demonstrated that using the eCPAT app, youth are able to independently reach similar conclusions regarding the availability, usability, and condition of park characteristics that were comparable to those

of a trained researcher. Ensuring data quality within PAR frameworks is fundamental to understanding community needs and developing environmental action plans[173,174] and our findings establish that youth can make valuable contributions within this process. Second, given the proliferation of smartphones, tablets, and other electronic devices among both adolescents and adults[26], the eCPAT app has potential to be distributed and used widely by the general public. For example, the eCPAT app could be utilized to crowdsource environmental park data that could be uploaded in real time to a database interface for others to access and benefit from. Similarly, future practice or research efforts could incorporate eCPAT app data collection into Park Prescription initiatives to improve community awareness of park features and attributes in an effort to increase park-based PA.[175,176] Finally, adaptation of the eCPAT app for use by local planning officials could allow agencies to collect and make data-driven decisions based on specific community needs, as well as assist with standardization of aggregated nationwide parks and recreation resource data (a priority identified by diverse agencies across the U.S.).[132,133]

Conclusion

This study was a part of a broader research project to engage youth in becoming advocates for healthy community design and represents an important next step in ongoing research about the role of technology in youth empowerment for and engagement in health promotion efforts. The eCPAT app is a youth-oriented mobile technology application that provides a comprehensive assessment of park environments. Future dissemination of this research will integrate the eCPAT app into youth-led, community-based participatory research projects to advocate for and implement positive park changes in an effort to improve overall community health.

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Table 4.1 Youth Participant Characteristics

Characteristic	n (%)
Total	52 (100.0)
Age	
Middle school (12-13 yrs)	21 (42.0)
High school (14-18 yrs)	29 (58.0)
Gender	
Male	19 (36.5)
Female	33 (63.5)
BMI	
Underweight (< 5%)	3 (6.0)
Normal (5-84.99%)	42 (84.0)
Overweight (85-94.99%)	2 (4.0)
Obese (>=95%)	3 (6.0)
Race	
White	33 (63.5)
Black	14 (26.9)
Other	1 (1.9)
2 or more races	4 (7.7)

Table 4.2 Study Park Characteristics

Characteristic	n (%)
Total	47 (100.0)
Size (acres)	
0-4.99	23 (48.9)
5-9.99	5 (10.6)
10-14.99	7 (14.9)
>=15	12 (25.5)
Activity areas per park	
1-3	12 (25.5)
4-6	20 (42.5)
>=7	15 (32.0)
Location by district	
City of Greenville Parks and Recreation	25 (53.2)
Greenville County Parks, Recreation, and Tourism	14 (29.8)
City of Mauldin Parks and Recreation	4 (8.5)
City of Simpsonville Parks and Recreation	3 (6.4)
City of Greer Parks and Recreation	1 (2.1)
Neighborhood median income (quartiles)[a,b]	
Lowest	12 (25.5)
Second	12 (25.5)
Third	12 (25.5)
Fourth	11 (23.4)
Neighborhood minority population (%)[b]	
0-24	20 (42.6)
25-49	11 (23.4)
50-74	7 (14.9)
75-100	9 (19.1)

[a]Income quartiles ($): 16,321-24,306; 24,307-43,095; 43,096-56,856; 56,857-112,500

[b]Neighborhood income and minority proportion are based on data from the American Community Survey 5-year estimates (2008-2012) for block groups containing park area

Table 4.3 eCPAT Validity and Reliability

	Validity			Reliability		
eCPAT Item	**Pairs of ratings**	**Kappa**	**% agreement**	**Pairs of ratings**	**Kappa**	**% agreement**
Can the park be accessed for use?	47	0.000[b]	89.4%	46	-0.081[b]	84.8%
Are there signs that state the following?						
Park name?	47	0.897	97.9%	46	0.646	89.1%
Park hours?	47	0.517	80.9%	46	0.562	80.4%
Park contact information?	47	0.003	44.7%	46	0.203	71.7%
Park/facility rental information?	47	0.287	76.6%	46	0.777	95.7%
Park rules?	47	0.236	61.7%	46	0.397	69.6%
Park map?	47	0.486	89.4%	46	0.238	89.1%
Park equipment rental?	47	0.000[b]	97.9%	46	N/A[b]	95.7%
Park event/program information?	47	0.082	80.9%	46	0.179	87.0%
None present	47	0.846[b]	97.9%	46	0.631[b]	93.5%
How many points of entry does the park have?	47	0.314	51.1%	46	0.434	63.0%
Is there a public transit stop within sight of the park?	47	0.293[b]	91.5%	46	0.139[b]	84.8%
What types of parking are available?						
None	47	-0.044[b]	91.5%	46	-0.062[b]	87.0%
Parking lot	47	0.663	85.1%	46	0.849	93.5%
On street parking	47	0.732	87.2%	46	0.284	65.2%
Bike rack(s)	47	0.555	91.5%	46	0.330	87.0%
Are there sidewalks on any roads bordering the park?	47	0.654	83.0%	46	0.518	76.1%
Are the sidewalks usable?	23	0.000[b]	95.7%	20	0.000[b]	95.0%

[a]Insufficient pairs of ratings for accurate validity or reliability to be determined

[b]Insufficient item variability across parks to use kappa

Table 4.3 eCPAT Validity and Reliability (cont.)

	Validity			Reliability		
eCPAT Item	**Pairs of ratings**	**Kappa**	**% agreement**	**Pairs of ratings**	**Kappa**	**% agreement**
Are there curb cuts?	23	0.058	69.6%	20	-0.053	60.0%
Is there an external trail or path connected to the park?	47	0.214	63.8%	46	0.513	76.1%
Is the external trail useable?	5	N/A[b]	100.0%	14	0.000[b]	92.9%
Are there bike routes on any roads bordering the park?						
Bike lane	47	0.286	85.1%	46	0.385	89.1%
Bike route sign	47	0.000[b]	95.7%	46	0.367[b]	93.5%
Share the road signs/markers	47	0.000[b]	95.7%	46	-0.045[b]	91.3%
Bike routes none	47	0.376	85.1%	46	0.328	82.6%
Are there nearby traffic signals on any roads bordering the park?	47	0.115	55.3%	46	0.261	63.0%
What are the main land use(s) around the park?						
Residential	47	0.314[b]	80.9%	46	0.256[b]	69.6%
Commercial	47	0.315	78.7%	46	0.125	76.1%
Institutional	47	0.588	87.2%	46	0.246	78.3%
Industrial	47	0.150	85.1%	46	0.120	82.6%
Natural	47	0.231	61.7%	46	0.391	69.6%
None present	47	0.000[b]	95.7%	46	-0.045[b]	91.3%
Which of the following safety or appearance concerns are present in the neighborhood surrounding the park:						
Poor lighting	47	0.157	59.6%	46	0.386	71.7%

[a]Insufficient pairs of ratings for accurate validity or reliability to be determined

[b]Insufficient item variability across parks to use kappa

Table 4.3 eCPAT Validity and Reliability (cont.)

	Validity			Reliability		
eCPAT Item	**Pairs of ratings**	**Kappa**	**% agreement**	**Pairs of ratings**	**Kappa**	**% agreement**
Graffiti	47	-0.068[b]	87.2%	46	0.148[b]	84.8%
Vandalism	47	-0.060[b]	87.2%	46	-0.066[b]	84.8%
Excessive litter	47	0.084	72.3%	46	0.072	80.4%
Heavy traffic	47	0.256	78.7%	46	0.617	91.3%
Excessive noise	47	0.301	80.9%	46	0.281	82.6%
Vacant or unfavorable buildings	47	0.084	72.3%	46	0.378	84.8%
Poorly maintained properties	47	0.138	66.0%	46	0.275	76.1%
Lack of eyes on the street	47	0.081	70.2%	46	0.046	78.3%
Evidence of threatening persons or behaviors	47	0.288[b]	91.5%	46	0.789[b]	97.8%
None present	47	0.138	66.0%	46	0.185	60.9%
Playground#	47	0.735	87.2%	46	0.721	87.0%
Useable?	30	N/A[b]	100.0%	30	N/A[b]	100.0%
Good condition?	30	0.375	80.0%	30	0.172	73.3%
Distinct areas for different age groups?	30	0.315	70.0%	30	0.068	66.7%
Colorful equipment?	30	0.444	83.3%	30	0.375	80.0%
Shade cover for some (25%+) of the area?	30	0.348	66.7%	30	0.267	63.3%
Benches in/surrounding area	30	0.255	76.7%	30	0.259	86.7%
Fence around area?	30	0.645	83.3%	30	0.648	83.3%
Separation or distance from road?	30	0.118	70.0%	30	0.167	73.3%
Sports Field#	47	0.615	85.1%	46	0.426	76.1%
Useable?	4	N/A[b]	100.0%	3	N/A[b]	100.0%
Good condition?	4	1.000	100.0%	3	0.000	66.7%

[a]Insufficient pairs of ratings for accurate validity or reliability to be determined

[b]Insufficient item variability across parks to use kappa

Table 4.3 eCPAT Validity and Reliability (cont.)

	Validity			Reliability		
eCPAT Item	**Pairs of ratings**	**Kappa**	**% agreement**	**Pairs of ratings**	**Kappa**	**% agreement**
Baseball Field#	47	0.890	93.6%	46	0.765	89.1%
Useable?	13	N/A[b]	100.0%	5	0.000[b]	80.0%
Good condition?	13	0.114	53.8%	5	0.545	80.0%
Swimming Pool#	47	N/A[b]	100.0%	46	0.000[b]	97.8%
Useable?[a]	0	N/A	Empty	0	N/A	Empty
Good condition?[a]	0	N/A	Empty	0	N/A	Empty
Splash Pad#	47	0.000[b]	95.7%	46	-0.015[b]	93.5%
Useable?[a]	0	N/A	Empty	0	N/A	Empty
Good condition?[a]	0	N/A	Empty	0	N/A	Empty
Basketball Court#	47	0.702	83.0%	46	0.720	84.8%
Useable?	19	0.000	94.7%	18	0.000	94.4%
Good condition?	19	-0.067	47.4%	18	0.649	83.3%
Tennis Court#	47	0.629	89.4%	46	0.776	93.5%
Useable?[a]	0	N/A	Empty	3	N/A	100.0%
Good condition?[a]	0	N/A	Empty	3	N/A	100.0%
Volleyball Court#	47	0.791	97.9%	46	0.657	97.8%
Useable?[a]	2	N/A	100.0%	1	N/A	100.0%
Good condition?[a]	2	0.000	50.0%	1	N/A	100.0%
Trail#	47	0.329	61.7%	46	0.605	78.3%
Useable?	13	N/A[b]	100.0%	11	N/A[b]	90.9%
Good condition?	13	0.755	92.3%	11	-0.100	81.8%
Connected to activity areas	10	N/A[b]	100.0%	10	0.000[b]	70.0%
Distance markers/sign	12	0.333	66.7%	10	-0.015	50.0%

[a]Insufficient pairs of ratings for accurate validity or reliability to be determined

[b]Insufficient item variability across parks to use kappa

Table 4.3 eCPAT Validity and Reliability (cont.)

	Validity			Reliability		
eCPAT Item	**Pairs of ratings**	**Kappa**	**% agreement**	**Pairs of ratings**	**Kappa**	**% agreement**
Benches along trail	12	0.167	58.3%	10	-0.200	40.0%
What is the trail surface?	12	0.750	91.7%	10	0.000	80.0%
Fitness Equipment/Station#	47	0.324[b]	97.9%	46	0.324[b]	97.8%
Useable?[a]	1	N/A	100.0%	0	N/A	Empty
Good condition?[a]	1	N/A	100.0%	0	N/A	Empty
Skate Park#	47	N/A[b]	97.9%	46	0.000[b]	97.8%
Useable?[a]	0	N/A	Empty	0	N/A	Empty
Good condition?[a]	0	N/A	Empty	0	N/A	Empty
Off-leash Dog Park#	47	0.384[b]	93.6%	46	0.477[b]	93.5%
Useable?[a]	0	N/A	Empty	1	N/A	100.0%
Good condition?[a]	0	N/A	Empty	1	N/A	100.0%
Open/GreenSpace#	47	0.280	48.9%	46	0.345	54.3%
Useable?	12	0.000[b]	91.7%	13	0.629[b]	92.3%
Good condition?	12	0.000	58.3%	13	0.156	61.5%
Lake#	47	0.484[b]	95.7%	46	-0.034[b]	91.3%
Useable?[a]	1	N/A	100.0%	0	N/A	Empty
Good condition?[a]	1	N/A	100.0%	0	N/A	Empty
Is there a designated swimming area?[a]	1	N/A	100.0%	0	N/A	Empty
Are restrooms available?	47	0.786	89.4%	46	0.778	89.1%
Useable?	19	0.420	78.9%	17	0.452	76.5%
Good condition?	19	0.208	52.6%	17	0.457	64.7%
Is there a family restroom?	19	0.457[b]	89.5%	17	0.301[b]	82.4%

[a]Insufficient pairs of ratings for accurate validity or reliability to be determined

[b]Insufficient item variability across parks to use kappa

Table 4.3 eCPAT Validity and Reliability (cont.)

	Validity			Reliability		
eCPAT Item	**Pairs of ratings**	**Kappa**	**% agreement**	**Pairs of ratings**	**Kappa**	**% agreement**
Is there a baby change station in any restroom?	19	0.756	89.5%	17	0.443	76.5%
Are there drinking fountain(s) at the park?	47	0.692	85.1%	46	0.671	84.8%
Drinking fountain#	15	0.439	73.3%	13	0.226	61.5%
Useable?	15	0.348	60.0%	13	0.500	69.2%
Good condition?	15	-0.143[b]	46.7%	13	0.480[b]	69.2%
Near activity areas?	15	0.082	60.0%	13	-0.083	61.5%
Are there bench(es) to sit on in the park?	47	0.386[b]	89.4%	46	0.327[b]	87.0%
Useable?	40	N/A[b]	90.0%	38	0.084[b]	78.9%
Good condition?	40	0.301	67.5%	38	0.320	65.8%
Are there picnic table(s) in the park?	47	0.897	97.9%	46	0.668	91.3%
Useable?	41	-0.038[b]	90.2%	37	0.226[b]	86.5%
Good condition?	41	-0.063[b]	53.7%	37	0.065[b]	56.8%
Is there a picnic shelter in the park?	47	0.811	91.5%	46	0.809	91.3%
Is there a grill or fire pit in the park?	47	0.744	87.2%	46	0.696	84.8%
Are there trash cans in the park?	47	0.000[b]	95.7%	46	0.367[b]	93.5%
Are they overflowing with trash	45	0.199[b]	86.7%	42	0.232[b]	83.3%
Are they near activity areas?	45	-0.158	64.4%	42	0.156	71.4%
Are recycling containers provided?	47	0.632	93.6%	46	0.691	93.5%
Is there food/vending machines available in the park?	47	0.221	87.2%	46	0.657	97.8%
Are fruits and/or vegetables available in the park?[a]	1	N/A[b]	100.0%	1	N/A	100.0%

[a]Insufficient pairs of ratings for accurate validity or reliability to be determined

[b]Insufficient item variability across parks to use kappa

Table 4.3 eCPAT Validity and Reliability (cont.)

eCPAT Item	Validity			Reliability		
	Pairs of ratings	Kappa	% agreement	Pairs of ratings	Kappa	% agreement
If the sun was directly overhead, how much of the park would be shaded?	47	0.413	66.0%	46	0.531	73.9%
Are there rules posted about animals in the park?	47	0.595	80.9%	46	0.660	84.8%
Is there a place to get dog waste pick up bags in the park?	47	0.636	85.1%	46	0.710	89.1%
Are bags available at any of the locations?	10	-0.111[b]	80.0%	9	-0.174[b]	66.7%
Are there lights in the park?	47	0.422	72.3%	46	0.419	71.7%
How much of the park could be lit?	23	0.324	65.2%	21	0.008	42.9%
Are the activity areas lit?	23	0.224	52.5%	21	0.087	42.9%
Is the park monitored?	47	0.067	72.3%	46	0.434	87.0%
Are there any emergency devices in the park?	47	N/A[b]	97.9%	46	0.000[b]	97.8%
From the center of the park, how visible is the surrounding neighborhood?	47	0.243	55.3%	46	0.461	67.4%
Are there road(s) of any type through the park?	47	0.269	74.5%	46	-0.095	58.7%
Are there traffic control mechanisms on the roads within the park?	4	0.000	50.0%	2	1.000	100.0%
Which of the following park quality or safety concerns are present in the park?						
Graffiti	47	0.121	72.3%	46	0.330	87.0%
Vandalism	47	-0.079[b]	85.1%	46	-0.089[b]	82.6%
Excessive litter	47	-0.099	66.0%	46	0.289	80.4%
Excessive animal waste	47	N/A[b]	100.0%	46	N/A[b]	100.0%

[a]Insufficient pairs of ratings for accurate validity or reliability to be determined

[b]Insufficient item variability across parks to use kappa

Table 4.3 eCPAT Validity and Reliability (cont.)

eCPAT Item	Validity			Reliability		
	Pairs of ratings	Kappa	% agreement	Pairs of ratings	Kappa	% agreement
Excessive noise	47	-0.040[b]	78.7%	46	0.213[b]	80.4%
Poor maintenance	47	0.714	89.4%	46	0.354	71.7%
Evidence of threatening persons or behaviors	47	0.292[b]	91.3%	45	0.477[b]	95.6%
Dangerous spots in the park	47	0.253	78.3%	45	0.167	77.8%
Other	47	0.357	68.1%	46	0.387	69.6%
What aesthetic features are present in the park?						
Evidence of landscaping	47	0.465	72.3%	46	0.361	69.6%
Artistic feature	47	0.321	78.7%	46	0.284	80.4%
Historical or educational feature	47	0.410	80.9%	46	0.125	76.1%
Wooded area	47	-0.062	48.9%	46	-0.062	47.8%
Trees throughout the park	47	0.299	66.0%	46	0.103	56.5%
Water feature	47	0.670	89.4%	46	0.548	87.0%
Meadow	47	-0.114[b]	78.7%	46	0.042[b]	78.3%
None present	47	0.128	76.6%	46	0.243	78.3%

[a]Insufficient pairs of ratings for accurate validity or reliability to be determined

[b]Insufficient item variability across parks to use kappa

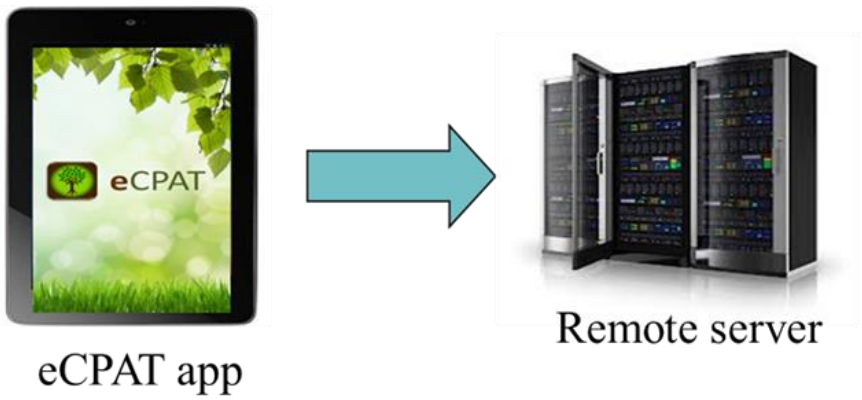

Figure 4.1 eCPAT App Wireless Data Transfer

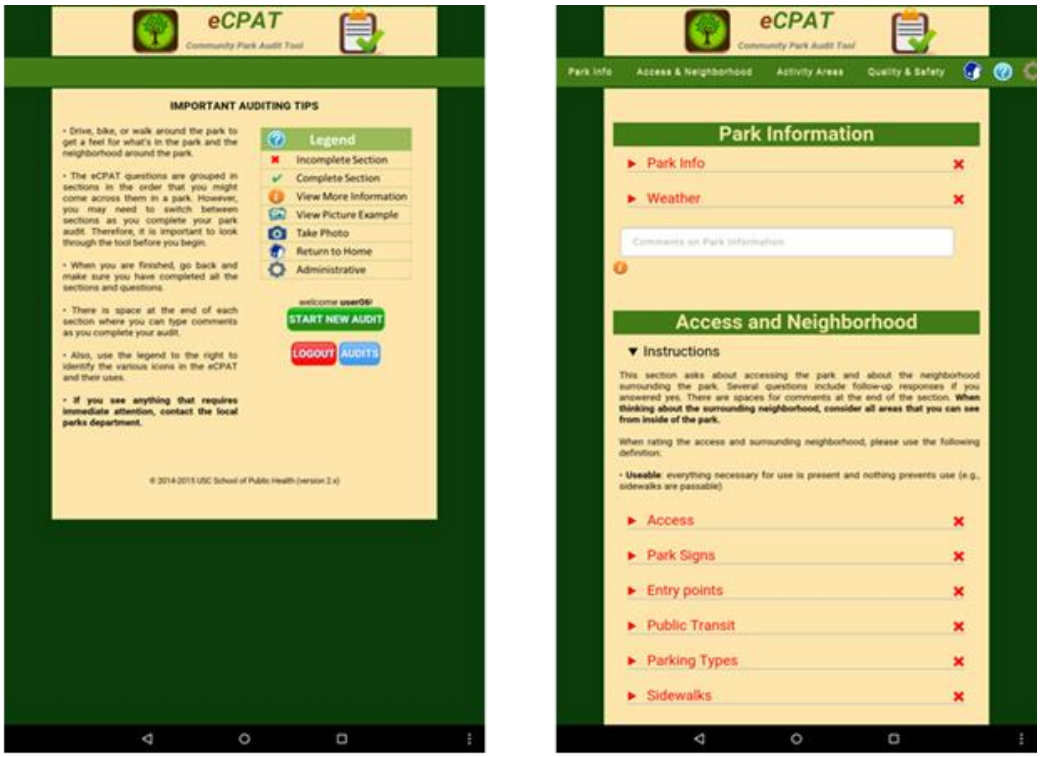

Figure 4.2 eCPAT App Screenshots

eCPAT Project Parks – Greenville County, SC

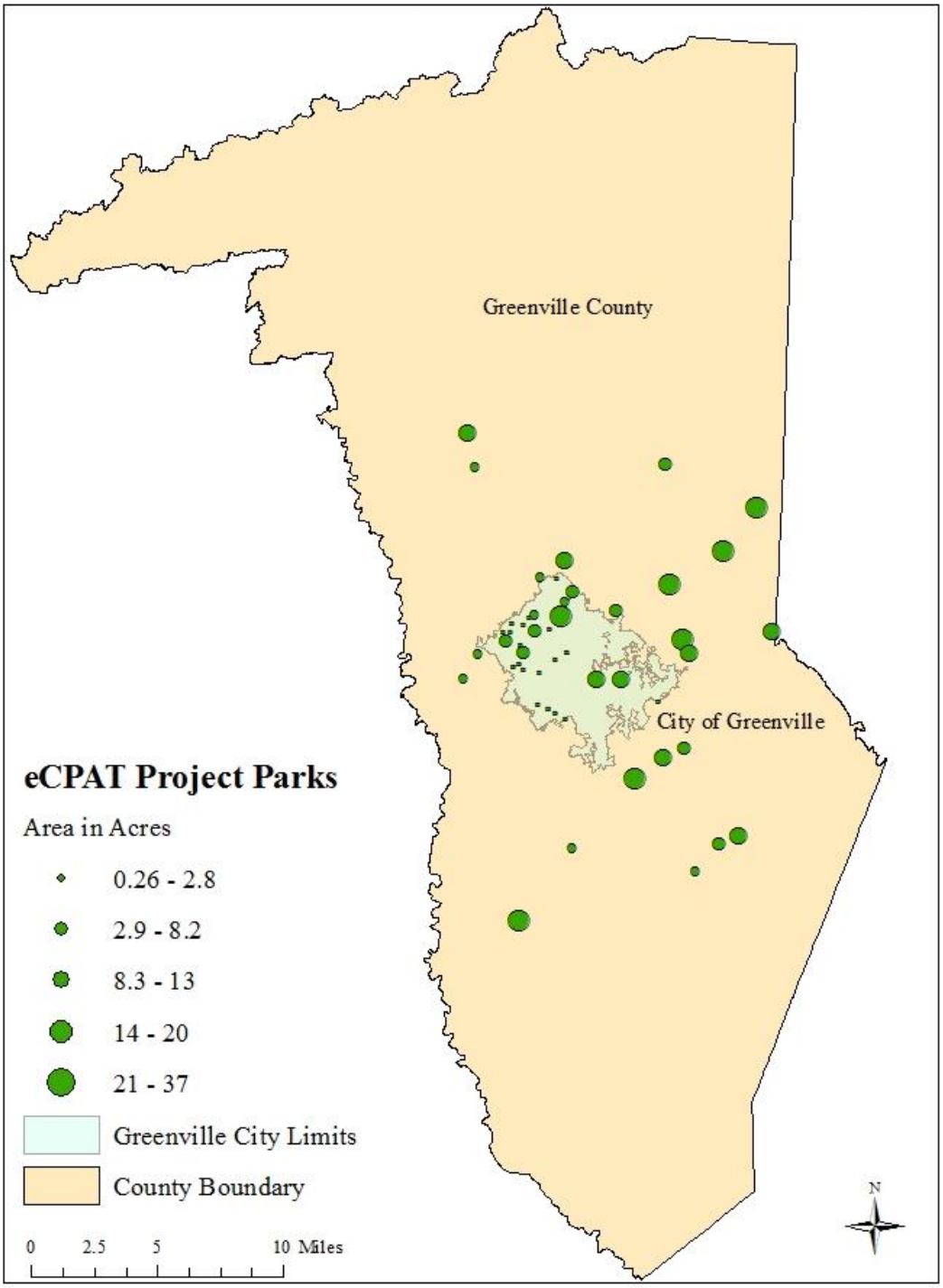

Figure 4.3 eCPAT Project Parks - Greenville, SC

CHAPTER 4: MANUSCRIPT 2

THE ELECTRONIC COMMUNITY PARK AUDIT TOOL (ECPAT) PROJECT: EXPLORING THE USE OF MOBILE TECHNOLOGY FOR YOUTH EMPOWERMENT AND ADVOCACY FOR HEALTHY COMMUNITY POLICY, SYSTEMS, AND ENVIRONMENTAL CHANGE[1]

