Use of physical activity monitoring devices by families in rural communities

**Background:** Several studies support the impact of Information Communication Technology-based interventions to promote physical activity among youth [9, 10]. Despite all the studies suggesting benefits of using technology to promote healthy lifestyles among youth, little is known on how technology can be used by the entire family to encourage healthy behavior that can be sustained over long period of time. Previous studies showed that children and youth rely and are dependent upon decisions and values of their caregivers when it comes to having a healthy lifestyle [11,12]. Thus, the exploration of behavior and attitudes of the entire family are needed.

**Objectives:** To explore how the use of physical activity tracking devices (FitBit Zip™) by families in rural communities influence a) participation in physical activity; and b) perception of physical activity.

**Methods:** Eleven families with one to three children of different ages took part in semi-structured group interviews following two weeks of using physical activity tracking devices (FitBit Zip™) as a family. The participants were asked to discuss their experience using the FitBit Zip™ as a family, motivation to be physically active, changes in their pattern of participation in those activities, level of engagement by different family members, and competitiveness with or support of each other. All interviews were voice recorded with the participants’ permission and later transcribed verbatim using pseudonyms. To analyze the data the primary investigator (IS) used open, axial, selective coding techniques.

**Results:** Two themes appeared from the data. Changes in physical activities as a result of using FitBit Zip™ as a family was either absent (lack of interest, already active lifestyle) or minimal (small, naturally occurring changes into everyday life or expanding participation in the activities they were already involved with). However, the participants reported change in attitude and perception of physical activities and healthy lifestyle. As a result of using physical activity tracking devices, the family members reported an increased awareness of their activity level and accountability for being inactive, introduced more conversations about active lifestyle and healthy lifestyle, and changed their view of physical activity to more positive one.

**Conclusions:** While the participation in physical activities as a result of using physical activity tracking devices (FitBit Zip™) by families in rural communities was not significantly changed, the attitude toward participating in physical activity was altered. Considering long term changes in lifestyle, the change in the attitude might have more important impact than the change in the immediate behavior.

**Keywords:** physical activity tracking devices; physical activity; family; rural community
Introduction

Increasing of physical activity among adults and children has been a primary goal of many disciplines, government initiatives and non-profit organizations. Unfortunately, only 1 in 5 adults and less than 3 in 10 high school students meet the 2008 Physical Activity Guidelines [1]. Among children 9–13 years old, 77.4% reported participating in free-time physical activity during the previous 7 days [2]. Geographical location which includes rural communities, such as Appalachia, continue to struggle with the highest levels of obesity and diabetes in the nation, with rates of diagnosed diabetes exceeding 10% and obesity prevalence is more than 30% [3].

Use of Technology in Promoting Health

Contemporary technology is often seen as one of the significant constraints to participation in physical activity [4]. Decreased exposure to the outdoors was connected to technology addiction and increase in attention deficit disorder among youth [4, 5]. However, in recent years, more and more often technology is being used to improve one’s health, particularly in rural communities. For example, some studies claimed that mental health information and self-help tools could be successfully delivered to rural communities via the Internet [6]. The authors explained that due to limited access to health providers and culture of self-reliance in rural communities, Internet-based programs might offer the necessary mental health assistance. Moreover, multiple studies supported effectiveness of online sex education programs in increasing knowledge of and improving use of healthier practices among sexually active youth [7, 8].

In the area of changing behaviors related to health and physical activity, technology has also been shown to be a successful tool [9, 10]. For example, in a study exploring diet and physical activity smartphone apps, users found these apps effective in promoting healthy eating
and exercising. The study participants believed the apps affected their actions, health consciousness, and self-education about nutrition and PA; as well as were a part of their social lives [9]. Some studies used the Internet and mobile phone technology to deliver an automated physical activity program to motivate adults to be more physically active [11, 12]. As a result of several strategies, including distribution of tailored solutions to perceived constraints, detailing a weekly exercise plan, sharing the results with others, and providing feedback on their level of physical activity, the participants of the program significantly increased their level of physical activity and lost higher percent of body fat than the control group. Among an adult population with chronic obstructive pulmonary disease it was revealed that an eHealth app was stimulating and that reaching daily physical activity goals was rewarding [12]. Additionally, older adults living with chronic illness found wearable activity trackers (including FitBit™) were useful and acceptable, although stated they may need support with setting up the device and interpreting the data [13]. The impact of Information Communication Technology-based interventions to promote physical activity among youth was also supported [14]. Despite all the studies suggesting benefits of using technology to promote healthy lifestyles among youth, little is known on how technology can be used by the entire family to encourage healthy behavior that can be sustained over long period of time.

