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The Feasibility of Using the Super Tracker Website for Behavior Changes in the Adolescent Population

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Abstract

Research suggests technology such as health websites may be a viable way to effect lifestyle behavior and promote health. Several websites utilize self-monitoring of physical activity and diet as well as provide health-related education as a method to impact behavior. One such site is the Super Tracker tool on ChooseMyPlate.gov, created by the United States Department of Health. The site was created to encourage healthy diet and physical activity within the US population. Therefore, the aim of this original research was to examine the acceptability and feasibility outcomes of a self-monitoring physical activity intervention delivered by the Super Tracker website among inner city adolescents. A total of 26 students volunteered for this feasibility study. The website incorporates goal setting, self-monitoring of physical and dietary activity. Focus groups were conducted to assess the participants' perceptions of the intervention and the application performance. Results suggested that the website intervention was feasible and acceptable to adolescents and may be utilized as an integral part in behavioral interventions for this specific population.

Keywords: *acceptability, physical activity, web-based, weight management*

Introduction

Research implies that within the last three decades obesity rates among children have doubled and quadrupled among adolescents (Ogden, Carroll, Kit and Flegal, 2014). According to Hedley et al. (2002), a child is considered overweight when his or her body mass index (BMI)-for-age is at or above the 85th percentile and below the 95th percentile and obese at greater than or equal to the 95th percentile. Childhood obesity has become one of the most challenging public health concerns of the twenty-first century according to Singh (2013). Its prevalence has created a national epidemic that is in desperate need of a national solution. On average, 75% of the waking hours of children in the US are being spent consumed by inactivity, while only about 12 minutes per day are spent on vigorous physical activities (Strauss, Rodzilsky, Burack, and Colin, 2001). Ogden et al. (2012) indicated that approximately 17% (or 12.5 million) of the youth aged from 2 - 19 years remain obese.

According to Ogden et al. (2014) reported that, the epidemic has attracted nationwide attention as the White House and U.S Surgeon General and the Center for Disease Control and Prevention (CDC) has initiated state-funded intervention programs to help combat the obesity epidemic such as the Myplate and the Super Tracker. The White House and U.S Surgeon General have also tried to intervene and have made recommendations. In spite of the efforts of so many, the prevalence of obesity among America's youth has yet to be improved.

In 2011-2012, approximately 17% (or 12.5 million) of the youth aged from 2 - 19 years were obese (Ogden et al. 2014). The obesity rates among this population have been correlated to several different behavioral, social and environmental factors including diet and exercise, access to recreation activity, neighborhood security, family income, and screen time and video gaming (Moreno, Johnson-Shelton, & Boles, 2013). For example, obesity rates among lower income families have been correlated to several different behavioral factors involving diet and exercise, social demographic factors including access to recreation activity, neighborhood security, family income, and environmental factors involving screen time and video gaming (Moreno, Johnson-Shelton, & Boles, 2013). Reviewing these factors, research has shown that Hispanic and African American children obesity rates have increased twice as fast when compared to white children obesity (Caprio et al. 2008). This statistic has been backed by understanding children in lower income families and environments are more vulnerable due to poor diets and limited access to physical activity (Moreno et al. 2013).

On average, 75% of the waking hours of children in the US are being spent consumed by inactive behaviors, while only about 12 minutes per day are spent on vigorous physical activities (Strauss, Rodzilsky, Burack, and Colin, 2001). In the midst of the aforementioned contributing factors, screen time, eating habits, and decreased physical activity have shown to have the most noteworthy effect on obesity (Lanningham-Foster et al., 2009). Researchers have often concluded that the overarching cause of the rise in the obesity prevalence among the youth is related to the technological takeover our nation has been exposed. Further, research suggests a negative correlation between screen time and perceived neighborhood security (Carson, Spence, Cutumisu, and Cargill, 2010). Understanding technology is now a normal part of adolescent lives, some researchers are utilizing technology as a part of the solution to the epidemic.