[1]Besenyi, GM, Schooley, BL, Turner-McGrievy, G, Wilcox, S, Wilhelm Stanis, SA, Kaczynski, AT. To be submitted to *Frontiers in Public Health – Digital Health* section

Abstract

The purpose of the second study was to explore the use of eCPAT mobile technology on youth empowerment and advocacy within a PAR framework by examining tool usability, effectiveness of mobile technology on youth empowerment and advocacy, interaction effects between tool format and regular technology use, and tool format preferences. A total of 124 youth were randomized into one of three study conditions: Control, Paper, and eCPAT. Intervention youth completed two park audits using paper-pencil or mobile technology tools. Youth completed pre and post surveys that measured tool usability, technology, empowerment, advocacy, and youth demographics. Independent samples t-tests and MANCOVAs explored differences in post-project levels of tool usability and empowerment and advocacy scores between groups. Multivariate linear regression analysis explored the interaction between Control, Paper, or eCPAT group membership and mean technology use in predicting empowerment and advocacy. Youth indicated that the eCPAT tool had higher usability scores, was better liked, and was preferred over paper-pencil methods. No main or interaction effects were found for post-project levels of youth empowerment or advocacy between study conditions. Mobile technology should be viewed as a potential strategy for increasing youth empowerment and advocacy within PAR frameworks given its ubiquity and preference among youth. Future dissemination will integrate the eCPAT as a critical component of youth-led action oriented PAR projects to improve community health. Given the proliferation of smartphones and other electronic devices among both adolescents and adults, the eCPAT application also has potential to be distributed and used widely by both the general public

and professionals alike to achieve successful community engagement in healthy PSE change efforts.

Keywords: mobile technology, youth, participatory, empowerment, advocacy, usability, parks

Introduction

Over the past three decades, childhood obesity has emerged as a substantial public health issue given its association with an increased risk of a variety of health concerns, such as high blood pressure, high cholesterol, heart disease, diabetes, depression, and premature mortality.[1,2] Indeed national surveys indicate that childhood obesity rates have doubled in children and quadrupled in adolescents over the past three decades.[3] In 2011-2012, 17% or approximately 12.7 million American youth ages 2-19 years were obese, with obesity rates highest (20.5%) in 12 to 19 year olds.[4] Obesity is especially prominent in South Carolina where approximately 28% of children 2-5 years old and almost 1 in 3 high school students are overweight or obese.[4,5] This is particularly disconcerting because children who are overweight are 70% more likely to be overweight or obese as adults.[6] Being physically active can significantly reduce the risk of childhood obesity and obesity-related chronic diseases.[7,8] However, youth physical activity participation declines with age[9,10] with only 27% of U.S. students in grades 9-12 achieving recommended levels in 2013.[11]

Developing neighborhood and community policy, systems, or environmental (PSE) improvements that support physical activity, including the creation or enhancement of parks and recreation resources, is a promising solution to the childhood obesity crisis.[12,13] However, creating healthy community PSE change requires a transdisciplinary approach, involving participation from multiple parties including community members.[14] Youth, in particular, should be recognized as competent citizens and community builders that can contribute to healthy community PSE change efforts, especially ones that directly affect them, by drawing upon their perspectives and

improving municipal decision processes.[15,16] For example, in one prominent study, youth engaged in several activities to advocate for tobacco-free schools (e.g., testifying at board meetings, petitioning other youth) and of the seven schools that passed such policies, five had substantial evidence of youth involvement or initiation.[16] Within this study, "adults readily acknowledged both the importance of having youth support and the leadership roles youth played in gaining support for the policy."[16 (pg. 609-610)] Additionally, engaging and empowering youth in healthy PSE change efforts contributes to positive youth development and prepares them for roles as active citizens and future public health leaders.[15-17] For example, Checkoway et al. described how members of the San Francisco Youth Commission have an increasing amount of influence in public policy at the municipal level and these efforts contribute to the youth's political and social development.[15] They also stated that the youth "gain substantial knowledge of the community, practical skills in political advocacy and community organizing, and civic competencies for civil society."[15 (pg. 1159)]

Participatory action research (PAR) is a common approach among social science and public health researchers that emphasizes community participation through collective inquiry, data collection, and action to address community-based issues.[18,19] Recent youth PAR models emphasize the need to promote positive youth development via youth empowerment through increased youth engagement in socioeconomic, public, and political community processes so that youth may be seen as valued community resources.[20] Checkoway and colleagues agreed, stating that youth PAR is valuable because it can develop youth knowledge and perspectives on sociopolitical issues, encourage youth to exercise political rights, give a voice to an under-represented group,

prepare youth for active democratic participation, and increase youth's ability to create community change.[21] Indeed, several researchers suggest that youth PAR should be viewed as part of the social research movement that focuses on community-based action for health.[21,22]

Past research indicates several common characteristics among youth PAR frameworks for successful community health promotion, including concepts of youth engagement, participation, and, most importantly, empowerment.[18] Recognition of youth as vital assets that can foster socio-political change within the community is essential. This characteristic of youth PAR emphasizes the need for adults to accept youth as community change agents and provide a supportive environment that *engages* and challenges youth to take leadership roles. Also key is the understanding that as part of the empowerment process, youth must achieve *critical awareness* of community issues through some sort of knowledge or education component. Often, this requires the collection of information to better understand community needs and socio-political goals. Finally, the inclusion of youth in *meaningful participation* in action-oriented projects is critical. This step highlights the transfer of power from adults to youth to give youth a greater level of control as an important component to increasing youth empowerment.

A growing body of literature suggests that the use of innovative technology within a participatory action research (PAR) framework is a promising method to engage and empower youth participants in building healthy communities.[23-29] For example, the Youth Empowerment Strategies (YES) Project focused on the use of Photovoice as a way to engage youth in social change efforts by capturing photos of strengths and issues within their environments.[30] Their work with 122 youth ages 9-12 years old within 13

afterschool groups successfully fostered both individual and group-level empowerment through social action projects aimed at improving neighborhood conditions. Similarly, the Youth Neighborhood Mapping Initiative involved youth mapping neighborhood assets and liabilities and voicing their perspectives through the use of geographic information systems (GIS), photography, internet blogs, and other digital medias.[31] The use of technology facilitated the youths' ability to express their perspectives, thereby engaging them in efforts to increase knowledge of community issues, raise community awareness, and advocate to affect change within their communities. Another study of 57 youth and five community partners through seven projects developed a conceptual model (e-PAR) for using technology within PAR to engage youth in community health promotion.[25] These projects engaged youth with a variety of digital media (e.g., photography, videos, music, websites) to increase self-expression, communication, and skill building to improve youth empowerment, address community health issues, and create positive change.

Leveraging technology in this way can facilitate diverse dimensions of youth empowerment (e.g., create a welcoming and safe environment, generate equitable power sharing, encourage participation in sociopolitical processes to effect change) by helping us to better understand how youth interact with their environment,[32] offer new ways and formats for youth to engage civically,[33] and provide youth with a vehicle for meaningful participation in the community.[23,34] A summary of benefits of utilizing technology within youth PAR frameworks is shown in Table 4.4. For example, technology has been shown to increase youth self-efficacy (overall[35] and explicitly for health-related PAR[23]), improve youth motivation for PAR,[33] increase youth voice in the community

(assertiveness),[23] and provide political or social agency.[33,36] Technology can also improve youth empowerment by combating common issues with PAR. For example, Amsden and VanWynberghe[37] note that youth typically fail to understand what PAR really is. However, use of technology within youth PAR efforts can fight apathy,[33] support reflective thought,[38] make them more self-sufficient researchers,[39] and increase youth civic engagement.[23,40] Additionally, youth PAR is often fraught with issues of lack of trust and power sharing between adults and youth,[41] yet technology can improve relationships with adults through increased efficacy,[23] reduced youth anxiety,[23] improved communication,[42] and the promotion of equitable power sharing through increased youth control.[23,34]

While promising, youth advocacy for healthy community PSE change is an understudied and under-evaluated approach.[43] Further, a gap remains between the development of youth-oriented technology tools and the inclusion of such tools within youth PAR frameworks.[26] The process of improving communities to promote physical activity and health will take time, but developing adequate technology tools and preparing today's youth to be the future leaders of healthy communities is a crucial first step.[16,26] The present study builds on two previous projects: the development of the Community Park Audit Tool[44] (CPAT) and the Healthy Young People Empowerment (HYPE) Project.[45] The CPAT project engaged 34 community stakeholders from diverse backgrounds (parks and recreation, health care, planning, education, private business, parents, teenagers, etc.) in a year-long study to develop and test a park audit tool to assess the potential of parks to promote physical activity.[44] The project involved three workshops and testing of the CPAT in 66 parks across Kansas City, MO. The resulting

tool was six pages long, included four sections (park information, access and surrounding neighborhood, park activity areas, and park quality), and demonstrated strong inter-rater reliability.[44] As described by participants, this process also resulted in a variety of important secondary outcomes related to community building, awareness, advocacy, and substantially improved perceptions of the importance of parks for community health.[44]

The HYPE Project was developed to enhance the capacity of adolescents (12-17 years, especially from low income and minority backgrounds) to plan and implement PSE change projects centered around community healthy eating and active living needs.[45] HYPE was guided by the MATCH model of health promotion as well as empowerment and positive youth development theories within a social ecological framework.[22,46,47] The HYPE Project consists of facilitator-led, 60-minute sessions through five progressive stages (Think, Learn, Act, Share, Evaluate) and culminates in a youth-led community PSE change project.[45] As of today, the HYPE Project has been implemented with 258 youth within 21 youth groups across 15 counties in South Carolina. Of these, several groups have utilized the CPAT tool as part of their action planning. Preliminary results of the HYPE Project indicate youth saw increases in community awareness, empowerment for, and engagement in youth-led action planning for healthy eating and active living.[45] As well, youth qualitative feedback indicated the CPAT was helpful in collecting and using important environmental data in their PSE change efforts. However, youth participants felt that mobile technology would be an easier and considerably more engaging format to collect park data than the current paper-and-pencil method.[45] Therefore, to further advance this research and practice agenda, developing and testing

the viability of an electronic version of the community park audit tool (eCPAT) among youth is an important next step.

The purpose of this study was to explore the use of eCPAT mobile technology on youth empowerment and advocacy for healthy community policy, systems, and environmental change efforts. Our goal was to understand differences between youth using mobile technology or paper-pencil tools within a PAR framework. Specifically, we explored four research questions:

1. Which tool format (mobile technology vs. paper-pencil) has higher levels of usability?
2. What is the effectiveness of using mobile technology (versus paper-pencil or no treatment) on indicators of youth empowerment or advocacy?
3. Does regular technology use interact with tool format to predict levels of youth empowerment or advocacy?
4. Which tool format do youth prefer?

Methods

Conceptual Model

This study was guided by technology user engagement and youth empowerment theories (discussed further below).[22,25,48,49] The conceptual model for this study illustrated in Figure 4.4 depicts the process of developing and testing mobile application technology to improve indicators of youth empowerment for healthy PSE change efforts (e.g., self-efficacy, motivation, critical awareness, perceived sociopolitical control). As shown in the left side of the model, development of the eCPAT mobile application was accomplished by incorporating key attributes of technology that influence user

engagement (or disengagement) such as interface aesthetics, sensory appeal, control, and interactivity, as well as improvement of functionality through application features such as instructions, definitions, examples, and photo capabilities.[48] Interface attributes and application features, along with previously validated CPAT content,[44] provided the foundation to create a highly usable eCPAT application for use by youth. Development of the eCPAT app is discussed in greater detail below.

According to the model (Figure 4.4), it was expected that through use of the eCPAT mobile application, youth will experience enhanced technology-related benefits for participating in PAR efforts.[23,33,34] Technology benefits are expected to lead to improvements in dimensions of youth empowerment and advocacy, such as increased youth self-efficacy and motivation for becoming involved in community-based efforts, increased youth knowledge and critical awareness of community issues, and heightened perceptions of sociopolitical control and assertiveness for making healthy community changes.[25-27] As indicated in the model, some research has found that youth's access and use of technology can impact resulting levels of civic engagement.[50] Likewise, in one study of adults, mobile technology use was shown to be a positive predictor of civic participation, but this effect was moderated by mobile technology competence.[51] Therefore, as part of the conceptual model, this study will explore the potential moderating effect that regular technology use might have on post-project levels of empowerment and advocacy. Finally, improvements in youth empowerment are expected to positively influence youth advocacy and participation in healthy community PSE change efforts in the future.[22,27,49] While the conceptual model above represents the entire process from technology development to youth engagement with technology to actual

participation in PSE change efforts, this study did not involve a full intervention that addressed all of these stages. Rather, this study represented key initial stages of the conceptual model including the development and testing of the innovative technology vital for successful youth empowerment as well as preliminary analyses of the effect of engaging in data collection with the eCPAT app.

eCPAT App Development

Multiple iterative stages were used to comprehensively develop an electronic application of the Community Park Audit Tool.[44] Briefly, a systematic literature review of youth, technology, and health advocacy identified theoretical frameworks and key methodologies for developing mobile applications to engage youth in health promotion efforts.[22,25,48,49] To further inform application development, key informant interviews (n=5) were conducted with experts in youth advocacy for obesity prevention, health information technology, and technology within parks and recreation settings about topics related to application format, design, functionality, and preferred operating systems and mobile devices. Linking this information to technical programming design, a team of health promotion and computer science academics used PhoneGap (a cross-platform framework that allows application design for both Android and iOS platforms) to create the eCPAT application for use on Android tablets. Technical application development phases followed standard system design protocol and included: a system requirement analysis, software design, program coding, and unit alpha (capacity) testing by computer programmers. Concurrently, a Microsoft SQL database was designed to house wireless data transfer from the eCPAT app upon data submission. Upon application and server design completion, a second round of extensive capacity field testing of both the eCPAT

application and wireless data transfer and storage were conducted. Further details about the development and testing of the eCPAT app can be found elsewhere.[52] A comparison between the CPAT and the newly-developed eCPAT formats can be found in Table 4.5. Key improvements of the mobile technology format include enhanced interface attributes such as sensory appeal (e.g., touchscreen, colorful font/graphics), control (e.g., enhanced navigation), and interactivity (e.g., answer validation, messages). As well, the eCPAT app included additional technology functionality such as built-in instructions and examples, ability to take pictures, GPS/GIS data collection, wireless data transfer, and acknowledgment of successful completion.

Study Setting

This study occurred in Greenville County, South Carolina. Greenville County is an important setting for this study due to significantly high rates of obesity. The state of South Carolina is ranked 42nd in the nation for obesity, with 30.8% of the population having a BMI of 30 or greater. Among youth in South Carolina, almost 1 in 3 high school students is overweight or obese.[53] Likewise, in South Carolina, almost 60% of high school students and almost 50% of middle school students are not physically active at least 60 min/day on five or more days/week.[53] These problems are especially prominent in Greenville County, where 41% of students are overweight (19%) or obese (22%).[54] Additionally, Greenville County was determined as an ideal location for this study given that it leveraged the study team's prior partnerships with parks and youth agencies and extended previous research efforts with the Greenville County community.

Study Design and Participants

This study utilized a randomized untreated delayed control group design with pre-test/posttest as shown in Figure 4.5. With the assistance of Greenville County Parks, Recreation, and Tourism, the City of Greenville Parks and Recreation Department, and LiveWell Greenville, 150 youth 11-18 years of age were recruited through a variety of methods to garner a broad cross-section of participants. Recruitment methods included distribution of a recruitment flyer through email and hard copies to Greenville County schools, after school groups, and parks and recreation programs, as well as a recruitment booth at the opening ceremony of the Park Hop summer program. All recruitment materials (emails, flyers, QR code) directed parents and youth to an event planning website (EventBrite) for project registration. The website included an overview and specific aims of the project, youth project requirements and incentives, anticipated project data collection dates, and a link to the Built Environment and Community Health (BEACH) Laboratory website with a full project description. The study was open to youth of all racial and ethnic groups and inclusion criteria included being 11-18 years old, living in Greenville County or attending a Greenville County school, and being able to hear, speak, and comprehend English. Both parental consent and youth assent were required for all youth prior to participation in the eCPAT Project and this study was approved by the University of South Carolina Institutional Review Board.

Blocked randomization using a random number generator was used to allocate the 150 youth into one of three study conditions (i.e., Control, Paper, and eCPAT, as described further below) ensuring similar group sizes (approximately 50 per group).

However, to help reduce contamination between conditions, youth within the same family were assigned to the same condition.

Data Collection

Data for this study were collected in June 2014. Pre and post data collection numbers are shown in Figure 4.5. Prior to project participation, all youth were given a pre-test survey that gathered baseline information about youth empowerment and advocacy indicators, technology access and use, and demographics. Youth in the Paper and eCPAT conditions were considered part of the "intervention", which included an hour-long, condition-specific project meeting followed by independent youth collection of observational data within parks using either paper or mobile technology formats. The project meeting included an overview of the project (15 minutes) and audit tool training for their assigned tool (15 minutes) that consisted of basic instructions, definitions, and information about how to answer questions. Youth also completed an on-site practice park audit (30 minutes) with their assigned tool at a park adjacent to the community center where the project meeting was held.

Observational park audits took place in 47 parks in Greenville County, SC. Project parks were selected to represent a diverse mix of quality, size, features, and geographic dispersion while staying within a 30 mile radius from the City of Greenville center to alleviate travel concerns. Youth in the Paper and eCPAT groups were randomly assigned the name of two parks and asked to independently complete a park audit at each one using their assigned audit format (Figure 4.5). All park audits were completed at assigned times and under the supervision of research staff. Youth in the eCPAT app group were provided Google Nexus 10 tablets onsite, while youth in the Paper condition were

provided with pencils, clipboards, and paper copies of the CPAT tool. After completion of their assigned park audits, youth in the Paper and eCPAT conditions completed a posttest survey specific to their experimental condition.

Youth in the Control group received no treatment during the main portion of the study and were also given a posttest. After completion of the project posttest, a subsample of youth (n=31 from the Control group were recruited to participate in a "Both" group (Figure 4.5). Similar to the Paper and eCPAT conditions, youth in the Both group completed a brief project meeting where they received training and audit tool practice, with the exception that this condition utilized both paper and mobile technology formats. Youth in the Both group were then assigned two park names and asked to complete one park audit using the eCPAT and one using the paper-pencil CPAT. After completing the assigned park audits, youth in the Both group completed a project posttest. Once the pretest, park audit data collection, and posttest had occurred, as shown in Figure 4.5, a subsample of 20 youth from each condition (Paper, eCPAT, Both) were recruited to participate in focus group discussions that further explored youth experiences (not analyzed here; see Gallerani et al., in press).[55] Youth received a $50 gift card for attending the initial project meeting, submitting their assigned park audits, and completing brief pre- and post-project surveys.

Measures

All youth completed identical pre-project surveys and then condition-specific post surveys which included measures that captured constructs related to tool usability, impressions, and preferences, technology use, as well as indicators of youth empowerment and advocacy. Usability of each tool (Paper or eCPAT) was captured in

the post-project survey with a modified version of the System Usability Scale (SUS)[56] that was comprised of 10 items on a 5-point Likert scale (e.g, I thought the eCPAT app was easy to use; 1=Strongly disagree, 5=Strongly agree). SUS scores were computed according to standard protocols that resulted in values ranging from 0-100, with scores of 68 or higher signifying above average usability.[57,58] Overall impressions of audit tools were captures with a single item on a 5-point Likert scale (1=Very negative, 5 = Very positive). Audit tool preferences were captures with a series of questions asking which tool they found easiest, most enjoyable, would want to use in the future, and liked the best.

Technology dimensions were captured in the pre-project survey with a modified version of the Media and Technology Usage and Attitudes Scale (MTUAS).[59] This scale assessed information related to regular technology usage on a 10-point Likert scale (1=Never, 10=All the time) and included subscales that measured smartphone usage (9 items, $\alpha = 0.93$), text messaging (3 items, $\alpha = 0.84$), phone calling (2 items, $\alpha = 0.71$), internet searching (4 items, $\alpha = 0.91$), emailing (2 items, $\alpha = 0.91$), video gaming (2 items, $\alpha = 0.83$), and television viewing (2 items, $\alpha = 0.61$).[59] A composite technology use score was created by calculating a mean for each subscale and then averaging the seven subscales. Mean technology use was categorized as high (>5) or low ($\leq$ 5), designating differences in regular use between "several times per week" and "once per day". In addition, four survey items were specifically created within the context of this project to better understand youth readiness/willingness to use mobile technology for healthy community PAR. The items were measured on a 5-point Likert scale (1=Strongly disagree, 5=Strongly agree) and asked specifically about whether the youth would use

mobile technology to access community news, communicate with community leaders, voice opinions about changes, and advocate for community changes.

Youth *empowerment* was captured within the pre- and posttest using the Individual Community-Related Empowerment (ICRE) scale shown to have high content validity (Lawshe's formula, CVR = 0.98) and internal consistency (α = 0.86).[49] The scale consisted of five dimensions that measured self-efficacy for making changes in the community (7 items, α = 0.88), intention to get involved in the community (4 items, α = 0.83), motivation to get involved in the community (3 items, α = 0.69), participation in community activities (3 items, α = 0.81), and critical awareness of issues in the community (1 item). This scale was assessed using a 5-point Likert scale (1=Strongly disagree, 5=Strongly agree) and included items such as "I have the knowledge and skills to influence my community" and "I am willing to get involved in my community." Additionally, youth *advocacy* was captured using items from the evaluation of the Youth Engagement and Action for Health (e-Yeah) Program which were found to have moderate to good internal consistency reliability.[60] The four dimensions related to youth advocacy for obesity prevention and included assertiveness for being a leader in the community (3 items, ICCs = 0.474, 0.524, 0.678), perceived sociopolitical control for making changes in the community (4 items, ICCs = 0.311, 1.0), history of advocacy activity (2 items, ICC = 0.154), and knowledge of resources (1 item). This scale was assessed on a 5-point Likert scale (1=Strongly disagree, 5=Strongly agree) and included items such as "I can talk with adults about issues I believe in" and "I enjoy participation because I want to have as much say as possible in my school or community." A score for each youth empowerment or youth advocacy dimension was created by averaging items

within each subscale. Finally, youth demographic information was collected, including gender, date of birth, height, weight, race, ethnicity, bike ownership, and whether or not the youth received free or reduced lunch at school.