Families and Physical Activity

Previous studies showed that children and youth rely and are dependent upon decisions and values of their caregivers when it comes to healthy lifestyle. Studies showed that parents’ engagement in physical activity is an important predictor of children’s engagement in physical activity, both during childhood and in later years in life [15, 16]. Moreover, parents’ support and encouragement can help a child to develop physical competence and self-worth, a crucial factor
in a long-term engagement in physical activity among children [17]. Unfortunately, there are multiple factors that prevent families from being more active, including time and money, family structure, environment, geographical location, and others [3, 16, 18]. As a result, it would be important to explore how families in rural communities could use technology to increase their participation in physical activity. More specifically, the objectives of this study were to explore: a) how the use of physical activity tracking devices (FitBit Zip™) by families in rural communities influences their participation in physical activity; and b) how use of physical activity tracking devices (FitBit Zip™) by families in rural communities influences their perception of physical activity.

Methods

Study Design

The study was conducted during 2014 in a small town in rural Appalachia. The study consisted of two stages. During the first stage, 22 families with children 7-13 years of age took part in a two-week long intervention study measuring the effect of a physical activity tracking device (FitBit Zip™) on physical activity participation in families. During those two weeks each family member was asked to wear a FitBit Zip™, as well as record the types of physical activities and the length of their participation in those activities into a journal. The study protocol was approved by the university’s Institutional Review Board. Parents signed an informed consent and children signed an informed assent. For the second stage of the study, eleven families volunteered to take part in family group interviews to reflect on their experiences using physical activity tracking devices in a group interview. This manuscript presents the results of these interviews.
Method of Data Collection

Eleven families with one to three children of different ages took part in the semi-structured group interviews conducted with each family separately in the researcher’s office. The interviews lasted between 30 minutes to an hour. The participants were asked to discuss their experience using the FitBit Zip™ as a family, motivation to be physically active, changes in their pattern of participation in those activities, level of engagement by different family members, and competitiveness with or support of each other. All interviews were voice recorded with the participants’ permission and later transcribed verbatim using pseudonyms.

Data Analysis

Data analysis begun as soon as several first interviews were recorded and continued until the point of data saturation was reached [19]. The principle investigator used open, axial, selective coding techniques to analyze the data [20]. Trustworthiness of the study was enhanced by ensuring credibility, originality, resonance, and usefulness [19]. The principle investigator developed expertise on the subject area, stayed conscious of the depth and range of the data, as well as made sure there were strong and direct links between the gathered data and the conclusions. The researcher also evaluated the data on the novelty, usefulness and resonance.

Results

Several themes appeared from the data: changes in physical activity as a result of using FitBit Zip™ as a family; change in the attitude toward physical activity as a result of using FitBit Zip™ as a family; and factors influencing changes in pattern of participation in and attitude toward physical activity.
Changes in Physical Activity as a Result of Using Physical Activity Tracking Device

**No changes in physical activity.**

The participants of the study were divided into two groups: those who experienced no change in physical activity and those who experienced slight changes. The majority of the participants reported no change in physical activity as a result of FitBit Zip™ use due to their rather active lifestyle prior to their participation in the study. A mother from family 6 explained, “We were already pretty active so I don’t know. [...] We get outside a fair amount, we go biking and running and stuff throughout the week outside.”

There was also a group of families who reported no change due to lack of interest from the parents. For example, a boy (family 11) had no specific reason for why his level of physical activity did not increase. However, following his mother’s response about her busy schedule and lack of interest, he stated “Well not much was different for me. It was kind of just daily stuff and that’s kind of how it was. [...] Nothing really changed, it’s just kind of how life is.” Most of the people who were not interested in increasing their participation in physical activity listed a number of constraints that stopped them from being more involved. These constraints included lack of energy, desire, interest in other non-active recreational activities, time, money, companionship, environmental (weather, sidewalks), and distraction by technology.