Accordingly, companies created active video games to decrease sedentary time while playing video games (Graf, Pratt, Hester, and Short, 2009). Researchers have suggested these active video games such as “Dance Dance Revolution”, sometimes referred to as “Exergaming” are an alternative for children to be active while accustoming to a healthy active lifestyle (Gao, Hannan., Xiang, Stodden, & Valdez, 2013). Technology models encourage and educate their users to healthier ways of life. It is ultimately up to the users, however, to apply technology in such a manner as to be a beneficial factor in their lives, one that impacts their health, and becomes an instrument for decreasing obesity prevalence. In efforts to intertwine technology with health and fitness, there has thus been a diligent outpouring of effort into the development of mobile and web-based applications to support a diverse range of health-promoting parameters. Because of the proliferation of web-based technology, apps are now equipped with state-of-the-art features allowing the sending of automated reminders, auto-sensing, self-monitoring, and even self-tracking of dietary and physical activity.

Reviewing the most common behavioral factors correlated to adolescent obesity, the most at-risk population and other weight related health concerns, while understanding that technology has become a part of everyday life, it no longer should be held responsible for the rise in obesity, but used adequately as a solution to the epidemic. This allowed the researcher to see the need for research that targeted the inner-city minority population. Therefore, this study’s primary aim was to examine the feasibility and acceptability of the Super Tracker to promote physical activity in an inner city population at various grade levels.

The Super Tracker was chosen for this study because it's an interactive, government funded, nutrition focused, website that also promotes physical activity. There were also no known studies similar to such incorporating the Super Tracker. Therefore, we wanted to explore how such a website could impact adolescents of a vulnerable population.

Methods

Participants

Participants were recruited through a variety of successful strategies used in similar studies, including word-of-mouth networking, fliers, and various incentives. These participants were not screened for health issues. The only requirement was that each participant in the study have daily computer and Internet access. Being under the age of 18, all participants were also required to provide the researcher with both personal assent and parental written informed consent. The University of Dayton's Institutional Review Board approved the protocol for this study. The study ultimately included 26 participants (11 males, 15 females). The 26 participants included one 12-year-old (3.8%), thirteen 13-year-olds (50%), eight 14-year-olds (30.8%) and four 15-year olds (15.4%) from an inner city school in Dayton, Ohio.

Intervention

Based on the *Dietary Guidelines for Americans* USDA, the Super Tracker is an online diet-tracking and activity-tracking tool designed to help Americans identify how their personal dietary and physical activity choices compare to recommended amounts customized for each user site. For the purpose of this 6-week mixed methods study, the participants were recommended to focus primarily on tracking their physical activity for 4 of the 7 days weekly. At the launch of the study, the participants were formally introduced to the study and its protocol. At that time participants created their accounts, provided the researcher with their personal login information, and were informed of the weekly incentive for tracking. The incentive was implemented simply to keep the children engaged in the study.

During the 6-week intervention, weekly email reminders were sent to participants to track. Participants were encouraged to track as accurately as possible and to browse the Super Tracker website for other health-related resources, such as the food tracker and the tips on

nutrition. . At baseline and week 6, a researcher met with all the participants to record anthropometric measurements and administer the 7-day physical activity PAQ questionnaires specific to age. As suggested by the creators of the PAQ, participants ages 14 and under completed the PAQ-C, while the participants ages 15 and up completed the PAQ-A. Participants were informed of their progress as time progressed.

Measurements

Anthropometric Measurements

Participant's heights were recorded using a stadiometer. Wearing lightweight clothing, the participants had their weights recorded in kilograms using a digital calibrated floor scale. Once those were recorded, BMI's were calculated verified in the CDC's BMI calculator (Centers for Disease Control and Prevention [CDC], 2016)and then participants were placed in their proper percentile according to the BMI-for-age- growth chart (CDC, 2016).

Physical Activity Measurements

Data on the outcome and physical activity behaviors were collected at week one of the study and again at 6 weeks. Physical activity levels were evaluated with the Physical Activity Questionnaire for children (PAQ-C) ages 8-14 and the Physical Activity Questionnaire for Adolescents (PAQ-A) for ages 14-19 to recall their physical activity for the week prior. Questionnaires were administered to recall total energy expenditure for the preceding week. The questionnaires asked for minutes of different types of physical activities and within different environments, such as at school as well as at out of school time. Indicators were computed by multiplying the number of days per week by minutes per day, resulting in minutes per week of each activity. Based on that summation, MVPA was computed. PAQ-C includes nine items and eight items for PAQ-A.

Each question was scored on a 5-point scale and then combined for a total physical activity score. Those values were then averaged to create a composite score. Scores could range from 1-5, with a higher value indicative of a higher activity level (Crocker, 1997). One asset of the PAQ is that it quantifies a general physical activity level for a whole week rather than trying to estimate overall frequency, intensity, and duration with detailed questions. The PAQ also

provides specific information about activity levels at different periods of the day (e.g. morning, lunch, recess, physical education, after school etc.).