Analyses

A variety of analyses were conducted to answer the study research questions. To understand differences in tool usability, an independent samples t-tests was used to examine differences in mean usability scores between Paper and eCPAT conditions. To examine differences in post-project levels of youth empowerment and advocacy, factorial multivariate analyses of covariance (MANCOVAs) compared the mean posttest empowerment and advocacy dimension scores across the Control, Paper, and eCPAT conditions controlling for respective baseline levels of each construct. Separate models were conducted for youth empowerment (5 variables) and youth advocacy (4 variables) scales. Skewness and kurtosis values as well as box plots were obtained to examine the distributions of youth empowerment and youth advocacy variables. Outliers as identified by SPSS (i.e. interquartile range multiplied by 1.5) were removed prior to analyses.[61] To understand potential moderating effects of regular technology use on the relationship between group condition and post-project levels of youth empowerment and advocacy, multivariate linear regression analyses explored the interaction between Control, Paper, or eCPAT group membership and mean technology use. Finally, descriptive statistics, including frequencies and percentages, explored preferences for the Paper or eCPAT tools among youth in the Both group that utilized both versions. All analyses were performed in SPSS 22.

Results

A total of 136 youth participated in the study; however, 12 youth were lost to attrition resulting in a final sample of 124 youth (Figure 4.5). Youth participant characteristics by study condition are shown in Table 4.6. Youth ranged from 11 to 18 years of age (M=13.6, SD=1.7), with just over half (50.8%) of participants in middle school. Youth participants were fairly representative of the Greenville County population with respect to gender, race/ethnicity, and socioeconomic indicators.[62] The majority of youth participants were female (62.1%), white (62.1%), and owned a bike (83.9%). Chi square and ANOVA tests for distribution of youth characteristics between study conditions indicated no significant differences between groups for gender [$\chi^2(2) = 0.44$, $p = 0.802$], age [$F(2,133) = 0.79$, $p = 0.457$], race [$\chi^2(8) = 4.96$, $p = 0.762$], bike ownership [$\chi^2(8) = 0.55$, $p = 0.758$], or free/reduced school lunch [$\chi^2(6) = 9.70$, $p = 0.138$].

As part of our study, we wanted to understand baseline youth access to technology and readiness or willingness to use technology for community PAR activities. Results (shown in Table 4.7) indicate that the majority of youth had access to a variety of mobile devices including a smartphone (70.6%), tablet or iPad (61.8%), and/or a laptop (66.2%). Chi square and ANOVA tests for distribution of youth technology access between groups indicated no significant differences for any mobile device, with the exception of the Control group having slightly more access to laptops than the other groups [$\chi^2(2) = 7.43$, $p<0.05$]. Overall, youth responded positively for being ready and/or willing to use technology for community PAR activities. On average, youth tended towards agreeing that that they would use a mobile device to find out what's going on in their community (M = 3.42, SD = 1.04), to communicate with school or community

leaders (M = 3.46, SD = 1.13), to voice their opinions about community changes (M = 3.47, SD = 1.05), and to convince people to make school or community changes (M = 3.59, SD = 1.05). One way ANOVAs indicated no significant differences between groups regarding technology readiness measures.

Our first research question explored differences in youth perceptions of tool usability between paper and mobile technology formats. Mean usability scores for both the Paper and eCPAT group were above 68 out of 100 indicating that both tools had above average usability.[57,58] As expected, youth indicated higher usability for the technology format over the paper format. eCPAT usability scores (M = 77.14, SD = 11.14) were, on average, higher than Paper usability scores (M = 74.35, SD = 14.90). However, an independent samples t-test indicated that this difference was not statistically significant $t(85) = -0.995$, $p=0.323$).

Our second research question examined the effectiveness of using mobile technology tools for healthy community PAR on post-project levels of youth empowerment (i.e., self-efficacy, intention, participation, motivation, critical awareness) and advocacy (i.e., assertiveness, perceived sociopolitical change, advocacy activity, knowledge). Nine participants were identified as outliers for the youth empowerment analysis and 12 participants were identified as outliers for the youth advocacy analysis. Post hoc outlier comparison tests found no differences in age or gender between groups. Pre and post means for youth empowerment and advocacy variables by study condition can be found in Table 4.8. Both pre and posttest youth answered positively (>3) for most indicators of youth empowerment or advocacy with the exception of participation in advocacy activity where youth were skewed toward disagreement (<3). Mean differences

between pre and posttest scores illustrate that youth in the Control condition saw minimal positive changes in four of nine youth empowerment and advocacy variables (Table 4.8). Youth in the Paper condition also saw modest positive changes in seven out of the nine dependent variables (Table 4.8). Youth in the eCPAT group saw the largest magnitude of positive changes in six out of nine empowerment and advocacy variables (Table 4.8). Despite raw pre to post mean differences suggesting a greater magnitude of change in the eCPAT condition, factorial multivariate analyses of covariance (MANCOVAs) controlling for baseline indicated no significant differences in post-project youth empowerment (Pillai's Trace V = 0.10, F(10,204) = 1.120, p = 0.349) or youth advocacy (Pillai's Trace V = 0.08, F(8,202) = 1.092, p = 0.370) variables between groups.

In relation to our third research question, we wished to understand whether youth's regular use (or non-use) of technology may moderate the effect that using mobile technology for community PAR had on youth empowerment or advocacy indicators. The mean technology use score for all youth in the study (M=5.100, SD=2.033) indicated that youth generally used mobile technology at least several times per week. Mean technology use scores were slightly higher for youth in the Control (M=5.452, SD=1.977) and eCPAT (M=5.167, SD=2.181) groups than the Paper (M=4.728, SD=1.904) group however a one way ANOVA indicated no significant differences, F(2,119) = 0.284. Multiple linear regression explored the interaction between study conditions (Control, Paper, eCPAT) and regular technology use (high vs. low) on posttest levels of youth empowerment and advocacy variables. Interaction model descriptives for youth empowerment and advocacy variables can be found in Table 4.9. No significant main effects for the interaction model were found for youth empowerment (Pillai's Trace =

0.15, F(10,194) = 11.605, p = 0.107) or youth advocacy variables (Pillai's Trace = 0.11, F(8, 192) = 1.449, p = 0.179).

Our final research question explored youth impressions of and preferences for paper versus mobile technology tool formats. Youth impressions of the Paper and eCPAT tools were comparable (M = 4.35, SD = 0.75 and M = 4.29, SD = 0.66 respectively) and differences were not statistically significant t(86) = 0.397, p = 0.69. To further understand youth preferences for paper versus mobile technology tools, we analyzed data from the delayed intervention (Both) group that tested both formats (n=31). As shown in Table 4.10, the majority of youth thought that the eCPAT app was easier to use (71.0%), enjoyed using the eCPAT app the most (80.6%), liked the eCPAT app format the best (77.4%), and would prefer to use the eCPAT app in future projects (80.6%).

Discussion

With the dramatic increase in childhood obesity rates over the last three decades, it is important to explore population-level solutions to youth physical inactivity.[3,63] Modifying the built environment of neighborhoods and communities is recognized as a promising solution.[12,13] However, civically engaging and empowering community members, especially youth, in healthy PSE change initiatives is essential to successful efforts.[14,15] Recent youth community health PAR paradigms have incorporated technology as a way to engage and empower youth to make healthy changes in their communities.[25,26] The current study extends this literature by exploring the effects of youth using a mobile technology data collection tool with respect to their reported levels of usability, empowerment, advocacy, and preference.

Baseline levels of youth access to technology revealed that the majority of study youth had access to multiple types of technology, especially mobile technology such as smartphones, tablets, or iPads. This finding is similar to a recent national survey showing high percentages of youth access to smartphones (47%), tablets (23%), or laptops (90%), as well as growing use of mobile technology applications (58%) and social networking sites (81%).[64] Moreover, our study found that youth were willing to utilize mobile technology for community PAR activities such as communication and advocacy efforts. This finding substantiates previous inferences that mobile technology is indeed a viable platform to civically engage youth in community health advocacy and promotion efforts.[27]

Overall, youth indicated above average usability for both data collection tool formats used in this study (i.e., paper CPAT and eCPAT mobile application). This helps to confirm that original efforts to create a user-friendly community park audit tool (CPAT) for use among diverse community members were efficacious.[44] Promisingly, youth reported higher average usability scores for the newly developed eCPAT application over the original paper-pencil tool. While not statistically significant, this result provides some evidence that the use of mobile technology formats can improve the PAR process among youth populations.[45,52]

Exploring the effectiveness of using mobile technology versus paper-pencil methods on indicators of youth empowerment or advocacy, we did not find significant differences between the eCPAT, Paper, or Control groups post project. This result is contradictory to previous research that has shown numerous benefits of using technology within youth PAR frameworks.[23,25,36,39,42] Although our results illustrated that youth in

the eCPAT group exhibited the largest magnitude of positive changes for six out of nine youth empowerment and advocacy variables, our study may have been underpowered to detect such differences.[65] Moreover, this pilot project only involved youth *collecting* observational park audit data. While all youth were able to successfully submit data upon audit completion, at the time of post evaluation, youth had not discussed, shared, or acted upon any of the data they had collected. Even though utilization of the eCPAT application for data collection purposes potentially fulfills multiple characteristics of successful youth PAR (e.g., engages and challenges youth, increases critical awareness of community issues), it may be that for youth to experience increases in levels of empowerment or advocacy, additional elements of youth PAR must be accomplished before "meaningful participation" is achieved.[19,23] Therefore, future research will seek to integrate eCPAT mobile technology use into broader action-oriented projects that leverage benefits of technology, such as improved adult-youth communications, equitable power sharing, and increased political or social agency.[23,36,42]

Overall, this study found high levels of regular mobile technology use among youth (i.e., over 80% of the youth sample used mobile technology at least once a week). We found no significant interaction effect between regular mobile technology use and study condition on post-project levels of youth empowerment or advocacy. This result suggests that mobile technology competency may not be an issue in youth populations as compared to what Campbell and colleagues found to be true in adults.[51] Nonetheless, future youth projects may need to consider mobile technology competency prior to integrating the eCPAT tool into PAR activities, especially among low income populations who may not have as abundant access or use of such technologies.[64] In such

instances, a brief introduction to mobile technology and, specifically, eCPAT capabilities may be warranted. Moreover, our study only viewed the technology moderator in terms of understanding how well youth might be able to adapt to using the eCPAT mobile technology tool format. As noted by Farnham and colleagues, it may be that youth's experience using mobile technology for specific purposes in the public/social domain (i.e., blogs, wikis, Twitter) may be more likely to influence the relationship between youth using mobile technology for PAR and resulting levels of youth empowerment or advocacy.[50] Consequently, future research with the eCPAT tool should consider ways that youth can publicly share data collection efforts to enhance youth's feelings of community interaction for health advocacy.

Finally, our study found that while the youth had positive to very positive impressions of both the paper-pencil and eCPAT mobile app tools, the vast majority of youth who experienced both preferred the eCPAT mobile application. Furthermore, 93.5% of youth indicated that they would use the eCPAT application in future projects. This finding confirms the feasibility of the eCPAT mobile application and supports its use an effective means of engaging youth in PAR for community health promotion efforts.

Limitations

This study had several limitations which provide direction for future research. For example, while our pilot study initially recruited a large number of youth, due to attrition, final group totals were lower than desired, thus limiting statistical power of the study. Additionally, the voluntary nature of study participation or the recruitment methods employed could have contributed to bias in attracting youth interested in such a project or

topic. However, as mentioned earlier, study participant characteristics were similar to those of youth in Greenville County. Further, randomization of youth into study conditions reduced potential bias on key variables; indeed, analyses of multiple sample characteristics indicated no differences between the three study conditions. Likewise, self-report survey measures and monetary incentives for project completion could lend to social desirability bias. However, our measures included multiple items for youth technology use, empowerment or advocacy that have previously shown good validity and reliability.[49,59,60] Further, use of a no treatment control group pretest/posttest design allowed us to understand naturally occurring changes in key measures and explore potential causal effects of technology on youth empowerment and advocacy. Finally, as noted above, this study only explored the effect of mobile technology in youth PAR in the context of environmental data collection. Future research should explore the use of eCPAT mobile technology with a large number of youth as part of action-oriented community health projects.

Conclusion

Overall, technology is becoming a staple among teens that cannot be ignored. Rather, researchers should capitalize on the proliferation of mobile devices to meet youth on digital platforms where they are spending their time. A growing body of research indicates that technology supports essential dimensions of youth PAR empowerment models while combating common PAR issues such as apathy, lack of trust, and power-sharing.[23,33,34] While the present study did not show significant effects or interaction of technology use between study conditions, our results illustrated that youth in the eCPAT group exhibited the largest magnitude of positive changes for six out of nine youth

empowerment and advocacy variables. Moreover, youth indicated higher levels of eCPAT tool usability and a strong preference for using mobile devices within youth PAR frameworks. In summary, eCPAT mobile technology should be viewed as a potential strategy for increasing youth engagement and empowerment in PAR for health promotion.[26,27] Future dissemination of this research will integrate the eCPAT application as a critical component of the Healthy Young People Empowerment (HYPE) Project,[45] a broader youth-led, community-based participatory research project to improve youth and community health. Given the ubiquity of smartphones and other electronic devices among both adolescents and adults,[64] the eCPAT application also has potential to be distributed and used widely by both the general public and professionals alike to achieve successful community engagement in healthy PSE change efforts.

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Table 4.4 Summary of Benefits of Technology within Youth PAR Frameworks

- Increases self-efficacy
- Fights apathy/improves motivation
- Facilitates youth self-expression
- Provides meaningful participation
- Increases youth voice within the community
- Improves youth-adult communication
- Promotes equitable power sharing (increased youth control)
- Provides political or social agency
- Improves access to resources
- Improves research capabilities
- Increases civic engagement

References [19,20,107,109,115,117-119,121,124]

Table 4.5 Comparison of Audit Tool Formats

	CPAT	eCPAT
Format	Paper	Electronic
Interface Attributes		
Aesthetics	Black and white paper	Color with graphics
Sensory appeal	No	Touchscreen
Control	Limited	Yes
Interactivity	No	Yes
Functionality	Limited	Yes
Features		
Instructions	Limited within tool (Separate training manual)	Yes
Definitions	Limited within tool (Separate training manual)	Yes
Example pictures	None within tool (Separate training manual)	Yes
Camera	No	Yes
GIS	No	Yes
Answer validation	No	Yes
Wireless data transfer	No	Yes
Successful completion message	No	Yes

Table 4.6 Youth Participant Characteristics

Characteristic	Total n (%)	Control n (%)	Paper n (%)	eCPAT n (%)
Total	124 (100)	36 (29.0)	43 (34.7)	45 (36.3)
Age				
Middle School (11-13 yrs)	63 (50.8)	19 (52.8)	22 (51.2)	22 (48.9)
High School (14-18 yrs)	61 (49.2)	17 (47.2)	21 (48.8)	23 (51.1)
Gender				
Male	47 (37.9)	13 (36.3)	18 (41.9)	16 (35.6)
Female	77 (62.1)	23 (63.9)	25 (58.1)	29 (64.4)
Race				
White	77 (62.1)	19 (52.8)	29 (67.4)	29 (64.4)
Black	31 (25.0)	11 (30.6)	9 (20.9)	11 (24.4)
Other	3 (2.4)	1 (2.8)	1 (2.3)	1 (2.2)
2 or more races	13 (10.5)	5 (13.9)	4 (9.3)	4 (8.9)
Hispanic/Latino	5 (4.0)	0 (0)	4 (9.3)	1 (2.2)
Bike ownership	104 (83.9)	29 (80.6)	36 (83.7)	39 (86.7)
Free/reduced school lunch	23 (18.5)	8 (22.2)	10 (23.3)	5 (11.1)

Table 4.7 Mobile Technology Access and Readiness

Characteristic	Total	Control	Paper	eCPAT
Mobile Device Access	(n, %)	(n, %)	(n, %)	(n, %)
Cell Phone	(40, 29.4)	(12, 28.6)	(15, 31.9)	(13, 27.7)
Smartphone/iPhone	(96, 70.6)	(32, 76.2)	(29, 61.7)	(35, 74.5)
Tablet/iPad	(84, 61.8)	(26, 61.9)	(31, 66.0)	(27, 57.4)
Laptop	(90, 66.2)	(35, 83.3)	(27, 57.4)	(28, 59.6)
Nook/Kindle	(48, 35.3)	(19, 45.2)	(18, 38.3)	(11, 23.4)
Other (e.g. iPod, mobile gaming)	(19, 14.0)	(9, 21.4)	(6, 12.8)	(4, 8.5)
Mobile Device Readiness	(M, SD)	(M, SD)	(M, SD)	(M, SD)
I would use a mobile device to find out what's going on in my community	(3.42, 1.04)	(3.40, 1.25)	(3.50, 0.94)	(3.35, 0.95)
I would use an app on a mobile device to communicate with school or community leaders	(3.46, 1.13)	(3.43, 1.27)	(3.63, 0.94)	(3.30, 1.15)
I would use an app on a mobile device to voice my opinions about changes that should be made in my community	(3.47, 1.05)	(3.48, 1.27)	(3.63, 0.85)	(3.30, 0.99)
I would use an app on a mobile device to convince people to make changes in my school or community	(3.59, 1.05)	(3.57, 1.21)	(3.85, 0.73)	(3.35, 1.12)

Table 4.8 Youth Pre and Post Empowerment and Advocacy Scores

Study Condition	Empowerment or Advocacy Variable	N[ab]	Pre Mean	Std. Deviation	Post Mean	Std. Deviation	Mean Difference
Control	Self-Efficacy	33	3.97	0.52	3.86	0.48	-0.12
	Intention	33	4.14	0.79	3.98	0.67	-0.16
	Participation	33	3.62	0.87	3.65	0.80	0.02
	Motivation	33	4.16	0.78	4.16	0.66	0.00
	Critical Awareness	32	3.21	0.98	3.27	1.04	0.07
	Assertiveness	32	4.03	0.59	4.01	0.57	-0.02
	Perceived Sociopolitical Control	32	3.82	0.64	3.64	0.60	-0.18
	Advocacy Activity	32	2.02	0.80	2.06	0.70	0.05
	Knowledge	32	3.91	0.84	3.97	0.82	0.06
Paper	Self-Efficacy	42	4.06	0.57	4.10	0.58	0.04
	Intention	42	4.15	0.76	4.08	0.73	-0.07
	Participation	42	3.79	0.88	3.92	0.91	0.13
	Motivation	42	4.27	0.67	4.17	0.56	-0.10
	Critical Awareness	42	3.69	1.00	3.79	1.05	0.10
	Assertiveness	42	3.99	0.60	4.05	0.61	0.06
	Perceived Sociopolitical Control	42	3.64	0.64	3.70	0.62	0.07
	Advocacy Activity	42	2.18	0.86	2.30	0.82	0.12
	Knowledge	42	3.95	0.85	4.10	0.76	0.14
eCPAT	Self-Efficacy	40	3.76	0.56	3.83	0.48	0.07
	Intention	40	3.94	0.58	3.88	0.55	-0.05
	Participation	40	3.68	0.66	3.90	0.69	0.22
	Motivation	40	3.92	0.68	4.10	0.59	0.18
	Critical Awareness	40	3.51	0.97	3.63	0.93	0.11
	Assertiveness	37	3.61	0.62	3.53	0.51	-0.08
	Perceived Sociopolitical Control	37	3.38	0.59	3.36	0.52	-0.01
	Advocacy Activity	37	1.73	0.69	1.81	0.67	0.08
	Knowledge	37	3.35	0.92	3.59	0.72	0.24

a. 9 outliers removed prior to empowerment analyses
b. 12 outliers removed prior to youth advocacy analyses

Table 4.9 Youth Empowerment and Advocacy by Study Condition and Technology Use

Dependent Variable					95% Confidence Interval	
Youth Empowerment	Study Condition	Technology Use	Mean	Std. Error	Lower Bound	Upper Bound
Self-Efficacy	Control	Low	3.665[a]	.111	3.444	3.886
		High	3.921[a]	.090	3.743	4.099
	Paper	Low	3.990[a]	.084	3.824	4.156
		High	4.182[a]	.098	3.988	4.376
	eCPAT	Low	4.046[a]	.091	3.865	4.227
		High	3.847[a]	.094	3.660	4.034
Intention	Control	Low	3.861[a]	.148	3.567	4.156
		High	4.014[a]	.119	3.777	4.251
	Paper	Low	3.943[a]	.111	3.722	4.164
		High	4.173[a]	.130	3.915	4.431
	eCPAT	Low	4.002[a]	.121	3.761	4.242
		High	3.956[a]	.125	3.707	4.205
Participation	Control	Low	3.513[a]	.149	3.217	3.808
		High	3.851[a]	.120	3.613	4.089
	Paper	Low	3.729[a]	.112	3.507	3.951
		High	4.042[a]	.131	3.782	4.301
	eCPAT	Low	4.037[a]	.122	3.795	4.279
		High	3.681[a]	.126	3.431	3.931
Motivation	Control	Low	4.097[a]	.126	3.848	4.346
		High	4.185[a]	.101	3.984	4.386
	Paper	Low	3.968[a]	.094	3.780	4.155
		High	4.273[a]	.110	4.054	4.492
	eCPAT	Low	4.274[a]	.103	4.070	4.479
		High	4.027[a]	.106	3.816	4.238
Critical Awareness	Control	Low	3.498[a]	.213	3.076	3.920
		High	3.409[a]	.172	3.069	3.750
	Paper	Low	3.701[a]	.160	3.383	4.018
		High	3.838[a]	.187	3.468	4.209
	eCPAT	Low	3.855[a]	.174	3.510	4.201
		High	3.382[a]	.180	3.025	3.739

a. Covariates appearing in the model are evaluated at the following values: MEAN(Pre Self-Efficacy) = 3.9055, MEAN(Pre Intention) = 4.0486, MEAN(Pre Participation) = 3.6875, MEAN(Pre Motivation) = 4.0764, Pre Critical Awareness = 3.4667.

Table 4.9 Youth Empowerment and Advocacy by Study Condition and Technology Use (cont)

Dependent Variable Youth Advocacy	Study Condition	Technology Use	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Assertiveness	Control	Low	4.023[b]	.129	3.768	4.279
		High	3.824[b]	.111	3.602	4.045
	Paper	Low	3.863[b]	.097	3.671	4.056
		High	4.200[b]	.110	3.981	4.418
	eCPAT	Low	3.734[b]	.117	3.503	3.966
		High	3.709[b]	.114	3.482	3.935
Perceived Sociopolitical Control	Control	Low	3.534[b]	.129	3.278	3.790
		High	3.493[b]	.112	3.272	3.715
	Paper	Low	3.571[b]	.097	3.378	3.764
		High	3.802[b]	.110	3.582	4.021
	eCPAT	Low	3.657[b]	.117	3.425	3.890
		High	3.434[b]	.115	3.206	3.661
Advocacy Activity	Control	Low	1.959[b]	.163	1.635	2.283
		High	2.061[b]	.141	1.781	2.342
	Paper	Low	2.108[b]	.123	1.864	2.353
		High	2.271[b]	.140	1.994	2.549
	eCPAT	Low	2.063[b]	.148	1.770	2.357
		High	1.932[b]	.145	1.645	2.219
Knowledge	Control	Low	3.890[b]	.177	3.539	4.241
		High	3.775[b]	.153	3.471	4.079
	Paper	Low	3.913[b]	.133	3.648	4.177
		High	4.078[b]	.151	3.778	4.378
	eCPAT	Low	4.023[b]	.160	3.705	4.341
		High	3.699[b]	.157	3.388	4.011

b. Covariates appearing in the model are evaluated at the following values: MEAN(Pre Assertiveness) = 3.8951, MEAN(Pre Perceived Sociopolitical Control) = 3.6111, MEAN(Pre Advocacy Activity) = 2.0046, Pre Knowledge = 3.7407.