**Small changes in physically active recreation.**

Lastly, there were several families who reported small, naturally occurring changes into everyday life, including walking instead of taking a bus, parking farther away, and walking around house, etc. A mother from family 6 described, “It didn’t make me exercise on a day, like if I just felt tired and felt like I wasn’t going to exercise that day, it didn’t make me plan an exercise activity, but it did make me maybe just walk around a little more and run in place while
I’m making dinner.” Similarly, a father from family 1 explained that he was more motivated when he could visualize how inactive he was, “Yeah, it [FitBit Zip™] gave me more incentive to go do the activity because you’re looking and seeing you only have 5000 steps, I need 5000 more to go. I need to figure out something more to do today to increase my steps.”

Several families stated that while they did not introduce any new activities, they increased their level of participation in the activities in which they were already involved. Going on a longer hike or walk, practicing dancing or gymnastics more often, and other activities were listed by the participants. A mother from family 5 shared, “I don’t think we did anything new just more often. We didn’t do anything longer just more daily than a few days a week. We tried to fit more in during the week. [...] Just having a goal.” A girl from family 4 had similar reflection “I’m a dancer and I’m about to start pointe after Christmas. So I would put on my pointe shoes after I had on my pajamas and practice in the living room so I could gain a couple more steps.”

**Change in the Attitude Toward Physical Activity as a result of Using Physical Activity Tracking Device**

While changes in participation in physical activity is valuable, the change in attitude and perception of physical activity and healthy lifestyle overall might have even higher impact on the future of families in the study. As a result of using physical activity tracking devices, the family members reported an increased awareness of their activity level and accountability for being inactive, introduced more conversations about active and healthy lifestyle, and changed their view of physical activity to more positive one.

*Increased awareness and accountability.*
The majority of participants in this study were pleasantly or unpleasantly surprised by how active or inactive their everyday activities were. A mother from family 6 explained,

It made you a little more aware maybe when you thought you got enough exercise but maybe you didn’t quite. [...] I think it did make me more aware and how even just doing some little things, like we live near the [grocery store] and how walking to the [grocery store] could add, little bit more walking home from school, how that can give you some more steps.

In many cases this increased level of awareness motivated study participants to be more active during their recreation and every day activities. A mother from family 3 described her son’s increase in motivation as a result of using FitBit Zip™,

I think more awareness. He [son] was extra aware and made more of an effort like ‘oh I need to feed the FitBit Zip™ so he was making an extra effort.’ I could see that when he actually could see it, he was taking extra time to find ways, so yeah I noticed that behavior about him.

Similarly, the mother from family 5 shared her own increase in motivation to be more physically active as a result of FitBit Zip™ use, “I would try to be more active because before I would think 3 days a week was good. But thinking about the 10,000 each day made want to do more.”

More conversations about active recreation.

In addition to an increased awareness, the FitBit Zip™ use provoked more conversations about active lifestyle and health in general among family members. As father from family 10 described, “In the evening at least we talked about the steps and what they were doing and what they did for PE and things like that.” Comparing the number of steps between different family
members allowed families to be more intentional in planning physical active “They were constantly looking and seeing how many steps they had and what they were going to do.” (Mother, family 1). Moreover, families enjoyed the friendly competition with each other and celebrated the achievement of the winning family member, which further initiated conversations about active recreation. A mother from family 3 explained,

I think it was cool that we were thinking about it and checking on each other. [...] I think we kind of talked about it and looked at it, maybe twice a day or so. [...] It is kind of interesting because he [son] is ultra-competitive with it. [...] And it was kind of neat to celebrate with him and be like how did you get that many? What did you do today to get there? So I think for me as a parent it was fun to see him have this accomplishment and know that there were many days that he had more than I had.