Tracking Measurements

Over the course of the 6 weeks, the primary investigator (PI) checked each participant's Super Tracker profile two times per week, on Thursdays and Sundays. The participant who tracked most each week won a \$5 gift card to a local restaurant. Every Thursday the PI sent out reminder emails to all the participants reminding them to update their tracking and to complete their tracking that week by the coming Sunday at 5pm. Then on Sundays at 5pm, the PI would access each participant's account and record the number of days that were tracked for that week. The PI averaged weekly tracking and then notified participants via email on Monday mornings of the incentive winner for the week prior.

Focus Group Measurements

The focus groups were incorporated to determine the feasibility and acceptability of a web-based physical activity tracker. Because there are currently no models or theories about how to measure acceptability and feasibility, literature has deemed certain key concepts to be important: usability, readability, creditability, comprehensibility, and user-friendliness (Bacigalupo, Cudd, Littlewood, Bissell, Hawley, & Woods, 2013). Based on these concepts, the questions asked during the focus groups encouraged open and honest responses. The focus groups were conducted in an office and were orchestrated as round-table discussions; participants would listen to the questions and allowed to answer as they saw fit. The focus groups gave participants an equal opportunity to give feedback on their experience in the study. To gain a better understanding of the information collected during the focus groups, the researcher further broke down the overarching ideas and aspects of feasibility and acceptability into sub categories. The sessions were voice recorded and transcribed by the PI. Based on the verbal feedback provided, the primary researcher open-coded each transcription and determined main themes. From here the main themes were placed into core categories to depict participant experience with Super Tracker.

Statistical Analysis

Statistical analyses were performed using SPSS software (IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.). Analyses were performed using data collected on all the individuals that participated in the study. Frequency for gender and age

grouping were reported as well as the average BMI, PAQ score and physical activity monitoring. A paired samples t-test was run to determine change in PAQ score and BMI from pre- to post-intervention within participants. Further, using Analysis of Variance, participants were compared across grade levels to determine differences between grade levels in self-monitoring behavior ($p<.05$).

Results

Baseline demographic characteristics of the sample are shown in Table 1. At baseline, the study included 15 girls (58%) and 11 boys (42%). Participants were 12 to 15 years of age and had daily Internet and computer access. The study was open to all 7th, 8th and 9th grade students taking physical education who were enrolled in a public charter school in Dayton, Ohio. Participants had a body mass index (BMI) of 17.2 to 37.9 kg/m². Although this study was not statistically powered to detect change in anthropometric measures, results are displayed for interest.

PAQ-A and PAQ-C

Reviewing the data displayed in the Table 2, the researcher did not find a significant difference in the averaged PAQ scores from pre- to post-intervention indicating the intervention did not impact physical activity behavior. Further, the 9th grade participants were the only class to show a positive increase in their PAQ scores; the 7th and 8th grade participants' PAQ scores decreased.

Body Mass Index

At the conclusion of the study, the average male participant BMI was 23.15 ± 5.1 , while the female participant BMI was 23.78 ± 5.7 , placing the male and female participants in the 50th percentile according to the gender specific BMI-for-age CDC growth charts. Comparing pre- to post-intervention changes, shown in Table 3, there were no statically significant changes with regard to BMI ($p=.39$).

Tracking

Data in Table 4 reviewing participant tracking reveals information that could be beneficial to future studies. As seen in the PAQ results, there was again a relationship between grade level and the number of times an individual tracked his or her activity. The 9th grade participants tracked more frequently than did the 7th and 8th grade participants ($p=.04$, effect size = .66).

Table 5 displays averaged tracking by grade to illustrate the influence grade may have on the data tracked. As shown by results comparing the middle school participants to the high school participants, the older children on average tracked more than the younger ones.

Focus Groups

At the conclusion of the study, the researcher conducted two different focus groups. The first focus group included the 7th and 8th grade participants, and the other included only the 9th grade participants. These focus groups were grounded on feasibility, acceptability, and participant experience. The focus groups allowed for the researcher to gather collective takeaways and gain a better understanding of participants' opinions of the intervention as well as individual results. The focus groups were hosted in one of the schools offices. The PI informed the participants of the purpose of the focus groups started each session, informing them that the sessions were being voice recorded and would later be transcribed. The PI instructed the students to be respectful and honest in their responses to the scripted questions that were asked to each group.