Table 4.10 Youth Preferences for Tool Format

Preference Item	Paper CPAT	eCPAT app	I liked both equally	I don't like either
Which format was easier to use?	9.7%	71.0%	16.9%	3.2%
Which format did you enjoy using the most?	6.5%	80.6%	9.7%	3.2%
Which format would you want to use in future projects?	3.2%	80.6%	12.9%	3.2%
Overall, which format did you like the best?	9.7%	77.4%	12.9%	0.0%

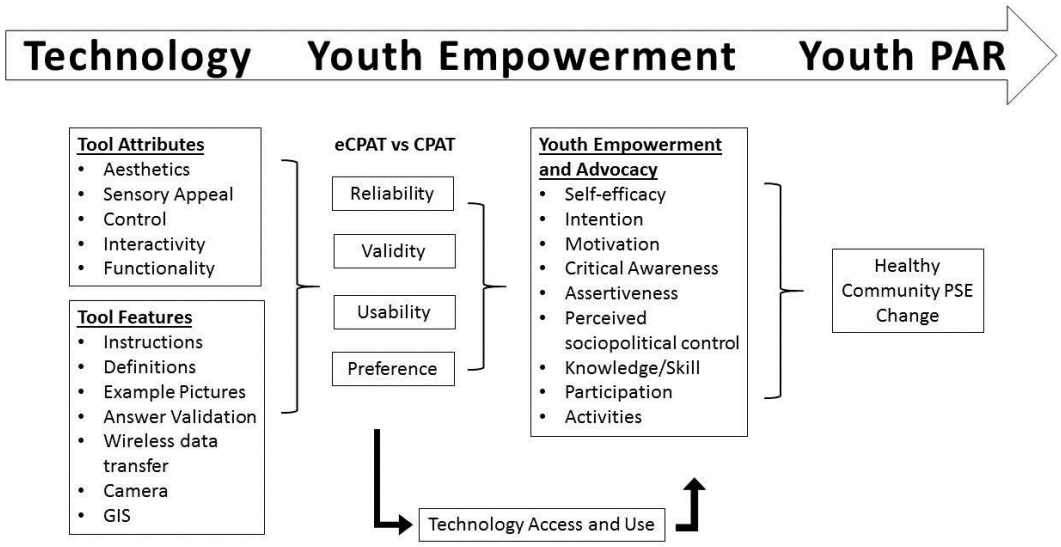

Figure 4.4 eCPAT Project Conceptual Model

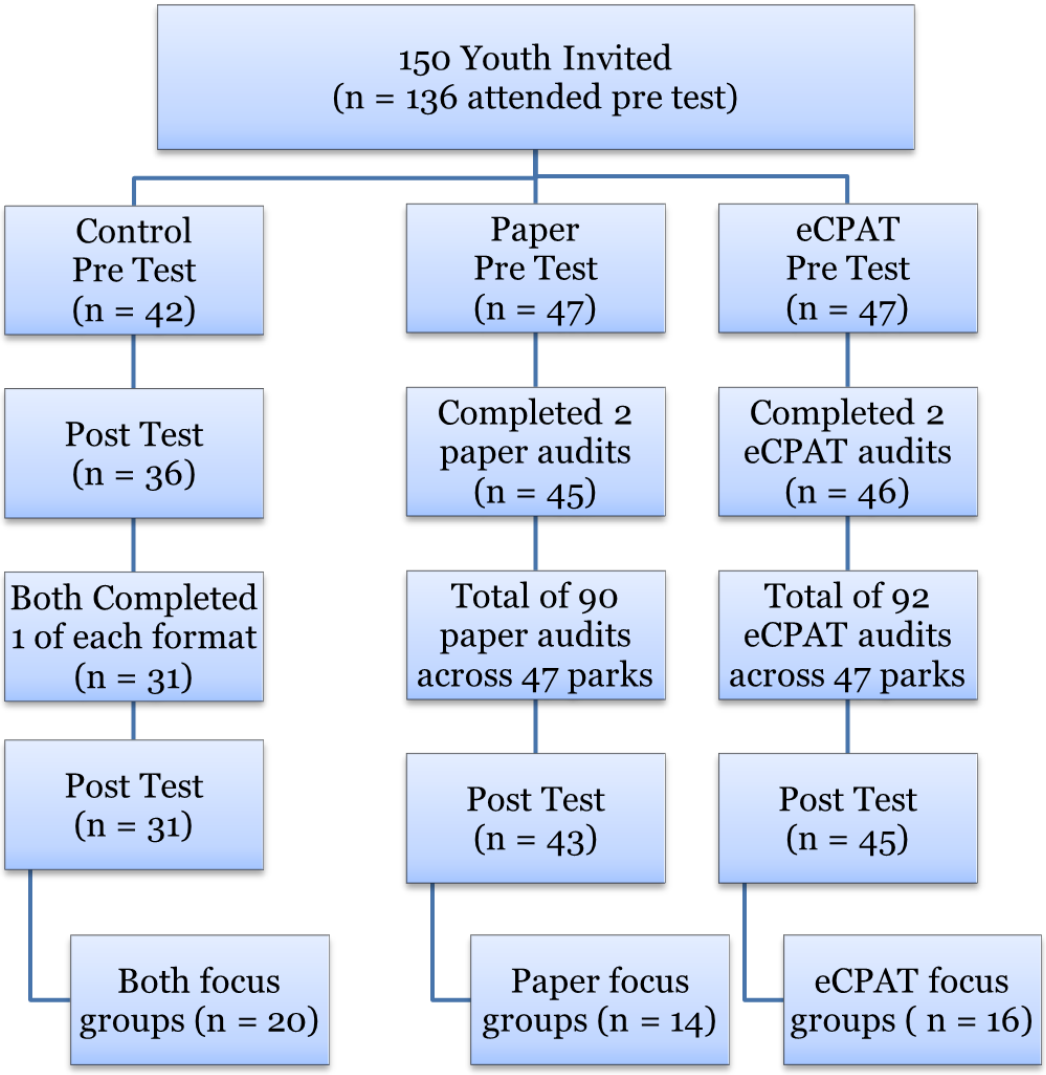

Figure 4.5 eCPAT Project Design with Participant Numbers

CHAPTER5: CONCLUSIONS AND IMPLICATIONS

5.1 Significance

Childhood obesity and physical inactivity have increased dramatically in recent years, with dire implications for the physical, emotional, and financial costs of a wide range of chronic diseases.[1] Modifying the built environment of neighborhoods and communities is recognized as one of the most promising solutions to these population-level crises.[2,3] Parks in particular, are fundamental settings for youth PA, especially in low-income communities, given their low cost and legislated ubiquity. Creating healthy communities, including better parks, will require the interest and participation of multiple constituencies.[10] For several reasons, youth can and should be recognized as competent citizens and community builders that can contribute to civic PSE change efforts because it draws upon their perspectives and improves municipal decision-making practices.[11,12] Further, engaging and empowering youth in healthy PSE change efforts contributes to positive youth development and prepares them for roles as active citizens and future public health leaders.[11-13] Indeed, youth advocacy for obesity prevention has been called the next wave of social change for health.[14] However, youth are frequently under-represented in PSE change processes.[11,12] The use of innovative technology within a PAR framework is proposed as a method to engage and empower youth participation in building healthy communities.[19] Specifically, in this project creation of a user-friendly electronic park audit tool application (eCPAT) was viewed as a way to provide a more interactive and hands-on way for youth to engage with their local communities and

to facilitate participation in park-related health promotion and advocacy efforts.[18,78,80]

5.2 Purpose

This proposal is a part of a broader research agenda to engage youth in becoming advocates for healthy community design. The specific aims of this research project were to:

1) To develop and examine the reliability and validity of an electronic version of the Community Park Audit Tool for use by youth on mobile devices.
2) To test the effectiveness of eCPAT mobile technology on indicators of youth empowerment and advocacy for healthy community policy, systems, and environmental change efforts.

5.3 Development and Validity and Reliability Testing of the eCPAT Application

The first study in this project described the development and validity and reliability testing of the eCPAT application for use by youth. Comprising two main application screens (i.e., home screen and data entry screen), the newly developed eCPAT app consisted of 149 items under 4 headings and incorporated a variety of technology benefits such as a touch screen interface, improved functionality and usability, integrated camera and GPS/GIS capabilities, answer validation, and wireless data transfer. Additionally, the eCPAT app incorporated technology design and functionality elements (e.g., colorful game-like appearance, simple and intuitive, built-in instructions/help) to make the app more user-friendly for use with youth.

Criterion-related validity and inter-rater reliability were evaluated using observational park audit data from 52 youth across 47 parks in Greenville County, SC. A total of 90 eCPAT items were examined using Cohen's kappa, while 41 items were

examined using percent agreement. A large portion of items (>70%) demonstrated moderate to perfect or fair validity and reliability, while many items demonstrated excellent percent agreement. This study concluded that eCPAT application is a youth-oriented mobile technology tool with adequate reliability and validity that provides a comprehensive assessment of park environments.

5.4 Exploring the Effects of Mobile Technology on Youth Empowerment and Advocacy

The purpose of the second study was to explore the use of eCPAT mobile technology on youth empowerment and advocacy within a PAR framework by examining tool usability, effectiveness of mobile technology on youth empowerment and advocacy, interaction effects between tool format and regular technology use, and tool format preferences. A total of 124 youth were randomized into one of three study conditions: Control, Paper, and eCPAT. Intervention youth completed two park audits using paper-pencil or mobile technology tools. Youth completed pre- and post-project surveys that measured tool usability, technology, empowerment, advocacy, and youth demographics. Independent samples t-tests and MANCOVAs explored differences in post-project levels of tool usability and empowerment and advocacy scores between groups. Multivariate linear regression analysis explored the interaction between Control, Paper, or eCPAT group membership and mean technology use in predicting empowerment and advocacy.

The results revealed that the majority of youth had access to multiple types of mobile technology, high levels of regular mobile technology use (i.e., over 80% of the youth sample used mobile technology at least once per week), and that they were willing to utilize mobile technology for community PAR activities such as communication and

advocacy efforts. Youth indicated above average usability for both data collection tool formats used in this study (i.e., paper CPAT and eCPAT mobile application). Promisingly, youth reported higher average usability scores for the newly developed eCPAT application over the original paper-pencil tool. Further, youth indicated that the eCPAT tool was better liked and was preferred over paper-pencil methods. No main or interaction effects were found for post-project levels of youth empowerment or advocacy between study conditions. Mobile technology should be viewed as a potential strategy for increasing youth empowerment and advocacy within PAR frameworks given its ubiquity, usability, and preference among youth.

5.5 Practical Implications

The results of these studies have several research and practical implications. First, there is a growing need for valid and reliable mobile technology tools for use by youth within participatory action research.[19,46] Our results demonstrated that using the eCPAT app, youth are able to independently reach similar conclusions regarding the availability, usability, and condition of park characteristics that were comparable to those of a trained researcher. Ensuring data quality within PAR frameworks is fundamental to understanding community needs and developing environmental action plans[173,174] and our findings establish that youth can make valuable contributions within this process. Second, the vast majority of youth preferred the eCPAT mobile application and acknowledged that they would use the eCPAT application in future projects. This finding confirms the feasibility of the eCPAT mobile application and supports its use an effective means of engaging youth in PAR for community health promotion efforts. Third, given the proliferation of smartphones, tablets, and other electronic devices among both

adolescents and adults,[26] the eCPAT app has potential to be distributed and used widely by the general public for park-related health education and promotion efforts. For example, Park Prescriptions is a movement supported by the Centers for Disease Control and Prevention and the National Recreation and Park Association to strengthen the connection between health care and parks and public lands to improve the physical and mental health among individuals and communities.[175,176] Such initiatives have been shown to be effective at increasing the percentage of patients who received physician counseling on the importance of PA and on the importance of parks as community PA resources.[177] The eCPAT app could be utilized as a way to crowdsource environmental park data that could be uploaded in real time to a database interface for patients and community members to access and benefit from. Similarly, future practice or research efforts could incorporate eCPAT app data collection into community needs assessments for a variety of community-based participatory purposes. Finally, given its enhanced data collection capabilities and heightened usability, adaptation of the eCPAT app for use by local planning officials could allow agencies to collect and make data-driven decisions based on specific community needs, as well as assist with standardization of aggregated nationwide parks and recreation resource data.

Overall, technology is becoming a staple among teens that cannot be ignored. Rather, researchers should capitalize on the proliferation of mobile devices to meet youth on digital platforms where they are spending their time. A growing body of research indicates that technology supports essential dimensions of youth PAR empowerment models while combating common PAR issues such as apathy, lack of trust, and power-sharing.[23,33,34] Future dissemination of this research will integrate the eCPAT application

as a critical component of the Healthy Young People Empowerment (HYPE) Project,[45] a broader youth-led, community-based participatory research project to improve youth and community health. Given the ubiquity of smartphones and other electronic devices among both adolescents and adults,[64] the eCPAT application has potential to be distributed and used widely within research and practical communities alike to achieve successful community engagement and create healthier community environments

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APPENDIX A: COMMUNITY PARK AUDIT TOOL

COMMUNITY PARK AUDIT TOOL

Instructions

Before you begin, try to locate a map of the park. Next, review the CPAT training guide and audit tool. It is important to make sure each question and response is clear when you are marking your answer. Then, go to the park and fill out this audit tool. The tool (6 pages) is divided into four sections that focus on different parts of the park. Further instructions are at the top of each section.

Tips for Using the Community Park Audit Tool (CPAT)

- Drive, bike, or walk around the park to get a feel for what's in the park and the neighborhood around the park.
- Questions on the CPAT are grouped in sections in the order that you might come across them in a park. However, you may need to switch between sections or pages as you complete the park audit. Therefore, it is important to look through the tool before you begin.
- When you are finished, go back and make sure you have completed all the sections and questions.
- There is space at the end of each section where you can write down comments as you complete your audit. The margins or back of the page can be used to take notes, but make sure to transfer your comments into the answer spaces.
- If you see anything that requires immediate attention, contact the local parks department.

Section 1: Park Information

Park Name: _____ **Observer Name or ID:** _____

Park Address/Location: _____

Were you able to locate a map for this park? ❑ No ❑ Yes

Was the park easy to find onsite? ❑ No ❑ Somewhat ❑ Yes

Date (m/d/yr): ___ /___ /_____

Temperature: ___ °F **Weather:** ❑ Clear ❑ Partly Cloudy ❑ Rain/Snow

Start Time: _____ am or pm (circle) **End Time:** _____ am or pm (circle) **Length of visit:** ____ min

Comments on Park Information:

Section 2: Access and Surrounding Neighborhood

This section asks about accessing the park and about the neighborhood surrounding the park. Several questions include follow-up responses if you answered yes. There are spaces for comments at the end of the section. **When thinking about the surrounding neighborhood, consider all areas that you can see from inside of the park**.

When rating the access and surrounding neighborhood, please use the following definition:

- **Useable**: everything necessary for use is present and nothing prevents use (e.g., sidewalks are passable)

1. Can the park be **accessed for use**? (e.g., not locked/fenced, available for activity, etc.) ❑ No ❑ Yes

2. Are there **signs** that state the following (could be same sign)? *(check all that are present)* ❑ None present
   ❑ Park name ❑ Park hours ❑ Park contact information ❑ Park/facility rental information
   ❑ Park rules ❑ Park map ❑ Rental equipment information ❑ Event/program information

3. How many **points of entry** does the park have? ❑ More than 5 (or park boundary is open) ❑ 2-5 ❑ Only 1

4. Is there a **public transit stop** within sight of the park? ❑ No ❑ Yes

5. What types of **parking** are available for the park? *(check all that are present)*
   ❑ None ❑ Parking Lot ❑ On street parking ❑ Bike rack(s)

6. Are there **sidewalks** on *any* roads bordering the park? (could be on opposite side of road) ❑ No ❑ Yes
   If yes … Are they useable? ❑ All or most are useable ❑ About half ❑ None or few useable
   If yes … Are there **curb cuts and/or ramps** on *any* sidewalks bordering or entering the park? ❑ No ❑ Yes

7. Is there an external **trail or path** connected to the park? ❑ No ❑ Yes
   If yes … Is it useable? ❑ No ❑ Yes

8. Are there **bike routes** on *any* roads bordering the park? *(check all that are present)*
   ❑ None ❑ Marked bike lane ❑ Bike route sign ❑ Share the road signs/markers

9. Are there nearby **traffic signals** on *any* roads bordering the park? (e.g., crosswalk, stop light/sign) ❑ No ❑ Yes

10. What are the main **land use(s) around the park**? *(check all that apply)* ❑ None present
    ❑ Residential ❑ Commercial ❑ Institutional (e.g., school) ❑ Industrial (e.g., warehouse) ❑ Natural

11. Which of the following **safety or appearance concerns** are present in the **neighborhood surrounding the park**? *(check all that are present in the surrounding neighborhood within sight on any side of the park)*
    ❑ Poor lighting (e.g., low or no lighting on surrounding neighborhood streets)
    ❑ Graffiti (e.g., markings or paintings that reduce the visual quality of the area)
    ❑ Vandalism (e.g., damaged signs, vehicles, etc.)
    ❑ Excessive litter (e.g., noticeable amounts of trash, broken glass, etc.)
    ❑ Heavy traffic (e.g., steady flow of vehicles)
    ❑ Excessive noise (e.g., noticeable sounds that are unpleasant or annoying)
    ❑ Vacant or unfavorable buildings (e.g., abandoned houses, liquor store)
    ❑ Poorly maintained properties (e.g., overgrown grass, broken windows)
    ❑ Lack of eyes on the street (e.g., absence of people, no houses or store fronts)
    ❑ Evidence of threatening persons or behaviors (e.g., gangs, alcohol/drug use)
    ❑ Other _____
    ❑ None present

Comments on Access or Surrounding Neighborhood Issues:

Section 3: Park Activity Areas

This section asks about the activity areas in the park. For <u>each</u> activity area type:

1. **First, mark the number (#) of areas that are present in the park** (if none, write "0").
2. Then, respond to questions about **up to three** of those activity areas. If there are more than three areas for a specific activity area type, **rate the first three you come across during the audit**. If there were no activity areas of that type present in the park, move on to the next type.
3. Finally, use the space provided to note any additional comments about each type of activity area.

When rating the activity areas, please use the following definitions:

- **Useable**: everything necessary for use is present (excluding portable equipment - rackets, balls, etc.) and nothing prevents use (e.g., are there nets up for tennis courts, goals for sport fields, are trails passable, etc.)
- **Good condition**: looks clean and maintained (e.g., minimal rust, graffiti, broken parts; even surface; etc.)

12. **Activity Areas**	**# of Areas**	**Area 1**	**Area 2**	**Area 3**
a. **Playground**	**(# :_____)**			
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Distinct areas for different age groups		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Colorful equipment (i.e., 3+ colors)		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Shade cover for some (25%+) of the area		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Benches in/surrounding area		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Fence around area (i.e., half or more)		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Separation or distance from road		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Comments:				
b. **Sport Field** (football/soccer)	**(# :_____)**			
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Comments:				
c. **Baseball Field**	**(# :_____)**			
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Comments:				
d. **Swimming Pool**	**(# :_____)**			
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Comments:				
e. **Splash Pad**	**(# :_____)**			
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Comments:				
f. **Basketball Court**	**(# :_____)**			
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Comments:				
g. **Tennis Court**	**(# :_____)**			
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Comments:				

Activity Areas	# of Areas	Area 1	Area 2	Area 3
h. **Volleyball Court**	(# :_____)			
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Comments:				
i. **Trail**	(# :_____)			
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Connected to activity areas		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Distance markers/sign		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Benches along trail		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
What is the trail surface? *(check one)*		❑ Paved ❑ Crushed stone ❑ Dirt/mulch	❑ Paved ❑ Crushed stone ❑ Dirt/mulch	❑ Paved ❑ Crushed stone ❑ Dirt/mulch
Comments:				
j. **Fitness Equipment/Stations**	(# :_____)			
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Comments:				
k. **Skate Park**	(# :_____)			
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Comments:				
l. **Off-Leash Dog Park**	(# :_____)			
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Comments:				
m. **Open/Green Space**	(# :_____)			
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Comments:				
n. **Lake**	(# :_____)			
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Is there a designated swimming area?		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Comments:				
o. **Other** (*fill in a type description for each*)		_____	_____	_____
Useable		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Good condition		❑ No ❑ Yes	❑ No ❑ Yes	❑ No ❑ Yes
Comments:				

Comments on Park Activity Areas:

Section 4: Park Quality and Safety

This section asks about factors related to comfort and safety when using the park. Several questions include follow-up responses if you answered yes. There are spaces for comments at the end of the section.

When rating the quality and safety features of the park, please use the following definitions:

- **Useable**: everything necessary for use is present and nothing prevents use (e.g., can get into restrooms, drinking fountains work, etc.)
- **Good condition**: looks clean and maintained (e.g., minimal rust, graffiti, broken parts; etc.)

13. Are there public **restroom(s) or portable toilet(s)** at the park? ❑ No ❑ Yes
    If yes ...
    Are the restroom(s) useable? ❑ All or most are useable ❑ About half ❑ None or few are useable
    Are they in good condition? ❑ All or most in good condition ❑ About half ❑ None or few in good condition
    Is there a family restroom? ❑ No ❑ Yes
    Is there a baby change station in any restroom? ❑ No ❑ Yes

14. Are there **drinking fountain(s)** at the park? ❑ No ❑ Yes
    If yes ...
    How many different fountains are there? (i.e., units, not spouts) _____
    Are the fountains useable? ❑ All or most are useable ❑ About half ❑ None or few are useable
    Are they in good condition? ❑ All or most in good condition ❑ About half ❑ None or few in good condition
    Are they near activity areas? ❑ All or most are near ❑ About half ❑ None or few are near

15. Are there **bench(es)** to sit on in the park? ❑ No ❑ Yes
    If yes ...
    Are the benches useable? ❑ All or most are useable ❑ About half ❑ None or few are useable
    Are they in good condition? ❑ All or most in good condition ❑ About half ❑ None or few in good condition

16. Are there **picnic table(s)** in the park? ❑ No ❑ Yes
    If yes ...
    Are the tables useable? ❑ All or most are useable ❑ About half ❑ None or few are useable
    Are they in good condition? ❑ All or most in good condition ❑ About half ❑ None or few in good condition
    Is there a picnic shelter in the park? ❑ No ❑ Yes
    Is there a grill or fire pit in the park? ❑ No ❑ Yes

17. Are there **trash cans** in the park? ❑ No ❑ Yes
    If yes ...
    Are they overflowing with trash? ❑ All or most overflowing ❑ About half ❑ None or few overflowing
    Are they near activity areas? ❑ All or most are near ❑ About half ❑ None or few are near
    Are recycling containers provided? ❑ No ❑ Yes

18. Is there **food/vending machines** available in the park? ❑ No ❑ Yes
    If yes ...
    Are fruits and/or vegetables available in the park? ❑ No ❑ Yes

19. If the sun was directly overhead, how much of the park would be **shaded**? ❑ <25% ❑ 25-75% ❑ >75%

20. Are there **rules posted about animals** in the park? (e.g., dogs must be leashed)? ❑ No ❑ Yes

21. Is there a place to get **dog waste pick up bags** in the park? ❑ No ❑ Yes
    If yes ... Are bags available at any of the locations? ❑ No ❑ Yes

22. Are there **lights** in the park? (not including neighborhood street lights) ❑ No ❑ Yes
If yes ...
How much of the park could be lit? ❑ <25% ❑ 25-75% ❑ >75%
Are the activity areas lit? ❑ All or most are lit ❑ About half ❑ None or few are lit

23. Is the **park monitored**? (e.g., volunteer or paid staff, patrolled by police, cameras, etc.) ❑ Unsure ❑ Yes

24. Are there **any emergency devices** in the park? (e.g., phone, button, emergency directions) ❑ No ❑ Yes

25. From the center of the park, how **visible is the surrounding neighborhood**? ❑ Fully ❑ Partially ❑ Not at all

26. Are there **road(s)** of any type through the park? ❑ No ❑ Yes
If yes ... Are there traffic control mechanisms on the roads within the park? (e.g., crosswalk, stop light or sign, brick road, speed bumps, roundabouts) ❑ No ❑ Yes

27. Which of the following **park quality or safety concerns** are present **in the park**? *(check all that are present)*
- ❑ Graffiti (e.g., markings or paintings that reduce the visual quality of the area)
- ❑ Vandalism (e.g., damaged signs, buildings, equipment, etc.)
- ❑ Excessive litter (e.g., noticeable amounts of trash, broken glass, etc.)
- ❑ Excessive animal waste (e.g., noticeable amounts of dog waste)
- ❑ Excessive noise (e.g., noticeable sounds that are unpleasant or annoying)
- ❑ Poor maintenance (e.g., overgrown grass/weeds/bushes or lack of grass in green areas)
- ❑ Evidence of threatening persons or behaviors (e.g., gangs, alcohol/drug use)
- ❑ Dangerous spots in the park (e.g., abandoned building, pit/hole)
- ❑ Other _____
- ❑ None present

28. What **aesthetic (i.e., beautiful/pleasing) features** are present **in the park**? *(check all that are present)*
- ❑ Evidence of landscaping (e.g., flower beds, pruned bushes)
- ❑ Artistic feature (e.g., statue, sculpture, gazebo, fountain)
- ❑ Historical or educational feature (e.g., monument, nature display, educational signs, etc.)
- ❑ Wooded area (e.g., thick woods or dense trees)
- ❑ Trees throughout the park (e.g., scattered trees)
- ❑ Water feature (e.g., lake, stream, pond)
- ❑ Meadow (e.g., natural, tall grassy area)
- ❑ Other _____
- ❑ None present

Comments on Park Quality and Safety Issues:

Before you are finished, please make you have answered all questions in the tool.