**Physical activity as a benefit.**

Lastly, the participants reported that after using the physical activity tracking device as a family their view of physically activity was changed to more positive one. As a result of the participation in the study, the participants changed their perception of physical activity from inconvenient and burdensome to beneficial. For example, walking the dog, parking farther away, and getting something from another room were now the activities that family members did not mind to do. For example, a mother from one of the least active families, stated “I had a better attitude about being more physical, like instead of being annoyed I had to park further away, I would be like that’s ok. This is good for me.” Another father described how he was using the FitBit Zip™ to motivate his children to walk the dog together. And a son from family 10 described how being active was no longer perceived as a burden by him and his sibling but rather as an opportunity to earn more steps, “One night someone was like ‘will you go get such and
such for me’ and no one would get off the couch, […] and when she said that or anyone said that
to me, I would be like ‘I’ll do it’. I got up and got up straight to do it.”

**Discussion**

Several major findings from this study reflect changes in both behavior and attitude
toward physical activity among families who used physical activity tracking devices (FitBit
Zip™). Some family members did not report increase in physical activity due to their already
active lifestyle or due to lack of interest. Several families also discussed multiple constraining
factors that hindered their participation in more physically active recreation, including lack of
energy, desire, interest in other non-active recreational activities, time, money, companionship,
environmental (weather, sidewalks), and distraction by technology. Additionally, there were
participants who stated that they made small changes in their recreation and every day activities
by either adding simple and easy activities or by expanding their participation in the activities
that were already part of their typical routine. More importantly, the family members in this
study discussed the changes in their attitude toward physically active recreation. They reported
an increased awareness of their activity level and accountability for being inactive, introduced
more conversations about active and healthy lifestyle, and changed their view of physical activity
to more positive one.

The findings in this study highlight several important issues related to increasing the level
of physical activity among children previously discussed in the literature. First, adults play a
crucial role when it comes to health and active lifestyle of the entire family [17]. As our data
indicated, the children in families whose parents had no interest in physical activity did not
change their lifestyle to more active despite the use of FitBit Zip™. On the other hand, in
families where parents were interested in increasing physically active recreation, they
encouraged their children’s participation, introduced discussions about experiences, and celebrated their children’s achievements. Second, in order to increase participation in physical activity among children it is important to make them fun yet still be challenging [17]. Our participants reflected on the enjoyment from the experience of using FitBit Zip™ and friendly competition between family members. Many children were excited to compete with their siblings and parents and as a result, found the process of being active to be fun. Lastly, previous studies described the sense of mastery often encourages children’s engagement in physical activities [17]. Having a set goal and being able to observe how one’s actions can allow the individual to achieve that goal might be one of the most important changes brought on by the use of FitBit Zip™ in this study. Change in one’s behavior motivated by the steps displayed on the FitBit Zip™ screen, as well as the change in one’s attitude toward physical activity to more positive view are closely related to sense of self-efficacy and perceived mastery. Observing the FitBit Zip™ screen allows the user to see the outcomes of their current activity level which may lead to more active and healthier lifestyle. The user also may also observe that positive outcomes can be achieved by making small changes in one’s everyday routine and by participating in things one already enjoys.

The important message from this study is the relationships between technology and physically active recreation. While technology is often viewed as a constraint to physical activity [4], it might also be used as a facilitator [21]. Moreover, technology can motivate not only behavior but also attitude toward active recreation, which often might be more valuable change when it comes to long-term improvement in healthy lifestyle. In addition, technology can bring families closer by providing a shared goal and healthy competition, as well as promote
healthy families by allowing more awareness about physical activity and health behavior in general.

While the study brings attention to some important areas in the research on physically active recreation, it also has several limitations. First, the participants who agreed to participate in the study were already predominantly active or at least had interest in introducing more physical activity into their family life. Moreover, while self-report is a useful method of data collection when it comes to changes in attitude, observation is more reliable method when the behavioral changes are in question. Second, the engagement of families with physical activity tracking devices (FitBit Zip™) was rather short (two weeks) and the novelty and excitement from this experience might decrease with time. In future studies, we recommend to allow participants longer period of engagement, as well as to ensure that the interviews are conducted soon after participation and in several weeks after the experience ended. Moreover, finding families who already own and use physical activity tracking devices may be a challenging but more reliable way to represent the experiences of families with this technology.

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Conflicts of Interest: no conflict to declare.
References


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