Feasibility

By definition, feasibility is the state or degree of being easily or conveniently done. This category will thus outline various measures of feasibility feedback provided by the participants with regard to different aspects of the intervention

1. Implementation of intervention

The quotes listed below were in regard to the feasibility of the Super Tracker website. For most participants, the website was very simple and easy to navigate. The main issues that the participants ran into was not saving their login information, forgetting it and getting locked out of their account, or simply forgetting to track their activity.

"I liked that it didn't take a lot of time to do"

"The more I used the website, the easier it became"

"It was simple—I just forgot to track most of the time"

"I locked myself out of my account a lot."

2. Application Layout and Structure

The majority of the students really weren't intrigued by the website and found it to be quite boring in its layout. Others mentioned they would have liked to have access to educational games that discussed health and what they could do to improve their health with regard to fitness and diet:

"The website was easy to use but boring"

"It would have been nice if there were tutorial videos to explain things in more detail"

"I wish it was more to do".

3.Tracking in the application

Tracking seemed to be either a hit or a miss. The participants who remembered to track were very consistent. However, many participants would either forget to track or would track so long after their activity that they were unsure of the duration of it.

"It was easy to track my activity"

"I wish I was able to track common activities for multiple days within the same screen"

"Sometimes my hours wouldn't save and made it look like I wasn't tracking like I should have"

"When I remembered to track it was easy to put it in the computer"

Acceptability

By definition, acceptability means to be pleasing to the receiver; satisfactory; agreeable; welcome. Thus this category will outline various aspects of the intervention that provide participants' feedback with regard to acceptability.

1. Participants' perceptions regarding the application

Participants appeared to be amazed at the various types of activities that were considered physical activity and were excited to track different activities. As a

result, several participants expanded their horizons with regard to the types of activities they participated in, while it allowed others to witness how inactive they were compared to physical activity recommendations. Further, a participant suggested an application instead of a website:

“Although I thought I was active the intervention really allowed me to see how inactive I was”

“taught me different ways to be active”

“I probably would have done better if the website had an application I could have used on my phone”.

2. Personal Relevance:

Participants, for the most part, stated that they believed they didn't feel like they needed this type of intervention just yet:

“I'm only a kid so I think this type of website will benefit me more when I get older but not now”;

“I'm pretty active now so maybe doing something like this will be more motivating for me later to stay active”

“It helped me lose weight.”

3. Personal Helpfulness

Participants appeared to differ in their thoughts about how helpful the intervention was for them personally. A few participants stated that they didn't have to increase their activity level because they were already quite active. Most of the participants that were very active seemed to be less influenced by the intervention. Some participants stated that the intervention helped them to be more conscious of how they spent their free time:

“Because I needed to track my activity I noticed I didn't play my video game as much”

“I wasn't on my phone as often because I went outside to play more”

“It taught me some responsibility because I signed up to be in the study and I needed to be responsible and track”

4. Participants' perceptions regarding message delivery and type

There were several methods of messaging used in the study, including face-to-face, email, and group messaging within Super Tracker. Participants agreed that seeing the researcher in person was by far the best reminder because they associated the researcher with tracking and it reminded them to track. Some stated that the email reminders were helpful since the emails forced them to get on their computers to check their email and this made a convenient time to complete their tracking as well. However, the emails weren't an ideal method for other participants:

"I never check my email so I never saw the reminders to track"

"The few times I did check my email and saw the reminders, if I didn't go track right then and there, I still forgot"

"I usually remembered when I saw the PI"

"The email reminders were helpful because I checked mine every night so when I saw them I would track."

Discussion

The primary aim of this study was to test the feasibility and acceptability of the Super Tracker website with a cohort of minority, urban adolescents. The results were consistent with those found in similar studies that suggested that Internet-based weight management programs are typically feasible and acceptable for adolescents (Hurling et al., 2007). The researchers found that in this population, text reminders may be a better-accepted method of messaging than email reminders. Some of the participants found emails helpful, but most of the participants didn't check their email regularly. Another study suggested that tailored messaging is necessary for improvements, especially for participants who had low baseline results and who may need stronger motivation to push forward (Cook, Bourdeaudhuij, Maes, Haerens, Grammatikaki, Widhalm, & Tountas, 2014). In future studies, research may want to consider implementing tailored messaging system to improve adherence and guidance (Gatwood, Balkrishnan, Erickson, An, Piette & Farris, 2015).