About the Community Park Audit Tool

The Community Park Audit Tool (CPAT) was developed in 2010 in Kansas City, Missouri by Andrew Kaczynski (Kansas State University) and Sonja Wilhelm Stanis (University of Missouri) in collaboration with the City of Kansas City Missouri Parks and Recreation Department. Development of the CPAT was supported by a grant from Active Living Research, a national program of the Robert Wood Johnson Foundation.

APPENDIX B: DEVELOPMENT AND TESTING OF A COMMUNITY STAKEHOLDER PARK AUDIT TOOL

Development and Testing of a Community Stakeholder Park Audit Tool

Andrew T. Kaczynski, PhD, Sonja A. Wilhelm Stanis, PhD, Gina M. Besenyi, MPH

Background: Parks are valuable community resources, and auditing park environments is important for understanding their influence on physical activity and health. However, few tools exist that engage citizens in this process.

Purpose: The purpose of this study was to develop a user-friendly tool that would enable diverse stakeholders to quickly and reliably audit community parks for their potential to promote physical activity. A secondary aim was to examine community stakeholders' reactions to the process of developing and using the new tool.

Methods: The study employed a sequential, multiphase process including three workshops and field testing to ensure the new instrument was the product of input and feedback from a variety of potential stakeholders and was psychometrically sound. All study stages, including data collection and analysis, occurred in 2010.

Results: Stakeholder recommendations were combined with reviews of existing instruments to create the new Community Park Audit Tool (CPAT). The CPAT contains four sections titled Park Information, Access and Surrounding Neighborhood, Park Activity Areas, and Park Quality and Safety. Inter-rater analyses demonstrated strong reliability for the vast majority of the items in the tool. Further, stakeholders reported a range of positive reactions resulting from their engagement in the project.

Conclusions: The CPAT provides a reliable and user-friendly means of auditing parks for their potential to promote physical activity. Future use of the CPAT can facilitate greater engagement of diverse groups in evaluating and advocating for improved parks and overall healthy community design.

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Physical activity is an important societal issue, and population-level approaches are necessary to affect public health outcomes.[1–3] Social ecological models and behavior settings theory emphasize that in addition to individual and interpersonal factors, the availability and characteristics of elements of the built environment exert a strong influence on health behaviors.[4–7] Parks are acknowledged as important environmental resources for physical activity,[8–10] but they can vary dramatically with respect to size, shape, available facilities and amenities, quality, safety, and neighborhood context. Indeed, several studies suggest that the features of a park are highly important in determining its use for physical activity.[11–13] For example, trails have been associated with adult physical activity[11,14] and playgrounds with youth physical activity,[15,16] whereas other attributes such as restrooms, drinking fountains, lighting, and shade have also been found to be important.[17–19]

Methods for evaluating active living environments have advanced rapidly, and observational audits are the best option when assessing the presence and quality of certain neighborhood attributes.[20] Several tools for auditing parks have been developed,[13,21–25] although the reported use of each has been limited to date.[11,26–28] Table 1 provides a summary, based on a review by the authors, of the attributes of prominent park-related audit tools (for further information on each tool, readers are referred to the original sources).

Despite each possessing numerous redeeming qualities, existing tools all contain shortcomings in that they

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Table 1. Summary of existing park audit tools

Audit tool	Use setting	Length (pages [items])	Completion time (minutes)	Park quality	Youth-oriented	Developed with stakeholders	Tested with stakeholders
BRAT-DO	Parks	16 (181)	Not available	Yes	Somewhat	Some	No
EAPRS	Parks	47 (646)	M: 67 Range: 10–258	Yes	Somewhat	Some	No
PARA	Various resources	1 (49)	M: 10 Range: up to 30	Limited	No	No	No
POST	Parks, ovals	2.5 (88)	Not available	Limited	No	Some	No
RFET	Various facilities	5 (61)	M: 20	Limited	No	No	No
SAGE	Various green spaces	2.5 (96)	Not available	Limited	No	No	No
SHAPE	Parks	1 (20)	Not available	Yes	No	Some	No

BRAT-DO, Bedimo–Rung Assessment Tools–Direct Observation[24]; EAPRS, Environmental Assessment of Public Recreation Spaces[23]; PARA, Physical Activity Resource Assessment[22]; POST, Public Open Space Audit Tool[43]; RFET, Recreation Facility Evaluation Tool[25]; SAGE, Systematic Audit of Green Space Environments[24]; SHAPE, Safe, Healthy, and Attractive Public Environments (unpublished Kansas City MO Parks and Recreation Department park maintenance audit tool)

were not designed with an explicit eye toward youth physical activity, were not developed or tested with varied stakeholders, and/or are too lengthy for practical use by community members and nonresearchers. Brownson et al.[20] suggested that "simplified observational measures of parks . . . can be created from existing measures. Creating practical measures for community groups should be a goal for researchers" (p. 120).

See Commentary by Floyd in this issue.

The comprehensive EAPRS instrument, for example, was developed via an extensive Delphi process asking park directors and users about park See Commentary by Floyd in this issue. elements that are important for physical activity, but its length may be perceived as daunting and stakeholders from other fields were not involved.[23] Further, to our knowledge, none of the existing tools have been tested for reliability with diverse community stakeholders. Additionally, only the two lengthier tools were at least somewhat youth-oriented in that they sufficiently captured park elements important to youth physical activity (e.g., details of playgrounds, family-friendly features).

In addition to accurate measurement, developing activity-friendly neighborhoods requires support from multiple constituencies.[29] This can be advanced by involving diverse groups in evaluating, advocating for, and promoting improved accessibility and design of community parks. Indeed, "the incorporation of reliable observational measures into health advocacy efforts should be encouraged to provide an evidence base for advocacy" (p. 120).[20] This broader citizen engagement in active living research will facilitate not only the fair treatment component of environmental justice (i.e., equal access to quality park environments) but also individuals and groups having an opportunity to be meaningfully involved in actions related to their health.[30,31] Thus, the purpose of this paper is to describe the development and testing of a user-friendly tool that can enable diverse stakeholders to quickly and reliably audit community parks for their potential to promote physical activity. A secondary aim was to examine community stakeholders' reactions to the process of developing and using the new tool.

Methods

Design

The present study was conducted in collaboration with the Kansas City, Missouri Parks and Recreation Department (KCMOPARD) and approved by the IRBs at Kansas State University and the University of Missouri. The seven project stages included: (1) review of existing park audit tools to evaluate their user-friendliness and suitability to youth physical activity and the domains and specific items each covers; (2) planning workshop engaging community stakeholders in the process of developing a park audit tool that emphasizes youth physical activity and use by nonresearchers; (3) development of a new park audit tool using information gathered in Stages 1 and 2; (4) training workshop with stakeholders to present the new tool and to train participants in its use for field testing; (5) testing of the tool, including interrater reliability analyses for all items; (6) evaluation workshop with stakeholders to gain feedback on the tool's usability and suggestions for disseminating it; and (7) dissemination of the tool locally and nationally to academic, professional, and lay audiences. The first six stages, including data collection and analysis, occurred in 2010.

Participants

With the assistance of KCMOPARD, representatives from prominent agencies and demographic groups with an interest in health and/or youth from across the KC metro area were recruited to participate in the study. Individuals were contacted with an initial project introduction letter from KCMOPARD and a follow-up e-mail from the study team. From an original list of 42 people, 34 stakeholders (14 male, 20 female; 32 adults, two teenagers) agreed to participate. These included representatives from public health, parks and recreation, planning, nonprofit agencies, youth agencies, education, business associations, municipal legislators, academia, and adult and youth park users and nonusers.

Tool Development

Creation of the new park audit tool was informed by a review of existing instruments (Stage 1), focus group discussions during the initial workshop with stakeholders (Stage 2), and three key informant interviews with researchers familiar with audit tools. The detailed content analysis covered six major existing audit tools, as well as KCMO's own SHAPE park maintenance rating tool (Table 1). The analysis identified all domains and subelements covered within existing instruments and the rating scales used to evaluate each item, as well as any available information on the reliability of specific items.

The initial workshop focus group discussions ($n = 24$) were each approximately 30 minutes and were focused on four primary topics: (1) park elements conducive to facilitating physical activity; (2) special considerations for promoting youth physical activity; (3) characteristics of a user-friendly audit tool; and (4) strengths and weaknesses of existing park audit tools. For each topic, the participants were divided into six groups of five to six individuals. The key informant interviews were 30–60 minutes and focused on the same topics. Following established guidelines,[32] all data were transcribed, coded by two reviewers, and subsequently used to develop a comprehensive yet parsimonious new audit tool. The draft tool was then reviewed and tested in a single park by stakeholders (Stage 4) and revised for content and clarity.

Study Area and Data Collection

The KCMO park system contains 219 parks that vary in size (0.09–1805 acres), geography (urban/suburban), neighborhood composition (e.g., income), quality (e.g., landscaping), safety (e.g., lighting), and availability of active (e.g., playground) and passive (e.g., picnic shelter) facilities and supporting amenities (e.g., restroom).[33] A sample of 66 parks was selected in which to test the new tool (Stage 5). Parks were chosen to maximize diversity with respect to location, size, key features, quality, and neighborhood income and racial composition. All project stakeholders were randomly assigned to each other and to three to 12 parks each. Provided with park addresses and maps, the stakeholders undertook the park audits independently and received $20 per hour for completing and returning their park audit forms. For seven parks, completed audits were received from only one stakeholder, often because of an inability to find or get to a park or personal time constraints. This resulted in a final sample of 59 pairs of ratings for use in the present analyses. Selected characteristics of the 59 parks are shown in Table 2.

A final workshop (Stage 6) was held to gain feedback on the stakeholder experience developing and using the tool and how it

Table 2. Characteristics and number of study parks

Characteristics	*n* (%)
Total	59 (100)
Size (acres)	
0.1–4.99	15 (25.4)
5–9.99	13 (22.0)
10–14.99	11 (18.7)
≥20	20 (33.9)
Selected park facilities	
Green space	56 (94.9)
Playground	38 (64.4)
Trail	32 (54.2)
Baseball field	26 (44.1)
Basketball court	17 (28.8)
Sport field	14 (23.7)
Tennis court	10 (16.9)
Lake	7 (11.9)
Splash pad	4 (6.8)
Swimming pool	3 (5.1)
Selected park amenities	
Car parking	57 (96.6)
Trash can	45 (76.3)
Benches	44 (74.6)
Picnic table	37 (62.7)
Lights	25 (42.4)
Shade	24 (40.7)
Picnic shelter	17 (28.8)
Restroom	13 (22.0)
Bike rack	4 (6.8)
Drinking fountain	4 (6.8)
Park quality[a]	
Low (0.00–0.74)	20 (33.9)
Medium (0.75–0.99)	18 (30.5)
High (1.00)	21 (35.6)
Location by district	
North	24 (40.7)
Central	18 (30.5)
South	17 (28.8)

(continued on next page)

Table 2. *(continued)*

Characteristics	*n* (%)
Neighborhood income (quartile)[b,c]	
Lowest	12 (20.7)
Second	16 (27.6)
Third	16 (27.6)
Fourth	14 (24.1)
Neighborhood minority population (%)[c]	
0–24	28 (47.5)
25–49	10 (16.9)
50–74	5 (8.5)
75–100	16 (27.1)

[a]Calculated based on average SHAPE maintenance rating from 2009 and 2010 (range=0–1.00)
[b]Income quartiles ($): 8,442–31,960; 31,961–41,737; 41,738–57,828; and 57,829–229,333
[c]Neighborhood income and minority proportion are based on data from the 2000 census for the tract containing each park's centroid.
SHAPE, Safe, Healthy, and Attractive Public Environments (unpublished Kansas City MO Parks and Recreation Department park maintenance audit tool)

could be disseminated and used in future. As part of this, a one-page survey was administered at the conclusion of the workshop. Two scale questions on the survey asked whether their perceptions of the importance of the built environment and parks for physical activity had improved over the course of the workshops (1 = not improved, 4 = improved a lot). Three open-ended questions asked about their experience participating in the tool development and testing process, the value of such a process for other community groups, and the utility of the tool as a resource for community members.

Analysis

Kappa and percent agreement statistics were used to examine the inter-rater reliability of all items in the new tool. Kappa accounts for chance agreement between raters and was interpreted using established guidelines.[34] Percent agreement is more appropriate when little variability exists among ratings (e.g., all playgrounds in good condition), and was considered acceptable if greater than 70%.[35] Items that performed poorly were either removed or modified based on feedback from the auditors gained in the final workshop. Finally, descriptive statistics were used to summarize the quantitative data collected via the survey during the final workshop. The qualitative data from the workshop discussions and open-ended survey questions about developing and using the new tool were analyzed by two of the authors for emergent themes using constant-comparison coding methods.[36]

Results

During the instrument development phase, stakeholders identified numerous points related to the themes of interest. First, for park elements conducive to facilitating physical activity, it was noted that the tool should capture the presence of a wide range of facilities (e.g., trail, ball diamond) and supporting amenities (e.g., restroom), as well as the condition of these and the ability of visitors to access and use them. Likewise, attributes related to comfort (e.g., drinking fountains); safety (e.g., lighting); quality (e.g., litter); and access (e.g., public transportation) were also important. Second, specific considerations related to youth included such things as fencing, vandalism, graffiti, traffic, shade, and separation between activity areas. Finally, desired qualities in a user-friendly audit tool included a length of two to eight pages or 15–60 minutes (to balance depth and parsimony), simple question response formats, space for subjective comments, and directions within the tool that were easy to follow and required minimal training.

These considerations were combined with a review of existing instruments to create the new Community Park Audit Tool (CPAT). The full CPAT (Appendix A, available online at www.ajpmonline.org) contains four sections titled Park Information, Access and Surrounding Neighborhood, Park Activity Areas, and Park Quality and Safety. An accompanying guidebook containing more detailed information and definitions was also developed to provide minimal training. In total, the tool spans six pages (including a half-page of instructions and tips and directions throughout) and is largely designed with dichotomous (yes/no) or ordinal (all/some/none) response formats. The completion time when used in diverse parks (1.1–193.2 acres) by stakeholders ranged from 10 to 65 minutes (depending on the size of a park and its observable features), with an average of 32 minutes per audit.

Inter-rater analyses demonstrated a high degree of reliability for the vast majority of the 140 items (Table 3). For ten items (all related to sub-elements of uncommon park activity areas [e.g., condition of a skate park or dog park]), reliability could not be assessed because less than three pairs of ratings were available.[23] In the rest of the tool, for all but four items, percent agreement between the two auditors exceeded 70%, with most items well above 80%–90%. For 56 items, kappa could not be calculated or was inappropriate because of low variability. However, only eight of the remaining 64 items had a kappa less than 0.40 (suggesting poor to fair agreement). Lower-reliability items were often related to subjective or temporally variable elements in the Park Quality and Safety section, such as noise and lighting coverage. During the final workshop, these issues were discussed, and stakeholders provided feedback about tool items or guidebook definitions that could be revised or clarified (e.g., better defining an "external trail"; distinguishing different types of bike

Table 3. Reliability of community park audit tool items, kappa statistic

Tool section	Total items	Reliability not assessed	Poor (0.00–0.19)	Fair (0.20–0.39)	Moderate (0.40–0.59)	Substantial (0.60–0.79)	Almost perfect (0.80–1.00)	Not applicable	>70%	<70%
Access and surrounding neighborhood	38	0	1	1	4	15	2	15	38	0
Park activity areas	52	10	0	0	5	8	5	24	40	2
Park quality and safety	50	0	0	6	4	13	10	17	48	2
Total	140	10	1	7	13	36	17	56	126	4

Note: Final two columns show percent agreement.

lanes). After such modifications, given their theoretic importance for park-based physical activity, many of these items were retained for further testing.

Finally, during the concluding survey, 83% of stakeholders reported that their perceptions of the importance of both the built environment and parks for promoting physical activity had improved "moderately" or "a lot" over the course of the project. When asked about the process and utility of the tool, participants spoke of networking and community-building impacts of the tool development process: "The process encourages and fosters a sense of togetherness, team building, and community." Additionally, they indicated the tool helps increase understanding of the importance of parks for physical activity: "It broadens awareness." Finally, they thought the tool will be useful for advocacy efforts: "It provides a nice vehicle for engaging grassroots citizens and constituents in a reasonably manageable process by which to assess parks and what they offer."

Discussion

Parks are important resources, but their full potential for promoting physical activity may yet be unrealized.[37] Creation of a briefer, user-friendly tool that has been developed, tested, and disseminated with a wide range of community stakeholders can facilitate greater participation by individuals and groups interested in investigating and advocating for parks and improved active-living environments.[20] Given its content validity and tested reliability and feasibility, the CPAT helps to fulfill this mandate.

At six pages in length and 32 minutes to complete on average, the CPAT fits within the page-length and use-duration guidelines recommended by stakeholders. It also balances concerns related to length voiced about lengthy researcher-oriented tools with anxieties about key park elements that shorter tools may be missing. Likewise, it includes numerous instructions and examples within the tool itself and questions with simplified response formats, two other suggestions emphasized during the first workshop.

Further, as a result of the comprehensive development process involving reviews of existing tools, key informant interviews, and multiple workshops with stakeholders, the CPAT is content valid and captures several types of elements (e.g., park quality, youth-oriented features) frequently not rated in other brief instruments. It also compares favorably with conceptual models about elements of parks that are important for physical activity.[8,10] Most importantly, though, unlike past tools largely designed for researchers, the CPAT was developed and tested with

community stakeholders from a variety of disciplines and fields.

Field testing among stakeholders showed strong inter-reliability for all tool components. The current findings are similar to those described in another study involving community members who conducted audits of street segments.[38] The fact that the CPAT was developed with considerable input from non-academic parties undoubtedly contributed to its reported ease of use and demonstrated reliability among stakeholders. Nevertheless, disparate interpretations of terms (e.g., bike lane) or varying frames of reference (e.g., poor maintenance) led to some minor confusion for a small minority of items that were subsequently clarified. Such issues reinforce the decision to, wherever possible, provide definitions and instructions on the tool itself, simplified rating scales, and an accessible guidebook as a backup reference.

On-site audits provide a means to measure detailed attributes of physical activity environments not catalogued in electronic databases. The use of such tools to engage community members in research and evaluation has also been shown to be a feasible and reliable approach.[38,39] Nevertheless, other practical methods for capturing environmental characteristics, including those within parks, also merit consideration. For example, Taylor et al.[40] described the use of Google Earth Pro to examine the quality of public open spaces. The authors reported that audits took considerably less time to complete when done online rather than on-site and that the two methods provided comparable information. However, numerous important items in the on-site audit tool (e.g., restrooms, drinking fountains, public transit access, neighborhood visibility) could not be assessed accurately or at all via remote imagery because of poor resolution and other limitations of the online system. As well, satellite images are not available for all areas (or may be obscured by tree cover, especially in parks) and how current such images are is usually unknown. Future research should explore how evolving technology and direct observation can be combined to both make active living research more interesting and accessible to average citizens and to gather the best information possible about the characteristics of park environments.

A growing body of literature suggests that capturing the characteristics of nearby parks is central to understanding their impact on park-based[11,19,41] and total[15,17] physical activity. However, it may be that perceptions of park attributes (e.g., safety, quality) are just as or more important than audited features. Moreover, objectively and subjectively measured proximity to parks often do not agree[42–45] and some research suggests that residents are uninformed about the features of parks within their community.[46] Therefore, involving residents in a process of evaluating neighborhood parks may facilitate not only outcomes related to engagement and advocacy but also awareness of local resources and how they may be used for physical activity.

Limitations

The goal for the current study of developing a user-friendly tool meant that certain concessions with respect to the length and complexity of the tool were necessary. Therefore, the CPAT is not as detailed as some existing tools designed for researchers (although it is more comprehensive than others) and the primarily dichotomous response options may reduce the variability in ratings. The CPAT was also tested across only 59 parks in a single city. As well, certain facilities and amenities were less prevalent in parks in the current study and therefore fewer pairs of ratings were available on which to test the inter-rater reliability of those items. Further, the stakeholders heralded from diverse fields, but almost all were adults and well educated (based on their employment positions). Finally, the stakeholders who tested the tool were involved in its development, which may have positively influenced the reliability of the ratings obtained. Future testing of the CPAT in diverse settings and with diverse groups should help to overcome these limitations.

Conclusion

The CPAT provides a reliable and user-friendly means of auditing parks for their potential to promote physical activity. Future research should test the CPAT with varied populations (including youth) and explore how using such tools can facilitate citizens' cognitive and behavioral responses related to knowledge, attitudes, and advocacy. For example, a recent study in two low-income urban neighborhoods found that the PARA was a useful needs assessment and program planning tool that facilitated familiarity with the local built and social environment; however, residents also noted several key objective (e.g., sidewalks) and subjective (e.g., bullying) attributes not captured by the tool.[39] In general, it is hoped that the CPAT and tools like it will facilitate greater engagement of diverse groups in considering, evaluating, and advocating for improved parks and overall healthy community design.

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Appendix

Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.amepre.2011.10.018.

APPENDIX C: BETA TESTING FOCUS GROUP GUIDE

Beta Testing Focus Group Guide

Thank you very much for agreeing to participate in eCPAT beta testing. At this time, you should have all used the new eCPAT app to audit a park. We would like to ask you some questions about the design of the app interface and your thoughts about using the app to collect information.

1. **What did you like/not like about using the app interface?**
   Probes: What about the application made the park auditing experience good? Bad?
   Appearance: What about the look of the app did you like/not like?
   (i.e., format, color, logo, interactivity of buttons, symbols, signifiers)
   Functionality: What worked/didn't work? (Drop down boxes, tabs, scrolling, camera, help)

2. **How easy was it to complete the form using the app interface?**
   Probes: Discuss how easy/hard it was to learn to use the app
   (i.e. instructions, help, icons, movement within the app)
   How intuitive were the built in prompts, helps, instructions? How might the app be made to be more intuitive?

3. **What challenges did you experience using the mobile device and app interface?**
   Probes: Format? Functionality? Organization? Ability to interact with? Errors/glitches? Speed/efficiency?

4. **What did you expect the app to do that it did not do?**
   Probes: Before you began using the app, and knowing that you were going to use the app to "rate" a park, what did you think the app was going to be able to do?
   Did it do everything you expected?

5. **What additional functions would you add?**
   Probe: Think about what your favorite apps can do.
   What would you like to be able to do with an app such as this?

6. **Thinking about both the paper and electronic versions of the CPAT, which one was easier to use? Why?**

7. **Did you prefer one tool over the other? What did you prefer in each one?**

APPENDIX D: USABILITY SURVEY

eCPAT Testing Follow Up Survey

Please answer these questions about using the CPAT and eCPAT app. For each question, circle yes or no or one of the numbers between 1 to 6.

Question 1 Do you feel that you successfully completed all the components of the eCPAT app?

Yes No

Question 2 In relation to the paper version of the CPAT, I found the eCPAT app to be:

Very difficult to use 1 … 2 … 3 … 4 … 5 … 6 Very easy to use

Question 3 The eCPAT app was well organized and functions were easy to find.

Strongly disagree 1 … 2 … 3 … 4 … 5 … 6 Strongly agree

Question 4 I immediately understood the function of each item in the eCPAT app.

Strongly disagree 1 … 2 … 3 … 4 … 5 … 6 Strongly agree

Question 5 All of the functions I expected to find in the eCPAT app were present.

Strongly disagree 1 … 2 … 3 … 4 … 5 … 6 Strongly agree

Question 6 The buttons in the eCPAT app were well organized and easy to find.

Strongly disagree 1 … 2 … 3 … 4 … 5 … 6 Strongly agree

Question 7 I immediately understood the function of each button in the eCPAT app.

Strongly disagree 1 … 2 … 3 … 4 … 5 … 6 Strongly agree

Question 8 All of the functions I expected to find on the menu bar in the eCPAT app were present.

Strongly disagree 1 … 2 … 3 … 4 … 5 … 6 Strongly agree

Question 9 I found navigating around the eCPAT app screen to be:

Very difficult 1 … 2 … 3 … 4 … 5 … 6 Very easy

Question 10 My overall impression of the eCPAT app is:

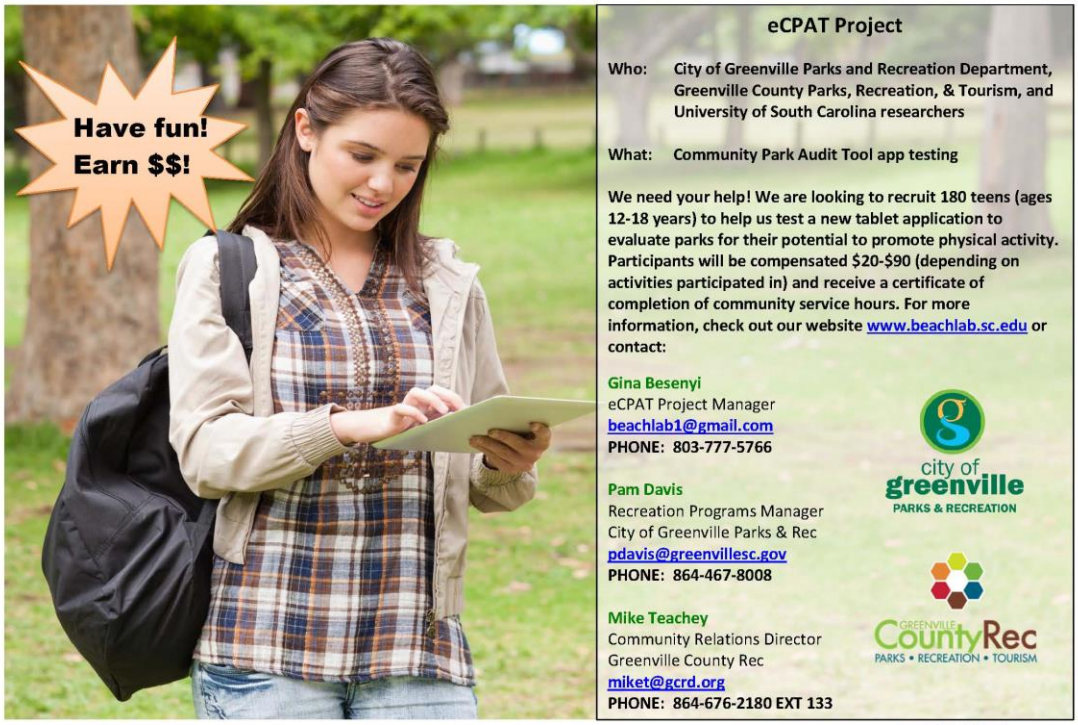
Very negative 1 … 2 … 3 … 4 … 5 … 6 Very positive

eCPAT Testing Follow Up Survey

Please answer these questions about using the eCPAT app based on how much you agree or disagree with each statement. Please circle a number between 1 to 5 (1=strongly disagree, 2=disagree, 3=neither disagree nor agree, 4=agree, 5=strong agree).

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this eCPAT app frequently.	○	○	○	○	○
2. I found the eCPAT app unnecessarily complex.	○	○	○	○	○
3. I thought the eCPAT app was easy to use.	○	○	○	○	○
4. I think that I would need the support of a technical person to be able to use the eCPAT app.	○	○	○	○	○
5. I found the various functions in the eCPAT app were well integrated.	○	○	○	○	○
6. I thought there was too much inconsistency in the eCPAT app.	○	○	○	○	○
7. I would imagine that most people would learn to use the eCPAT app very quickly.	○	○	○	○	○
8. I found the eCPAT app very cumbersome to use.	○	○	○	○	○
9. I felt very confident using the eCPAT app.	○	○	○	○	○
10. I needed to learn a lot of things before I could get going with the eCPAT app.	○	○	○	○	○

APPENDIX E: RECRUITMENT FLYER



Follow link or scan QR to sign up!

https://www.eventbrite.com/e/ecpat-project-registration-11157609711

APPENDIX F: PRE PROJECT SURVEY

ID_____

eCPAT Pre-Project Survey

Thank you very much for participating in the eCPAT Project. We are interested in learning more about youth perceptions about physical activity, parks, and mobile technology. Please read through and answer all questions in the survey.

PHYSICAL ACTIVITY

1. **During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.)**
   - ❑ 0 days
   - ❑ 1 day
   - ❑ 2 days
   - ❑ 3 days
   - ❑ 4 days
   - ❑ 5 days
   - ❑ 6 days
   - ❑ 7 days

2. **On an average school day, how many hours do you watch TV?**
   - ❑ I do not watch TV on an average school day
   - ❑ Less than 1 hour per day
   - ❑ 1 hour per day
   - ❑ 2 hours per day
   - ❑ 3 hours per day
   - ❑ 4 hours per day
   - ❑ 5 or more hours per day

3. **On an average school day, how many hours do you play video or computer games or use a computer for something that is not school work? (Count time spent on things such as Xbox, PlayStation, an iPod, an iPad or other tablet, a smartphone, YouTube, Facebook or other social networking tools, and the Internet.)**
   - ❑ I do not play video or computer games or use a computer for something that is not school work
   - ❑ Less than 1 hour per day
   - ❑ 1 hour per day
   - ❑ 2 hours per day
   - ❑ 3 hours per day
   - ❑ 4 hours per day
   - ❑ 5 or more hours per day

4. **In an average week when you are in school, on how many days do you go to physical education (PE) classes?**
   - ❑ 0 days
   - ❑ 1 day
   - ❑ 2 days
   - ❑ 3 days
   - ❑ 4 days
   - ❑ 5 days

5. **During the past 12 months, on how many sports teams did you play? (Count any teams run by your school or community groups.)**
   - ❑ 0 teams
   - ❑ 1 team
   - ❑ 2 teams
   - ❑ 3 or more teams

6. **In a usual week, how many days do you walk or bike to school?** _____days

7. **In a usual week, how many days do you walk or bike from school?** _____days

PARK USAGE AND PERCEPTIONS

Please answer the following questions about park usage. By park, we mean a public park or outdoor recreation area in the community designed for active or passive use.

8. **Within the last month (i.e., last 30 days), did you visit a park?**

❑ Yes – please answer the following questions ❑ No – skip to question 12

8b. How many days in the last month (i.e., last 30 days) did you visit a park?

____ days in the last month visited a park ❑ Do not know

8c. During your last park visit, how much time did you spend in the park?

____ (hours) : ____ (minutes) during last park visit ❑ Do not know

8d. Of that time you said you spent in a park during your last park visit, how much time did you spend being physically active? By physically active, we mean doing any physical movement rather than sitting (e.g., walking, biking).

____ (hours) : ____ (minutes) being physically active during last park visit ❑ Do not know

9. **Which of the following best describes your activity level during your last park visit? (*check only one*)**

❑ Mostly sitting
❑ Mostly light activities (standing, walking or strolling at a slow pace)
❑ Mostly moderate activities (walking at a moderate pace, playing tennis)
❑ Mostly vigorous activities (jogging, soccer, playing basketball)
❑ Do not know

10. **What activities did you do during your last park visit? *(check all that apply)***

❑ Walking/hiking	❑ Picnicking	❑ Wildlife viewing (e.g., bird watching)
❑ Jogging/running	❑ Relaxing	❑ Viewing/photographing nature
❑ Biking	❑ Reading	❑ Sightseeing
❑ Rollerblading	❑ Fishing	❑ Playing with friends or parents
❑ Group sports	❑ Tennis	❑ Swimming
❑ Martial arts/Tai Chi	❑ Yoga	❑ Other (*please specify*): _____

11. **What facility areas did you use during your last park visit? (*check all that apply*)**

❑ Trails	❑ Playground	❑ Sport Fields (e.g., football, soccer)
❑ Basketball Court	❑ Off-Leash Dog Park	❑ Fitness Equipment/Stations
❑ Baseball Field	❑ Lake	❑ Swimming Pool/Splash Pad
❑ Tennis Court	❑ Skate Park	❑ Picnic Area
❑ Volleyball Court	❑ Open/Green Space	❑ Other (*please specify*): _____

12. When you travel to a park, how do you usually get there? (*check only one*)

❑ Walk ❑ Bike ❑ Driven in a car ❑ Public transit ❑ Other _____

YOUTH EMPOWERMENT AND ADVOCACY

13. Please tell us how much you disagree or agree with the following statements by circling a number from 1 to 5 for each question.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I have the knowledge and skills to influence my community.	1	2	3	4	5
b.	I have the ability to impact my community in important ways.	1	2	3	4	5
c.	I have confidence in my capabilities to make needed changes in my community.	1	2	3	4	5
d.	I am able to affect the area in which I live.	1	2	3	4	5
e.	I can influence community members to take actions on important issues.	1	2	3	4	5
f.	I have the knowledge and skills to gather information relevant to my community.	1	2	3	4	5
g.	I know I can make a difference in my community.	1	2	3	4	5
h.	I want to get involved in my community.	1	2	3	4	5
i.	I am willing to get involved in my community.	1	2	3	4	5
j.	I am going to get involved in my community.	1	2	3	4	5
k.	I intend to take action in my community.	1	2	3	4	5
l.	I participate in community activities.	1	2	3	4	5
m.	I am involved in my community.	1	2	3	4	5
n.	I volunteer for community projects.	1	2	3	4	5
o.	I think it is important for me to get involved in my community.	1	2	3	4	5
p.	I feel that efforts to address community issues are worthwhile.	1	2	3	4	5
q.	I am motivated to get involved in my community.	1	2	3	4	5
r.	I think that the problems in my community are serious.	1	2	3	4	5

14. Please tell us how much you disagree or agree with the following statements by circling a number from 1 to 5 for each question.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I am a leader.	1	2	3	4	5
b.	I like to wait and see if someone else is going to solve a problem.	1	2	3	4	5
c.	I find it very hard to talk in front of a group.	1	2	3	4	5
d.	I can talk with adults about issues I believe in.	1	2	3	4	5
e.	If I tell someone "in charge," like a leader, about my opinions, they will listen to me.	1	2	3	4	5
f.	I can ask others to help work on making our school or community healthier	1	2	3	4	5
g.	I can start discussions with others about how to change our school or community to make it healthier.	1	2	3	4	5
h.	I enjoy participation because I want to have as much say as possible in my school or community.	1	2	3	4	5
i.	I know how to get information about ways to make my school or community a better place for being physically active and eating healthy.	1	2	3	4	5

15. Please tell us how often you have done the following actions.

		Never	1-3 Times	4-6 Times	6+ Times
a.	In the last year, how many times have you tried to tell **school leaders, people in your community, or politicians** to be more interested in making your school or community a better place for being physically active and eating healthy?	1	2	3	4
b.	In the last year, how many times have you talked to your **parents or family members** about changes needed to make your school or community a better place for being physically active and eating healthy?	1	2	3	4

TECHNOLOGY AND SOCIAL MEDIA

Please answer the following questions about technology and social media.

16. What types of mobile technology do you have access to? (check all that apply)

- ❑ Cell phone (not a smartphone)
- ❑ Smartphone
- ❑ Tablet or iPad
- ❑ Laptop
- ❑ Nook/Kindle
- ❑ Other (please list) _____
- ❑ Other (please list) _____
- ❑ Other (please list) _____

17. What types of social networking do you have? (check all that apply)

- ❑ Facebook
- ❑ Instagram
- ❑ Twitter
- ❑ Snapchat
- ❑ Vine
- ❑ KIK Messaging
- ❑ Vine
- ❑ Pinterest
- ❑ Google +
- ❑ ask.fm
- ❑ tubmlr
- ❑ flickr
- ❑ Other (please list) _____
- ❑ Other (please list) _____

18. Please place an X in the appropriate box to indicate how often you do each of the following activities on your mobile phone.

_____ I do not have a mobile phone (skip to question 19)

		Never	Once a Month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour	All the time
a.	Send and receive text messages on a mobile phone										
b.	Make and receive mobile phone calls										
c.	Check for text messages on a mobile phone										
d.	Check for voice calls on a mobile phone										
e.	Read email on a mobile phone										
f.	Get directions or use GPS on a mobile phone										
g.	Browse the web on a mobile phone										
h.	Listen to music on a mobile phone										
i.	Take pictures using a mobile phone										
j.	Check the news on a mobile phone										
k.	Record a video on a mobile phone										
l.	Use apps (for any purpose) on a mobile phone										
m.	Search for information with a mobile phone										
n.	Use your mobile phone during class or work time										

19. **Please place an X in the appropriate box to indicate how often you do each of the following activities. When we say mobile device, we mean a smartphone, tablet, iPad, laptop, nook, kindle, or other mobile device capable of these functions.**

_____ **I do not have a mobile device (skip to question 20)**

		Never	Once a Month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour	All the time
a.	Watch TV shows, movies, etc. on a mobile device										
b.	Watch video clips on a mobile device										
c.	Download media files from other people on a mobile device										
d.	Share your own media files on a mobile device										
e.	Search the internet for news on a mobile device										
f.	Search the internet for information on a mobile device										
g.	Search the internet for videos on a mobile device										
h.	Search the internet for images or photos on a mobile device										
i.	Play games on a mobile device										
j.	Play games with other people online on a mobile device										

Almost there! Just a few more questions...

20. Please indicate how often you do each of the following activities on social networking sites such as Facebook, Instagram, Twitter, or any other social networking site.

_____ I do not have social networking (skip to question 21)

		Never	Once a Month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour	All the time
a.	Check your social media page or other social networks										
b.	Check your social media page or other social networks from a mobile device										
c.	Check social media at work or school										
d.	Post status updates										
e.	Post photos										
f.	Browse profiles and photos										
g.	Read postings										
h.	Comment on postings, status updates, photos, etc.										
i.	Click "Like" to a posting, photo, etc.										

21. Please answer the following questions about your Facebook or other social media friends.

_____ I do not have social networking (skip to question 22)

		0	1-50	51-100	101-175	176-250	251-375	376-500	501-750	751 or more
a.	How many friends do you have on social media (i.e. Facebook, Instagram)?									
b.	How many of your social media friends do you know in person?									
c.	How many people have you met online that you have never met in person?									
d.	How many people do you regularly interact with online that you have never met in person?									

22. Please tell us how much you disagree or agree with these statements about technology.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I feel it is important to be able to find any information whenever I want online.	1	2	3	4	5
b.	I feel it is important to be able to access the internet any time I want.	1	2	3	4	5
c.	I think it is important to keep up with the latest trends in technology.	1	2	3	4	5
d.	Technology will provide solutions to many of our problems.	1	2	3	4	5
e.	With technology anything is possible.	1	2	3	4	5
f.	I feel that I get more accomplished because of technology.	1	2	3	4	5
g.	New technology makes people waste too much time.	1	2	3	4	5
h.	New technology makes life more complicated.	1	2	3	4	5
i.	New technology makes people more isolated.	1	2	3	4	5

23. Please tell us how much you disagree or agree with these statements about using mobile devices.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I use a mobile device to find out what's going on in my community.	1	2	3	4	5
b.	I would use an app on a mobile device to communicate with school or community leaders.	1	2	3	4	5
c.	I would use an app on a mobile device to voice my opinions about changes that should be made in my school or community.	1	2	3	4	5
d.	I would use an app on a mobile device to convince people to make changes in my school or community.	1	2	3	4	5

Please turn to the last page to answer a few final questions about you...

PARTICIPANT INFORMATION
Please tell us a little bit more about you. Please don't worry, all information will be kept private.

24. What is your gender? ❑ Male ❑ Female

25. What is your date of birth? Month/Day/Year _____/_____/_____

26. What is your height? _____ feet _____ inches

27. What is your weight? _____ pounds

28. Are you of Hispanic or Latino origin? ❑ Yes ❑ No

29. What racial category best describes you? (*check all that apply)*
- ❑ American Indian or Alaska Native
- ❑ Asian
- ❑ Black
- ❑ Native Hawaiian or Other Pacific Islander
- ❑ White
- ❑ Other *(please specify)*: _____

30. How many total motor vehicles are owned by the members of your household? *(that are driven at least once per week)* # of vehicles_____

31. Do you own a bike? ❑ Yes ❑ No

32. Do you qualify for free or reduced lunch at school? ❑ Yes ❑ No ❑ Don't know

---

Please enter your name and address for attendance purposes. This information will be stored separately from your survey answers.

First Name _____

Last Name _____

Street Address _____

City _____ **Zip** _____

You're done! Thank you very much for completing this survey.
Please return it to a workshop staff member!

APPENDIX G: POST PROJECT SURVEY – PAPER CONDITION

ID_____

eCPAT Post Survey

Thank you very much for participating in the eCPAT Project. We are interested in learning more about youth perceptions about physical activity, parks, and mobile technology. Please read through and answer all questions in the survey.

PHYSICAL ACTIVITY

1. **During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.)**

❑ 0 days	❑ 4 days
❑ 1 day	❑ 5 days
❑ 2 days	❑ 6 days
❑ 3 days	❑ 7 days

PARK USAGE AND PERCEPTIONS

Please answer the following questions about park usage. Do NOT count your scheduled park visits for this project. By park, we mean a public park or outdoor recreation area in the community designed for active or passive use.

2. **Within the last month (i.e., last 30 days), did you visit a park? (Do NOT count your scheduled park visits for this project).**

❑ Yes – please answer the following questions ❑ No – skip to question 3

2b. How many days in the last month (i.e., last 30 days) did you visit a park?

____ days in the last month visited a park ❑ Do not know

2c. During your last park visit, how much time did you spend in the park?

____ (hours) : ____ (minutes) during last park visit ❑ Do not know

2d. Of that time you said you spent in a park during your last park visit, how much time did you spend being physically active? By physically active, we mean doing any physical movement rather than sitting (e.g., walking, biking).

____ (hours) : ____ (minutes) being physically active during last park visit ❑ Do not know

3. **How likely are you to visit a park in the next 30 days?**

❑ Very unlikely ❑ Unlikely ❑ Neither ❑ Likely ❑ Very Likely

4. **How important do you think parks are in the community?**

❑ Very unimportant ❑ Unimportant ❑ Neither ❑ Important ❑ Very important

5. **How important do you think parks are for physical activity?**

❑ Very unimportant ❑ Unimportant ❑ Neither ❑ Important ❑ Very important

ID_____

YOUTH EMPOWERMENT AND ADVOCACY

6. Please tell us how much you disagree or agree with the following statements by circling a number from 1 to 5 for each question.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I have the knowledge and skills to influence my community.	1	2	3	4	5
b.	I have the ability to impact my community in important ways.	1	2	3	4	5
c.	I have confidence in my capabilities to make needed changes in my community.	1	2	3	4	5
d.	I am able to affect the area in which I live.	1	2	3	4	5
e.	I can influence community members to take actions on important issues.	1	2	3	4	5
f.	I have the knowledge and skills to gather information relevant to my community.	1	2	3	4	5
g.	I know I can make a difference in my community.	1	2	3	4	5
h.	I want to get involved in my community.	1	2	3	4	5
i.	I am willing to get involved in my community.	1	2	3	4	5
j.	I am going to get involved in my community.	1	2	3	4	5
k.	I intend to take action in my community.	1	2	3	4	5
l.	I participate in community activities.	1	2	3	4	5
m.	I am involved in my community.	1	2	3	4	5
n.	I volunteer for community projects.	1	2	3	4	5
o.	I think it is important for me to get involved in my community.	1	2	3	4	5
p.	I feel that efforts to address community issues are worthwhile.	1	2	3	4	5
q.	I am motivated to get involved in my community.	1	2	3	4	5
r.	I think that the problems in my community are serious.	1	2	3	4	5

ID_____

7. Please tell us how much you disagree or agree with the following statements.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I am a leader.	1	2	3	4	5
b.	I like to wait and see if someone else is going to solve a problem.	1	2	3	4	5
c.	I find it very hard to talk in front of a group.	1	2	3	4	5
d.	I can talk with adults about issues I believe in.	1	2	3	4	5
e.	If I tell someone "in charge," like a leader, about my opinions, they will listen to me.	1	2	3	4	5
f.	I can ask others to help work on making our school or community healthier	1	2	3	4	5
g.	I can start discussions with others about how to change our school or community to make it healthier.	1	2	3	4	5
h.	I enjoy participation because I want to have as much say as possible in my school or community.	1	2	3	4	5
i.	I know how to get information about ways to make my school or community a better place for being physically active and eating healthy.	1	2	3	4	5

8. Please tell us how often you have done the following actions.

		Never	1-3 Times	4-6 Times	6+ Times
a.	In the last year, how many times have you tried to tell **school leaders, people in your community, or politicians** to be more interested in making your school or community a better place for being physically active and eating healthy?	1	2	3	4
b.	In the last year, how many times have you talked to your **parents or family members** about changes needed to make your school or community a better place for being physically active and eating healthy?	1	2	3	4

ID_____

TECHNOLOGY AND SOCIAL MEDIA

9. Please tell us how much you disagree or agree with these statements about using mobile devices by circling a number from 1 to 5.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I use a mobile device to find out what's going on in my community.	1	2	3	4	5
b.	I would use an app on a mobile device to communicate with school or community leaders.	1	2	3	4	5
c.	I would use an app on a mobile device to voice my opinions about changes that should be made in my school or community.	1	2	3	4	5
d.	I would use an app on a mobile device to convince people to make changes in my school or community.	1	2	3	4	5

10. Please tell us how much you disagree or agree with these statements about technology.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I feel it is important to be able to find any information whenever I want online.	1	2	3	4	5
b.	I feel it is important to be able to access the internet any time I want.	1	2	3	4	5
c.	I think it is important to keep up with the latest trends in technology.	1	2	3	4	5
d.	Technology will provide solutions to many of our problems.	1	2	3	4	5
e.	With technology anything is possible.	1	2	3	4	5
f.	I feel that I get more accomplished because of technology.	1	2	3	4	5
g.	New technology makes people waste too much time.	1	2	3	4	5
h.	New technology makes life more complicated.	1	2	3	4	5
i.	New technology makes people more isolated.	1	2	3	4	5

ID_____

11. Please place an X in the appropriate box to indicate how often you do each of the following activities on your mobile phone.

_____ I do not have a mobile phone (skip to question 12)

		Never	Once a Month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour	All the time
a.	Send and receive text messages on a mobile phone										
b.	Make and receive mobile phone calls										
c.	Check for text messages on a mobile phone										
d.	Check for voice calls on a mobile phone										
e.	Read email on a mobile phone										
f.	Get directions or use GPS on a mobile phone										
g.	Browse the web on a mobile phone										
h.	Listen to music on a mobile phone										
i.	Take pictures using a mobile phone										
j.	Check the news on a mobile phone										
k.	Record a video on a mobile phone										
l.	Use apps (for any purpose) on a mobile phone										
m.	Search for information with a mobile phone										
n.	Use your mobile phone during class or work time										

ID_____

12. Please place an X in the appropriate box to indicate how often you do each of the following activities. When we say mobile device, we mean a smartphone, tablet, iPad, laptop, nook, kindle, or other mobile device capable of these functions.