Quantitative results revealed the only significant finding was between groups with regard to tracking and grade level. The focus group results suggested Super Tracker is feasible and

acceptable approach to improve adolescent physical activity. They found the website very interesting, simple, and time-efficient, and nearly all participants accepted aspects related to format and layout. Nevertheless, there was room for numerous improvements within the intervention. Participants indicated they had issues saving their tracking once they were logged into their accounts. This is important to consider as it may have caused a fluctuation in the tracking averages as well as in the participants' interest in the study, which ultimately could have skewed the data. Participants recommended the addition of tutorial videos and walk-throughs to clarify how to properly navigate the website and input information. Lastly, a phone application may be more convenient and has gained much attention in the current health technology realm.

Something to consider with any similar future study would be to incorporate it within a classroom setting, such as a health class or physical activity class. This would allow for more instruction time and better understanding, also providing the participants-more time to engage in the intervention. Research from various studies has suggested that web-based interventions are feasible and acceptable, but that they need to be tailored and implemented more readily.

The adolescents generally believed the intervention was simple, and many noted that tracking caused them to become more active. Research suggested that messaging increased the likelihood for behavior change (Vandelanotte & Bourdeaudhuij, 2003); however, the results of this study were inconsistent with those findings.

Considerations

This study had several important limitations that should be noted in any review.. Generalizability of the study was limited because of the makeup and the size of the sample: the small number of participants was predominantly African American adolescents from one inner-city public charter school. Another limiting factor was that the web-based intervention required tracking and feedback provided by participants. Self-reported measurements typically lack reliability due to recall bias, and they might create inaccurate estimates of the examined health behaviors as well as any true measures of feasibility and acceptability. Furthermore, as a result of not initially conducting health screening, deeper tailoring was almost impossible to employ; deeper tailoring possibly would have shifted results in a more positive direction.

With regard to accessibility, it may not be as convenient for others as it was for the individuals in this study; the participants in this study were all provided with chrome books by their school. And ultimately, this was only a 6-weeks-long study; therefore, there wasn't much

time to see a great deal of improvement. This type of study is also likely to be more feasible and acceptable when conducted as a part of a physical education class curriculum (Kumanyika & Obarzanek, 2003). The present study was a small 6-week feasibility and acceptability study. Due to the lack of significant findings, further studies should conduct a similar analysis with larger population and longer duration to witness more significant findings.

Conclusion

The results suggest that the majority of the participants experienced little to no change in their BMI. Although this method didn't produce noteworthy findings with regard to anthropometric measurements among the participants, there was potential to enhance physical activity levels and assessment through the development and integration of smart phone technology.. Research has shown that tailored and interactive features encourage further use and thus may lead to more impressive improvements in physical activity levels as well as in overall adolescent health.

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Table 1*Baseline Characteristics of all participants*

	Males		Females	
	M	SD	M	SD
N	11		15	
Age	13.6	.72	13.5	.65
Height (cm)	164.9	8.7	165.3	8.6
Weight (kg)	61.7	19.6	63.9	21.4
BMI	23.2	5.05	23.8	5.7

Table 2

PAQ Averages of participants at baseline and 6 weeks

	PAQ at baseline	SD	PAQ at 6 weeks	SD
7th	2.33	0.33	2.18	0.40
8th	2.35	0.62	2.34	0.66
9th	2.54	0.62	2.66	0.67
Average	2.40	0.54	2.40	0.61

Table 3*BMI Averages at baseline and 6 weeks*

	BMI-for-age at baseline	SD	BMI-for-age at 6 weeks	SD
7th	26.16	8.10	26.33	8.30
8th	22.66	3.76	22.64	3.58
9th	22.79	5.42	22.90	5.78
Average	23.64	5.66	23.71	5.80

Table 4*Average Days Tracked over the 6 weeks*

	Average	SD	Min	Max
7th	23.86	13.58	5.00	38.00
8th	25.91	16.14	7.00	58.00
9th	42.88	14.93	18.00	59.00
Total	30.57	16.78	5.00	59.00

Table 5*Tracking Averages from baseline to 6 weeks*

	Tracking at baseline	SD	Tracking at 6 weeks	SD
7th	3.29	3.04	5	1.73
8th	3.73	2.61	3.36	2.34
9th	4.13	1.96	5.63	1.06
Average	3.71	2.54	4.66	1.71