_____ I do not have a mobile device (skip to question 13)

		Never	Once a Month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour	All the time
a.	Watch TV shows, movies, etc. on a mobile device										
b.	Watch video clips on a mobile device										
c.	Download media files from other people on a mobile device										
d.	Share your own media files on a mobile device										
e.	Search the internet for news on a mobile device										
f.	Search the internet for information on a mobile device										
g.	Search the internet for videos on a mobile device										
h.	Search the internet for images or photos on a mobile device										
i.	Play games on a mobile device										
j.	Play games with other people online on a mobile device										

Almost there! Just a few more questions…

ID_____

13. Please indicate how often you do each of the following activities on social networking sites such as Facebook, Instagram, Twitter, or any other social networking site.

_____ I do not have social networking (skip to question 14)

		Never	Once a Month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour	All the time
a.	Check your social media page or other social networks										
b.	Check your social media page or other social networks from a mobile device										
c.	Check social media at work or school										
d.	Post status updates										
e.	Post photos										
f.	Browse profiles and photos										
g.	Read postings										
h.	Comment on postings, status updates, photos, etc.										
i.	Click "Like" to a posting, photo, etc.										

AUDIT TOOL USABILITY

14. Do you feel that you successfully completed the Community Park Audit Tool (CPAT) during your park visits? ❑ Yes ❑ No

15. The Community Park Audit Tool was well organized

❑ Strongly Disagree ❑ Disagree ❑ Neutral ❑ Agree ❑ Strongly Agree

15. The thing I liked the least about the CPAT was:

16. The thing I liked the most about the CPAT was:

ID_____

17. Please tell us how much you disagree or agree with these statements about using the CPAT.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I think that I would like to use the CPAT frequently.	1	2	3	4	5
b.	I found the CPAT unnecessarily complex.	1	2	3	4	5
c.	I thought the CPAT was easy to use.	1	2	3	4	5
d.	I think that I would need the support of a technical person to be able to use the CPAT.	1	2	3	4	5
e.	I found the various functions in the CPAT were well integrated.	1	2	3	4	5
f.	I thought there was too much inconsistency in the CPAT.	1	2	3	4	5
g.	I would imagine that most people would learn to use the CPAT very quickly.	1	2	3	4	5
h.	I found the CPAT very awkward to use.	1	2	3	4	5
i.	I felt very confident using the CPAT.	1	2	3	4	5
j.	I needed to learn a lot of things before I could get going with the CPAT.	1	2	3	4	5

18. My overall impression of the CPAT is:

❑ Very negative ❑ Negative ❑ Neutral ❑ Positive ❑ Very positive

FUTURE PROJECTS

19. I am interested in <u>participating</u> in future research projects similar to this one.

❑ Strongly Disagree ❑ Disagree ❑ Neutral ❑ Agree ❑ Strongly Agree

20. I would like to be <u>contacted</u> about future opportunities to participate in research studies.

❑ Yes ❑ No

Please enter your name for attendance purposes. This information will be stored separately from your survey answers.

First Name _____

Last Name _____

APPENDIX H: POST PROJECT SURVEY – ECPAT CONDITION

ID_____

eCPAT Post Survey

Thank you very much for participating in the eCPAT Project. We are interested in learning more about youth perceptions about physical activity, parks, and mobile technology. Please read through and answer all questions in the survey.

PHYSICAL ACTIVITY

1. **During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.)**

❑ 0 days	❑ 4 days
❑ 1 day	❑ 5 days
❑ 2 days	❑ 6 days
❑ 3 days	❑ 7 days

PARK USAGE AND PERCEPTIONS

Please answer the following questions about park usage. Do NOT count your scheduled park visits for this project. By park, we mean a public park or outdoor recreation area in the community designed for active or passive use.

2. **Within the last month (i.e., last 30 days), did you visit a park? (Do NOT count your scheduled park visits for this project).**

❑ Yes – please answer the following questions ❑ No – skip to question 3

2b. How many days in the last month (i.e., last 30 days) did you visit a park?

____ days in the last month visited a park ❑ Do not know

2c. During your last park visit, how much time did you spend in the park?

____ (hours) : ____ (minutes) during last park visit ❑ Do not know

2d. Of that time you said you spent in a park during your last park visit, how much time did you spend being physically active? By physically active, we mean doing any physical movement rather than sitting (e.g., walking, biking).

____ (hours) : ____ (minutes) being physically active during last park visit ❑ Do not know

3. **How likely are you to visit a park in the next 30 days?**

❑ Very unlikely ❑ Unlikely ❑ Neither ❑ Likely ❑ Very likely

4. **How important do you think parks are in the community?**

❑ Very unimportant ❑ Unimportant ❑ Neither ❑ Important ❑ Very important

5. **How important do you think parks are for physical activity?**

❑ Very unimportant ❑ Unimportant ❑ Neither ❑ Important ❑ Very important

ID_____

YOUTH EMPOWERMENT AND ADVOCACY

6. Please tell us how much you disagree or agree with the following statements by circling a number from 1 to 5 for each question.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I have the knowledge and skills to influence my community.	1	2	3	4	5
b.	I have the ability to impact my community in important ways.	1	2	3	4	5
c.	I have confidence in my capabilities to make needed changes in my community.	1	2	3	4	5
d.	I am able to affect the area in which I live.	1	2	3	4	5
e.	I can influence community members to take actions on important issues.	1	2	3	4	5
f.	I have the knowledge and skills to gather information relevant to my community.	1	2	3	4	5
g.	I know I can make a difference in my community.	1	2	3	4	5
h.	I want to get involved in my community.	1	2	3	4	5
i.	I am willing to get involved in my community.	1	2	3	4	5
j.	I am going to get involved in my community.	1	2	3	4	5
k.	I intend to take action in my community.	1	2	3	4	5
l.	I participate in community activities.	1	2	3	4	5
m.	I am involved in my community.	1	2	3	4	5
n.	I volunteer for community projects.	1	2	3	4	5
o.	I think it is important for me to get involved in my community.	1	2	3	4	5
p.	I feel that efforts to address community issues are worthwhile.	1	2	3	4	5
q.	I am motivated to get involved in my community.	1	2	3	4	5
r.	I think that the problems in my community are serious.	1	2	3	4	5

ID_____

7. Please tell us how much you disagree or agree with the following statements.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I am a leader.	1	2	3	4	5
b.	I like to wait and see if someone else is going to solve a problem.	1	2	3	4	5
c.	I find it very hard to talk in front of a group.	1	2	3	4	5
d.	I can talk with adults about issues I believe in.	1	2	3	4	5
e.	If I tell someone "in charge," like a leader, about my opinions, they will listen to me.	1	2	3	4	5
f.	I can ask others to help work on making our school or community healthier	1	2	3	4	5
g.	I can start discussions with others about how to change our school or community to make it healthier.	1	2	3	4	5
h.	I enjoy participation because I want to have as much say as possible in my school or community.	1	2	3	4	5
i.	I know how to get information about ways to make my school or community a better place for being physically active and eating healthy.	1	2	3	4	5

8. Please tell us how often you have done the following actions.

		Never	1-3 Times	4-6 Times	6+ Times
a.	In the last year, how many times have you tried to tell **school leaders, people in your community, or politicians** to be more interested in making your school or community a better place for being physically active and eating healthy?	1	2	3	4
b.	In the last year, how many times have you talked to your **parents or family members** about changes needed to make your school or community a better place for being physically active and eating healthy?	1	2	3	4

ID_____

TECHNOLOGY AND SOCIAL MEDIA

9. Please tell us how much you disagree or agree with these statements about using mobile devices by circling a number from 1 to 5.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I use a mobile device to find out what's going on in my community.	1	2	3	4	5
b.	I would use an app on a mobile device to communicate with school or community leaders.	1	2	3	4	5
c.	I would use an app on a mobile device to voice my opinions about changes that should be made in my school or community.	1	2	3	4	5
d.	I would use an app on a mobile device to convince people to make changes in my school or community.	1	2	3	4	5

10. Please tell us how much you disagree or agree with these statements about technology.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I feel it is important to be able to find any information whenever I want online.	1	2	3	4	5
b.	I feel it is important to be able to access the internet any time I want.	1	2	3	4	5
c.	I think it is important to keep up with the latest trends in technology.	1	2	3	4	5
d.	Technology will provide solutions to many of our problems.	1	2	3	4	5
e.	With technology anything is possible.	1	2	3	4	5
f.	I feel that I get more accomplished because of technology.	1	2	3	4	5
g.	New technology makes people waste too much time.	1	2	3	4	5
h.	New technology makes life more complicated.	1	2	3	4	5
i.	New technology makes people more isolated.	1	2	3	4	5

ID_____

11. Please place an X in the appropriate box to indicate how often you do each of the following activities on your mobile phone.

_____ I do not have a mobile phone (skip to question 12)

		Never	Once a Month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour	All the time
a.	Send and receive text messages on a mobile phone										
b.	Make and receive mobile phone calls										
c.	Check for text messages on a mobile phone										
d.	Check for voice calls on a mobile phone										
e.	Read email on a mobile phone										
f.	Get directions or use GPS on a mobile phone										
g.	Browse the web on a mobile phone										
h.	Listen to music on a mobile phone										
i.	Take pictures using a mobile phone										
j.	Check the news on a mobile phone										
k.	Record a video on a mobile phone										
l.	Use apps (for any purpose) on a mobile phone										
m.	Search for information with a mobile phone										
n.	Use your mobile phone during class or work time										

ID_____

12. **Please place an X in the appropriate box to indicate how often you do each of the following activities. When we say mobile device, we mean a smartphone, tablet, iPad, laptop, nook, kindle, or other mobile device capable of these functions.**

_____ I do not have a mobile device (skip to question 13)

		Never	Once a Month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour	All the time
a.	Watch TV shows, movies, etc. on a mobile device										
b.	Watch video clips on a mobile device										
c.	Download media files from other people on a mobile device										
d.	Share your own media files on a mobile device										
e.	Search the internet for news on a mobile device										
f.	Search the internet for information on a mobile device										
g.	Search the internet for videos on a mobile device										
h.	Search the internet for images or photos on a mobile device										
i.	Play games on a mobile device										
j.	Play games with other people online on a mobile device										

Almost there! Just a few more questions…

ID_____

13. Please indicate how often you do each of the following activities on social networking sites such as Facebook, Instagram, Twitter, or any other social networking site.

_____ I do not have social networking (skip to question 14)

		Never	Once a Month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour	All the time
a.	Check your social media page or other social networks										
b.	Check your social media page or other social networks from a mobile device										
c.	Check social media at work or school										
d.	Post status updates										
e.	Post photos										
f.	Browse profiles and photos										
g.	Read postings										
h.	Comment on postings, status updates, photos, etc.										
i.	Click "Like" to a posting, photo, etc.										

AUDIT TOOL USABILITY

14. Do you feel that you successfully completed the eCPAT app during your park visits? ❑ Yes ❑ No

15. Please tell us how much you disagree or agree with these statements about using the eCPAT app.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	The eCPAT app was well organized.	1	2	3	4	5
b.	I immediately understood the function of each item in the eCPAT app.	1	2	3	4	5
c.	All of the functions I expected to find in the eCPAT app were present.	1	2	3	4	5
d.	The buttons in the eCPAT app were well organized and easy to find.	1	2	3	4	5
e.	I immediately understood the function of each button in the eCPAT app.	1	2	3	4	5
f.	All of the functions I expected to find on the menu bar in the eCPAT app were present.	1	2	3	4	5

ID_____

16. Please tell us how much you disagree or agree with these statements about using the eCPAT app.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I think that I would like to use the eCPAT app frequently.	1	2	3	4	5
b.	I found the eCPAT app unnecessarily complex.	1	2	3	4	5
c.	I thought the eCPAT app was easy to use.	1	2	3	4	5
d.	I think that I would need the support of a technical person to be able to use the eCPAT app.	1	2	3	4	5
e.	I found the various functions in the eCPAT app were well integrated.	1	2	3	4	5
f.	I thought there was too much inconsistency in the eCPAT app.	1	2	3	4	5
g.	I would imagine that most people would learn to use the eCPAT app very quickly.	1	2	3	4	5
h.	I found the eCPAT app very awkward to use.	1	2	3	4	5
i.	I felt very confident using the eCPAT app.	1	2	3	4	5
j.	I needed to learn a lot of things before I could get going with the eCPAT app.	1	2	3	4	5

17. The thing I liked the least about the eCPAT app was:

18. The thing I liked the most about the eCPAT app was:

19. My overall impression of the eCPAT app is:

❑ Very negative ❑ Negative ❑ Neutral ❑ Positive ❑ Very positive

ID_____

FUTURE PROJECTS

20. I am interested in participating in future research projects similar to this one.

❑ Strongly Disagree ❑ Disagree ❑ Neutral ❑ Agree ❑ Strongly Agree

21. I would like to be contacted about future opportunities to participate in research studies.

❑ Yes ❑ No

Please enter your name for attendance purposes. This information will be stored separately from your survey answers.

First Name _____

Last Name _____

APPENDIX I: POST PROJECT SURVEY – CONTROL CONDITION

ID_____

eCPAT Post Survey

Thank you very much for participating in the eCPAT Project. We are interested in learning more about youth perceptions about physical activity, parks, and mobile technology. Please read through and answer all questions in the survey.

PHYSICAL ACTIVITY

1. **During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.)**

❑ 0 days ❑ 4 days
❑ 1 day ❑ 5 days
❑ 2 days ❑ 6 days
❑ 3 days ❑ 7 days

PARK USAGE AND PERCEPTIONS

Please answer the following questions about park usage. By park, we mean a public park or outdoor recreation area in the community designed for active or passive use.

2. **Within the last month (i.e., last 30 days), did you visit a park?**

❑ Yes – please answer the following questions ❑ No – skip to question 3

2b. How many days in the last month (i.e., last 30 days) did you visit a park?

____ days in the last month visited a park ❑ Do not know

2c. During your last park visit, how much time did you spend in the park?

____ (hours) : ____ (minutes) during last park visit ❑ Do not know

2d. Of that time you said you spent in a park during your last park visit, how much time did you spend being physically active? By physically active, we mean doing any physical movement rather than sitting (e.g., walking, biking).

____ (hours) : ____ (minutes) being physically active during last park visit ❑ Do not know

3. **How likely are you to visit a park in the next 30 days?**

❑ Very unlikely ❑ Unlikely ❑ Neither ❑ Likely ❑ Very Likely

4. **How important do you think parks are in the community?**

❑ Very unimportant ❑ Unimportant ❑ Neither ❑ Important ❑ Very important

5. **How important do you think parks are for physical activity?**

❑ Very unimportant ❑ Unimportant ❑ Neither ❑ Important ❑ Very important

ID_____

YOUTH EMPOWERMENT AND ADVOCACY

6. Please tell us how much you disagree or agree with the following statements by circling a number from 1 to 5 for each question.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I have the knowledge and skills to influence my community.	1	2	3	4	5
b.	I have the ability to impact my community in important ways.	1	2	3	4	5
c.	I have confidence in my capabilities to make needed changes in my community.	1	2	3	4	5
d.	I am able to affect the area in which I live.	1	2	3	4	5
e.	I can influence community members to take actions on important issues.	1	2	3	4	5
f.	I have the knowledge and skills to gather information relevant to my community.	1	2	3	4	5
g.	I know I can make a difference in my community.	1	2	3	4	5
h.	I want to get involved in my community.	1	2	3	4	5
i.	I am willing to get involved in my community.	1	2	3	4	5
j.	I am going to get involved in my community.	1	2	3	4	5
k.	I intend to take action in my community.	1	2	3	4	5
l.	I participate in community activities.	1	2	3	4	5
m.	I am involved in my community.	1	2	3	4	5
n.	I volunteer for community projects.	1	2	3	4	5
o.	I think it is important for me to get involved in my community.	1	2	3	4	5
p.	I feel that efforts to address community issues are worthwhile.	1	2	3	4	5
q.	I am motivated to get involved in my community.	1	2	3	4	5
r.	I think that the problems in my community are serious.	1	2	3	4	5

ID_____

7. Please tell us how much you disagree or agree with the following statements.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I am a leader.	1	2	3	4	5
b.	I like to wait and see if someone else is going to solve a problem.	1	2	3	4	5
c.	I find it very hard to talk in front of a group.	1	2	3	4	5
d.	I can talk with adults about issues I believe in.	1	2	3	4	5
e.	If I tell someone "in charge," like a leader, about my opinions, they will listen to me.	1	2	3	4	5
f.	I can ask others to help work on making our school or community healthier	1	2	3	4	5
g.	I can start discussions with others about how to change our school or community to make it healthier.	1	2	3	4	5
h.	I enjoy participation because I want to have as much say as possible in my school or community.	1	2	3	4	5
i.	I know how to get information about ways to make my school or community a better place for being physically active and eating healthy.	1	2	3	4	5

8. Please tell us how often you have done the following actions.

		Never	1-3 Times	4-6 Times	6+ Times
a.	In the last year, how many times have you tried to tell **school leaders, people in your community, or politicians** to be more interested in making your school or community a better place for being physically active and eating healthy?	1	2	3	4
b.	In the last year, how many times have you talked to your **parents or family members** about changes needed to make your school or community a better place for being physically active and eating healthy?	1	2	3	4

ID_____

TECHNOLOGY AND SOCIAL MEDIA

9. Please tell us how much you disagree or agree with these statements about using mobile devices by circling a number from 1 to 5.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I use a mobile device to find out what's going on in my community.	1	2	3	4	5
b.	I would use an app on a mobile device to communicate with school or community leaders.	1	2	3	4	5
c.	I would use an app on a mobile device to voice my opinions about changes that should be made in my school or community.	1	2	3	4	5
d.	I would use an app on a mobile device to convince people to make changes in my school or community.	1	2	3	4	5

10. Please tell us how much you disagree or agree with these statements about technology.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I feel it is important to be able to find any information whenever I want online.	1	2	3	4	5
b.	I feel it is important to be able to access the internet any time I want.	1	2	3	4	5
c.	I think it is important to keep up with the latest trends in technology.	1	2	3	4	5
d.	Technology will provide solutions to many of our problems.	1	2	3	4	5
e.	With technology anything is possible.	1	2	3	4	5
f.	I feel that I get more accomplished because of technology.	1	2	3	4	5
g.	New technology makes people waste too much time.	1	2	3	4	5
h.	New technology makes life more complicated.	1	2	3	4	5
i.	New technology makes people more isolated.	1	2	3	4	5

ID_____

11. Please place an X in the appropriate box to indicate how often you do each of the following activities on your mobile phone.

_____ I do not have a mobile phone (skip to question 12)

		Never	Once a Month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour	All the time
a.	Send and receive text messages on a mobile phone										
b.	Make and receive mobile phone calls										
c.	Check for text messages on a mobile phone										
d.	Check for voice calls on a mobile phone										
e.	Read email on a mobile phone										
f.	Get directions or use GPS on a mobile phone										
g.	Browse the web on a mobile phone										
h.	Listen to music on a mobile phone										
i.	Take pictures using a mobile phone										
j.	Check the news on a mobile phone										
k.	Record a video on a mobile phone										
l.	Use apps (for any purpose) on a mobile phone										
m.	Search for information with a mobile phone										
n.	Use your mobile phone during class or work time										

ID_____

12. Please place an X in the appropriate box to indicate how often you do each of the following activities. When we say mobile device, we mean a smartphone, tablet, iPad, laptop, nook, kindle, or other mobile device capable of these functions.

_____ I do not have a mobile device (skip to question 13)

		Never	Once a Month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour	All the time
a.	Watch TV shows, movies, etc. on a mobile device										
b.	Watch video clips on a mobile device										
c.	Download media files from other people on a mobile device										
d.	Share your own media files on a mobile device										
e.	Search the internet for news on a mobile device										
f.	Search the internet for information on a mobile device										
g.	Search the internet for videos on a mobile device										
h.	Search the internet for images or photos on a mobile device										
i.	Play games on a mobile device										
j.	Play games with other people online on a mobile device										

Almost there! Just a few more questions…

ID_____

13. Please indicate how often you do each of the following activities on social networking sites such as Facebook, Instagram, Twitter, or any other social networking site.

_____ I do not have social networking (skip to bottom of this page)

		Never	Once a Month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour	All the time
a.	Check your social media page or other social networks										
b.	Check your social media page or other social networks from a mobile device										
c.	Check social media at work or school										
d.	Post status updates										
e.	Post photos										
f.	Browse profiles and photos										
g.	Read postings										
h.	Comment on postings, status updates, photos, etc.										
i.	Click "Like" to a posting, photo, etc.										

Please enter your name and address for attendance purposes. This information will be stored separately from your survey answers.

First Name _____

Last Name _____

APPENDIX J: POST PROJECT SURVEY – BOTH CONDITION

ID_____

eCPAT Post Survey

Thank you very much for participating in the eCPAT Project. We are interested in learning more about youth perceptions about physical activity, parks, and mobile technology. Please read through and answer all questions in the survey.

CPAT USABILITY

Please answer the following items about the paper version of the Community Park Audit Tool (CPAT)

1. Do you feel that you successfully completed the Community Park Audit Tool (CPAT) during your park visits? ❑ Yes ❑ No

2. The CPAT was well organized

❑ Strongly Disagree ❑ Disagree ❑ Neutral ❑ Agree ❑ Strongly Agree

3. Please tell us how much you disagree or agree with these statements about using the CPAT.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I think that I would like to use the CPAT frequently.	1	2	3	4	5
b.	I found the CPAT unnecessarily complex.	1	2	3	4	5
c.	I thought the CPAT was easy to use.	1	2	3	4	5
d.	I think that I would need the support of a technical person to be able to use the CPAT.	1	2	3	4	5
e.	I found the various functions in the CPAT were well integrated.	1	2	3	4	5
f.	I thought there was too much inconsistency in the CPAT.	1	2	3	4	5
g.	I would imagine that most people would learn to use the CPAT very quickly.	1	2	3	4	5
h.	I found the CPAT very awkward to use.	1	2	3	4	5
i.	I felt very confident using the CPAT.	1	2	3	4	5
j.	I needed to learn a lot of things before I could get going with the CPAT.	1	2	3	4	5

ID_____

4. The thing I liked the least about the CPAT was:

5. The thing I liked the most about the CPAT was:

6. My overall impression of the CPAT is:

❑ Very negative ❑ Negative ❑ Neutral ❑ Positive ❑ Very positive

eCPAT USABILITY

Please answer the following items about the electronic version of the Community Park Audit Tool (eCPAT app).

7. Do you feel that you successfully completed the eCPAT app during your park visits? ❑ Yes ❑ No

8. Please tell us how much you disagree or agree with these statements about using the eCPAT app.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	The eCPAT app was well organized.	1	2	3	4	5
b.	I immediately understood the function of each item in the eCPAT app.	1	2	3	4	5
c.	All of the functions I expected to find in the eCPAT app were present.	1	2	3	4	5
d.	The buttons in the eCPAT app were well organized and easy to find.	1	2	3	4	5
e.	I immediately understood the function of each button in the eCPAT app.	1	2	3	4	5
f.	All of the functions I expected to find on the menu bar in the eCPAT app were present.	1	2	3	4	5

ID_____

9. Please tell us how much you disagree or agree with these statements about using the eCPAT app.

		Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a.	I think that I would like to use the eCPAT app frequently.	1	2	3	4	5
b.	I found the eCPAT app unnecessarily complex.	1	2	3	4	5
c.	I thought the eCPAT app was easy to use.	1	2	3	4	5
d.	I think that I would need the support of a technical person to be able to use the eCPAT app.	1	2	3	4	5
e.	I found the various functions in the eCPAT app were well integrated.	1	2	3	4	5
f.	I thought there was too much inconsistency in the eCPAT app.	1	2	3	4	5
g.	I would imagine that most people would learn to use the eCPAT app very quickly.	1	2	3	4	5
h.	I found the eCPAT app very awkward to use.	1	2	3	4	5
i.	I felt very confident using the eCPAT app.	1	2	3	4	5
j.	I needed to learn a lot of things before I could get going with the eCPAT app.	1	2	3	4	5

10. The thing I liked the least about the eCPAT app was:

11. The thing I liked the most about the eCPAT app was:

12. My overall impression of the eCPAT app is:

❑ Very negative ❑ Negative ❑ Neutral ❑ Positive ❑ Very positive

ID_____

PREFERENCES

13. Please tell us which format of the audit tool you prefer? (place an "X" in one column for each question)

	Paper CPAT	Electronic eCPAT app	I liked both equally	I didn't like either
Which format was easier to use?				
Which format did you enjoy using the most?				
Which format would you want to use in future projects?				
Overall, which format did you like the best?				

FUTURE PROJECTS

14. I am interested in participating in future research projects similar to this one.

❑ Strongly Disagree ❑ Disagree ❑ Neutral ❑ Agree ❑ Strongly Agree

15. I would like to be contacted about future opportunities to participate in research studies.

❑ Yes ❑ No

Please enter your name for attendance purposes. This information will be stored separately from your survey answers.

First Name _____

Last Name _____

APPENDIX K: POST PROJECT FOCUS GROUP GUIDE – PAPER CONDITION

eCPAT Post-Project Focus Group Guide - Paper

Thanks you for participating in this project over the past couple weeks. At this time, you have all had the chance to participate in the initial workshop and conduct two park audits, and you have done your pre and post project surveys. Now, we would like to ask you about your experiences during the project. We're hoping you can tell us more about what you liked and didn't like and so on. So I don't have to write everything down, we're going to audio record our conversation. So just a reminder, this is a safe space and everyone's thoughts are welcome. Please be respectful to others when they are talking and try not to interrupt or talk over one another. Any questions before we get started?

1. **Overall, tell us what you thought about this project.**
   Probes: What did you like or not like about being part of this project?
   Did this change at all the way you looked at your community?

2. **What did you think about the paper CPAT tool?**
   Probes: How was the length? (i.e. how long did it take to complete? was it too long? too short?)
   Tell me about your experience evaluating the park using this tool
   Tell me about how easy/hard it was to use the CPAT
   Discuss any challenges using the CPAT

3. **So you might be aware that some of the youth got to use an app version of the tool on a tablet. Describe what you think the app format should look like.**
   Probes: What app features or functions should it have?
   What would you expect the app to do?
   Discuss additional features or functions or capabilities the app should have

4. **Would you use the CPAT tool in the future?**
   Probes: Why/why not?

5. **So you've collected all of this information about what's in the parks and the quality and safety of the parks and surrounding neighborhood. What could you do with the information you collected?**
   Probes: What kinds of projects do you think this tool could be used for?

6. **Think about if <u>you</u> wanted to make changes in your community using the information collected from this tool. What would you do?**
   Probes: What kinds of steps would you take?
   What kind of help would you need?
   What else, if anything, would youth need in order to use the information you collected? (i.e. what else could help you to make changes)

7. **Who do you think might use a tool like this?**
   Probes: Youth? Adults? School clubs/Afterschool groups? Community members? Parks and rec professionals?

8. **Is this something you would want to participate in in future?**

9. **Any other thoughts that you'd like to share about the CPAT tool or the overall project?**

Thank you all so much for participating!

APPENDIX L: POST PROJECT FOCUS GROUP GUIDE – ECPAT CONDITION

eCPAT Post-Project Focus Group Guide – eCPAT app

Thanks you for participating in this project over the past couple weeks. At this time, you have all had the chance to participate in the initial workshop and conduct two park audits, and you have done your pre and post project surveys. Now, we would like to ask you about your experiences during the project. We're hoping you can tell us more about what you liked and didn't like and so on. So I don't have to write everything down, we're going to audio record our conversation. So just a reminder, this is a safe space and everyone's thoughts are welcome. Please be respectful to others when they are talking and try not to interrupt or talk over one another. Any questions before we get started?

1. **Overall, tell us what you thought about this project.**
   Probes: What did you like or not like about being part of this project?
   Did this change at all the way you looked at your community?

2. **What did you think about the electronic eCPAT app?**
   Probes: How was the length? (i.e. how long did it take? was it too long? too short?)
   Tell me about your experience evaluating the park using this tool
   How easy/hard it was to use the eCPAT app?
   Discuss any challenges using the eCPAT app

3. **What else did you like or not like about the eCPAT app?**
   Probes: Tell me about app features or functions you liked
   Tell me about app features or functions you did not like
   What did you expect the app to do that it did not do?
   Discuss additional features or functions or capabilities could we add to the app

4. **Would you use the eCPAT tool in the future?**
   Probes: Why/why not?

5. **So you've collected all of this information about what's in the parks and the quality and safety of the parks and surrounding neighborhood. What could you do with the information you collected?**
   Probes: What kinds of projects do you think this tool could be used for?

6. **Think about if <u>you</u> wanted to make changes in your community using the information collected from this tool. What would you do?**
   Probes: What kinds of steps would you take?
   What kind of help would you need?
   What else, if anything, would youth need in order to use the information you collected? (i.e. what else could help you to make changes)

7. **Who do you think might use a tool like this?**
   Probes: Youth? Adults? School clubs/Afterschool groups? Community members? Parks and rec professionals?

8. **Is this something you would want to participate in in future?**

9. **Any other thoughts that you'd like to share about the eCPAT app or the overall project?**

Thank you all so much for participating!

APPENDIX M: POST PROJECT FOCUS GROUP GUIDE – BOTH CONDITION

eCPAT Post-Project Focus Group Guide - BOTH

Thanks you for participating in this project over the past couple weeks. At this time, you have all had the chance to participate in the initial workshop and conduct two park audits, and you have done your pre and post project surveys. Now, we would like to ask you about your experiences during the project. We're hoping you can tell us more about what you liked and didn't like and so on. So I don't have to write everything down, we're going to audio record our conversation. So just a reminder, this is a safe space and everyone's thoughts are welcome. Please be respectful to others when they are talking and try not to interrupt or talk over one another. Any questions before we get started?

1. **Overall, tell us what you thought about this project.**
   Probes: What did you like or not like about being part of this project?
   Did this change at all the way you looked at your community?

So you all got a chance to try out both formats of the tool (paper and eCPAT app). Let's start by talking about the paper version.

2. **What did you think about the paper CPAT tool?**
   Probes: How was the length (i.e. how long did it take to complete? was it too long? too short?)
   Tell me about your experience evaluating the park using this tool
   Tell me about how easy/hard it was to use the CPAT
   Discuss any challenges using the CPAT

3. **What did you think about the electronic eCPAT app?**
   Probes: How was the length? (i.e. how long did it take? was it too long? too short?)
   Tell me about your experience evaluating the park using this tool
   How easy/hard it was to use the eCPAT app?
   Discuss any challenges using the eCPAT app ?

4. **What else did you like or not like about the eCPAT app?**
   Probes: Tell me about app features or functions you liked
   Tell me about app features or functions you did not like
   What did you expect the app to do that it did not do?
   Discuss additional features or functions or capabilities could we add to the app

5. **Thinking about both paper and electronic tools, which format was easier to use?**
   Probes: Why? Describe what made it easier

6. **Thinking about <u>both paper and electronic</u> tools, which format (paper or electronic) did you prefer?**
   Probes: Why?

7. **Would you use the <u>CPAT or eCPAT</u> tool in the future?**
   Probes: Why/why not?

8. **So you've collected all of this information about what's in the parks and the quality and safety of the parks and surrounding neighborhood. What could you do with the information you collected?**
   Probes: What kinds of projects do you think this tool could be used for?

9. **Think about if <u>you</u> wanted to make changes in your community using the information collected from this tool. What would you do?**
   Probes: What kinds of steps would you take?
   What kind of help would you need?
   What else, if anything, would youth need in order to use the information you collected? (i.e. what else could help you to make changes)

10. **Who do you think might use a tool like this?**
    Probes: Youth? Adults? School clubs/Afterschool groups? Community members? Parks and rec professionals?

11. **Is this something you would want to participate in in future?**

12. **Any other thoughts that you'd like to share about either tool or the overall project?**

Thank you all so much for participating!

APPENDIX N: CONSENT FORM

Department of Health Promotion, Education, and Behavior
Arnold School of Public Health

Consent Form

Study Title: eCPAT: Using mobile technology to assess the acceptability, feasibility, and efficacy of the Community Park Audit Tool with youth

Gina M. Besenyi, MPH, Andrew T. Kaczynski, PhD,

If participants include those under 18 years of age: 1) The subject's parent or legal guardian will be present when the informed consent form is provided. 2) The subject will be able to participate only if the parent or legal guardian provides permission and the adolescent (age 12-18) provides his/her assent. 3) In statements below, the word "you" refers to your adolescent or teen who is being asked to participate in the study.

Introduction and Purpose

You are invited to participate in this research study conducted by Dr. Andrew Kaczynski and Ms. Gina Besenyi. I am a graduate student in the Department of Health Promotion, Education, and Behavior at the University of South Carolina. I am conducting a research study as part of the requirements for my doctoral degree and I would like to invite you to participate. This study is funded by the South Carolina Clinical and Translational Research Institute. **The purpose of the eCPAT research study is to develop and test an electronic "app" version of the Community Park Audit Tool (eCPAT) for use by youth.** The CPAT is a user-friendly audit tool that captures characteristics about the park that may support or encourage park-based physical activity. This form explains what you will be asked to do if you decide to participate in this study. Please read it carefully and feel free to ask any questions you like before you make a decision about participating.

Description of Study Procedures

This project will occur in 50 parks in Greenville County, SC in partnership with the Greenville County Parks and Recreation District. As part of this study, you will be randomly assigned to 1 of 3 study groups. Additionally, you may be asked to participate in follow-up discussion groups.

Study Groups

Study groups will help to test formats of the Community Park Audit Tool. When you are randomly assigned to your study group, you will be asked to complete the following:

- Brief before and after surveys
- A workshop training on how to conduct a park audit using the CPAT or eCPAT or both
- Two park audits

When we say park audit, we mean an in-person recording of what is in a park (e.g. is there a playground?) and the quality of the park (i.e. is the playground useable or in good condition?). The training workshop will take place at the Bobby Pearse Community Center (704 Townes St) and take approximately 2 hours. The two park audits will take place at parks across Greenville County and may take up to 30 minutes each.

Example before and after survey scale questions

I can talk with adults about issues I believe in.
I know how to get information about ways to make my park a better place for being physically active.
I am confident that I can help make my community a better place for being physically active.
I am motivated to make healthy changes to my local park.

Discussion Groups

Some youth will be asked to participate in follow-up discussion groups that will aid in the testing of the Community Park Audit Tool. You will be asked to offer your opinions and preferences related to technology and electronic "apps" as well as review the audit tool used during your study group and offer feedback. Discussion groups will take approximately 1 hour each and will be audio-recorded.

Example discussion group questions:

Discuss what apps (if any) that you currently use…
In your words tell us what makes a user friendly app…
Talk about any issues you had with new eCPAT app…
Describe what we could do to make the eCPAT better…

Risks of Participation

There are no known risks associated with participating in this research except a slight risk of breach of confidentiality, which remains despite steps that will be taken to protect your privacy.

Benefits of Participation

As an indirect benefit from participating in this study, you may be more confident in your ability to complete park audits and have increased feelings of empowerment for making healthy changes to parks in your community.

Costs

There will be no costs to you for participating in this study (other than for any parking or gas expenses you may have).

Payments

Upon completion of all project activities, you will receive $50 for your participation. If you participate in a follow-up discussion group you will be compensated an additional $20.

Circumstances for Dismissal from the Study

You may be dismissed from the study without your consent for various reasons, including the following:

- If you fail to complete study activities (e.g. failure to complete forms).
- If you do not follow the instructions you are given.
- If the investigator believes that it is not in your best interest to continue in the study.

Contact Persons

For more information concerning this research, or if you believe you may have suffered a research related injury, you should contact **Gina Besenyi or Dr. Andrew Kaczynski** by phone (**803-777-5766**) or email (**atkaczyn@mailbox.sc.edu**).

If you have any questions about your rights as a research subject, you may contact: Thomas Coggins, Director, Office of Research Compliance, University of South Carolina, Columbia, SC 29208, Phone - (803) 777-7095, Fax - (803) 576-5589, E-Mail - tcoggins@mailbox.sc.edu.

Voluntary Participation

Participation in this study is voluntary. You are free not to participate or to withdraw at any time, for whatever reason, without negative consequences. To withdraw from the study please contact Gina Besenyi or Dr. Andrew Kaczynski at 803-777-5766. In the event that you do withdraw from this study, the information you have already provided will be kept in a confidential manner.

Signatures /Dates

Parent/Guardian: I have read (or have had read to me) the contents of this consent form and have been encouraged to ask questions. I understand that discussion groups with my child may be audio-recorded. I have received answers to my questions. I give my consent for my child to participate in this study, although I have been told that they may withdraw at any time without negative consequences. I have received (or will receive) a copy of this form for my records and future reference.

Parent/Guardian: _____Date_____

Minor: I have read the description of the study in this form, and I have been told what the procedures are and what I will be asked to do in this study. Any questions I had have been answered. I understand that group discussions may be audio-recorded. I have received permission from my parent(s) to participate in the study, and I agree to participate in it. I know that I can quit the study at any time.

Participant: _____Date_____

Researcher: As a representative of this study, I have explained to the participant or the participant's legally authorized representative the purpose, the procedures, the possible benefits, and the risks of this research study; the alternatives to being in the study; the voluntary nature of the study; and how privacy will be protected.

Researcher Signature: _____Date _____

APPENDIX O: EXAMPLE EMAIL – PARK VISIT REMINDER

From: beach lab
To: BESENYI, GINA
Subject: Fwd: Park Visit Reminder- Pelham Mill Park
Date: Thursday, October 02, 2014 12:11:42 PM

---------- Forwarded message ----------

From: **Mara Steedley** <steedleymara@gmail.com>
Date: Fri, Jun 13, 2014 at 8:19 PM
Subject: Park Visit Reminder- Pelham Mill Park
To: beach lab <beachlab1@gmail.com>

Hi,

This automatic message is to remind you of your scheduled park visit on **June 14th at 1:00 PM at Pelham Mill Park located at 2770 E. Phillips Rd, Greer, SC.**

You can click the link below for a map to the park: https://goo.gl/maps/19fVl

Please show up 10 minutes early. You will be meeting a trained researcher named Mara**.** Look for her wearing a gray tank top. If applicable, please meet in the parking lot for the park. Your park visit will last about 30 minutes, but may be completed in less time depending on the park size. Therefore, parents we ask that you stay for the duration of the park visit. All supplies for the park audits will be provided for you. We ask that you wear comfortable clothes/shoes and sunscreen. Also, you may wish to bring a bottle of water.

If you can't make your park visit, or the above park or time is incorrect, please contact Gina at beachlab1@gmail.com immediately. If you need to get a hold of someone the day of your park visit you may call Gina at 785-364-4882.

Gina

APPENDIX P: CERTIFICATE OF PARTICIPATION

UNIVERSITY OF SOUTH CAROLINA, ARNOLD SCHOOL OF PUBLIC HEALTH

Certificate of Participation

Five hours of community service is hereby granted to

Participant Name

for outstanding performance and lasting contribution to the

eCPAT PROJECT

Development and testing of mobile technology to engage youth in active living health promotion efforts

Awarded: 6/23/2014

Gina Besenyi, PhD Candidate

Andrew Kaczynski, Assistant Professor

city of greenville PARKS & RECREATION

UNIVERSITY OF SOUTH CAROLINA

Greenville Rec GREENVILLE COUNTY RECREATION DISTRICT

APPENDIX Q: CITI TRAINING CERTIFICATION

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI)

HUMAN RESEARCH CURRICULUM COMPLETION REPORT

Printed on 10/02/2014

LEARNER	Gina Besenyi (ID: 3129747) 800 Sumter Columbia South Carolina 29208 USA
DEPARTMENT	Health Promotion Education and Behavior
PHONE	803-777-5765
EMAIL	besenyi@email.sc.edu
INSTITUTION	University of South Carolina
EXPIRATION DATE	10/10/2015

SOCIAL & BEHAVIORAL RESEARCHERS

COURSE/STAGE:	Basic Course/1
PASSED ON:	10/10/2012
REFERENCE ID:	8891058

REQUIRED MODULES	DATE COMPLETED	SCORE
Belmont Report and CITI Course Introduction	10/02/12	2/3 (67%)
History and Ethical Principles - SBE	10/02/12	3/5 (60%)
Defining Research with Human Subjects - SBE	10/02/12	4/5 (80%)
The Federal Regulations	10/02/12	4/5 (80%)
Assessing Risk - SBE	10/10/12	4/5 (80%)
Informed Consent	10/10/12	5/5 (100%)
Privacy and Confidentiality - SBE	10/10/12	4/5 (80%)
Research With Protected Populations - Vulnerable Subjects: An Overview	10/10/12	4/4 (100%)
Vulnerable Subjects - Research Involving Workers/Employees	10/10/12	4/4 (100%)
Conflicts of Interest in Research Involving Human Subjects	10/10/12	5/5 (100%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research	10/10/12	3/3 (100%)
Records-Based Research	10/10/12	1/2 (50%)
The University of South Carolina	10/10/12	No Quiz

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI Program participating institution or be a paid independent Learner. Falsified information and unauthorized use of the CITI Program course sites is unethical, and may be considered research misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Program Course Coordinator

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI)

HUMAN RESEARCH CURRICULUM COMPLETION REPORT

Printed on 10/02/2014

LEARNER	Andrew Kaczynski (ID: 2780446) 800 Sumter HPEB - Room 216 Columbia SC 29208
DEPARTMENT	Health Promotion, Education, and Behavior
PHONE	803-777-7063
EMAIL	atkaczyn@mailbox.sc.edu
INSTITUTION	University of South Carolina
EXPIRATION DATE	04/01/2015

SOCIAL & BEHAVIORAL RESEARCHERS

COURSE/STAGE:	Basic Course/1
PASSED ON:	04/01/2012
REFERENCE ID:	7712396

REQUIRED MODULES	DATE COMPLETED	SCORE
Belmont Report and CITI Course Introduction	03/29/12	3/3 (100%)
History and Ethical Principles - SBE	03/29/12	4/4 (100%)
Defining Research with Human Subjects - SBE	03/29/12	5/5 (100%)
The Federal Regulations	03/31/12	4/5 (80%)
Assessing Risk - SBE	03/31/12	4/5 (80%)
Informed Consent	03/31/12	5/5 (100%)
Privacy and Confidentiality - SBE	03/31/12	4/5 (80%)
Research With Protected Populations - Vulnerable Subjects: An Overview	03/31/12	4/4 (100%)
Avoiding Group Harms - U.S. Research Perspectives	04/01/12	3/3 (100%)
Vulnerable Subjects - Research Involving Workers/Employees	04/01/12	4/4 (100%)
Conflicts of Interest in Research Involving Human Subjects	04/01/12	4/5 (80%)
Records-Based Research	04/01/12	2/2 (100%)
The University of South Carolina	04/01/12	No Quiz

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI Program participating institution or be a paid Independent Learner. Falsified information and unauthorized use of the CITI Program course site is unethical, and may be considered research misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Program Course Coordinator

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI)

HUMAN RESEARCH CURRICULUM COMPLETION REPORT

Printed on 10/02/2014

LEARNER	Mara Steedley (ID: 4141034)
DEPARTMENT	BEACH Lab
EMAIL	steedlm@email.sc.edu
INSTITUTION	University of South Carolina
EXPIRATION DATE	09/27/2017

SOCIAL & BEHAVIORAL RESEARCHERS

COURSE/STAGE:	Basic Course/1
PASSED ON:	09/28/2014
REFERENCE ID:	14156595

REQUIRED MODULES	DATE COMPLETED	SCORE
Belmont Report and CITI Course Introduction	09/28/14	2/3 (67%)
History and Ethical Principles - SBE	09/28/14	5/5 (100%)
Defining Research with Human Subjects - SBE	09/28/14	5/5 (100%)
The Federal Regulations	09/28/14	4/5 (80%)
Assessing Risk - SBE	09/28/14	5/5 (100%)
Informed Consent	09/28/14	5/5 (100%)
Privacy and Confidentiality - SBE	09/28/14	5/5 (100%)
Research With Protected Populations - Vulnerable Subjects: An Overview	09/28/14	4/4 (100%)
Vulnerable Subjects - Research Involving Workers/Employees	09/28/14	3/4 (75%)
Conflicts of Interest in Research Involving Human Subjects	09/28/14	4/5 (80%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research	09/28/14	3/3 (100%)
Records-Based Research	09/28/14	1/2 (50%)
The University of South Carolina	09/28/14	No Quiz

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI Program participating institution or be a paid Independent Learner. Falsified information and unauthorized use of the CITI Program course site is unethical, and may be considered research misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Program Course Coordinator

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- Name: Melissa Fair (ID: 3675539)
- Email: melissafair@gmail.com
- Institution Affiliation: Greenville Health System (ID: 639)
- Institution Unit: New Impact
- Phone: 8644232935

- Curriculum Group: Human Subjects Protection
- Course Learner Group: Social and Behavioral Research
- Stage: Stage 1 - Basic Course

- Report ID: 11052650
- Completion Date: 08/22/2013
- Expiration Date: 08/22/2015
- Minimum Passing: 80
- Reported Score*: 96

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED
Avoiding Group Harms - U.S. Research Perspectives	08/22/13
Recognizing and Reporting Unanticipated Problems Involving Risks to Subjects or Others in Biomedical Research	08/22/13
Belmont Report and CITI Course Introduction	08/22/13
History and Ethical Principles - SBE	08/22/13
Defining Research with Human Subjects - SBE	08/22/13
The Federal Regulations - SBE	08/22/13
Basic Institutional Review Board (IRB) Regulations and Review Process	08/22/13
Assessing Risk - SBE	08/22/13
Informed Consent - SBE	08/22/13
Privacy and Confidentiality - SBE	08/22/13
Records-Based Research	08/22/13
Genetic Research in Human Populations	08/22/13
Research With Protected Populations - Vulnerable Subjects: An Overview	08/22/13
Research with Prisoners - SBE	08/22/13
Research with Children - SBE	08/22/13
Vulnerable Subjects - Research Involving Children	08/22/13
Vulnerable Subjects - Research Involving Pregnant Women, Human Fetuses, and Neonates	08/22/13
Research and HIPAA Privacy Protections	08/22/13
Vulnerable Subjects - Research Involving Workers/Employees	08/22/13
Conflicts of Interest in Research Involving Human Subjects	08/22/13

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the required scores at the time all requirements for the course were met.

- Name: Melissa Fair (ID: 3675539)
- Email: melissafair@gmail.com
- Institution Affiliation: Greenville Health System (ID: 639)
- Institution Unit: New Impact
- Phone: 8644232935

- Curriculum Group: Human Subjects Protection
- Course Learner Group: Social and Behavioral Research
- Stage: Stage 1 - Basic Course

- Report ID: 11052650
- Report Date: 12/03/2014
- Current Score**: 96

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT
History and Ethical Principles - SBE	08/22/13
Defining Research with Human Subjects - SBE	08/22/13
Belmont Report and CITI Course Introduction	08/22/13
Records-Based Research	08/22/13
The Federal Regulations - SBE	08/22/13
Genetic Research in Human Populations	08/22/13
Assessing Risk - SBE	08/22/13
Research With Protected Populations - Vulnerable Subjects: An Overview	08/22/13
Informed Consent - SBE	08/22/13
Privacy and Confidentiality - SBE	08/22/13
Vulnerable Subjects - Research Involving Children	08/22/13
Research with Prisoners - SBE	08/22/13
Vulnerable Subjects - Research Involving Pregnant Women, Human Fetuses, and Neonates	08/22/13
Research with Children - SBE	08/22/13
Research and HIPAA Privacy Protections	08/22/13
Vulnerable Subjects - Research Involving Workers/Employees	08/22/13
Conflicts of Interest in Research Involving Human Subjects	08/22/13
Avoiding Group Harms - U.S. Research Perspectives	08/22/13
Basic Institutional Review Board (IRB) Regulations and Review Process	08/22/13
Recognizing and Reporting Unanticipated Problems Involving Risks to Subjects or Others in Biomedical Research	08/22/13

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