Asset-Based Insights on Designing Fitness Promotion Techs in Boston's Low-SES Neighborhoods

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CCS CONCEPTS

• **Human-centered computing → Collaborative and social computing theory, concepts and paradigms.**

KEYWORDS

asset-based design, public health, family physical activity, fitness tracking, low-SES, minorities

ABSTRACT

The disproportionate burden of obesity among low-socioeconomic status (SES), Black, and Latinx households underscores the ever-increasing health disparities in the United States. This epidemic can be prevented by prioritizing physical activity interventions for these populations. However, many technology-based physical activity interventions were designed for the individuals rather than for the individuals amidst their social environment.

In this position paper, I report my eight-year research and technology designs processes. Although this research was not specifically guided by asset-based design principles, assets consistently emerged during the in-depth fieldwork. They include *family relationships* and *caregiving communities*. These assets appeared to influence the motivation to engage with health technologies and also enhance family physical activity self-efficacy. However, since my studies were not guided by asset-based design principles, some key assets may not be sufficiently identified. By participating in this workshop, I seek to collaboratively explore how to support communities to identify their assets and also how to translate assets into technology designs towards enhancing health equity.

Asset-based design is an approach for community development that is interested to help communities to leverage and amplify the tangible and intangible assets that they have, rather than simply unpacking what is absent in the community [4, 15]. These assets can include community leaders, youths, families, seniors, cultural groups as well as community buildings and small businesses.

This approach is believed to be more sustainable because it focuses on community's strengths and opportunities.

INTRODUCTION

Adults and children of low-socioeconomic status (SES) or racial/ethnic minority households are burdened with the greatest risk of obesity [9]. Indeed, physical activity can reduce the risk of obesity. But, people of low-SES, Black, and Latinx backgrounds faced more barriers in living an active life [5]. These barriers are at the individual level (e.g., fatigue from burdensome work and caregiving duties) to the societal level (e.g., perceived neighborhood crime, limited access to recreational exercise facilities). Thus, physical activity interventions must be prioritized for these populations.

In the field of Human-Computer Interaction, for more than a decade, researchers have examined how technologies can support physical activity. These tools often used fitness sensors with novel visualizations, goal-setting tools, and tools for facilitating fitness data reflections. Indeed, these prototypes produced promising findings. However, the aforementioned prototypes may not have the same impact across all groups because physical activity is linked to SES, race, and ethnicity. Furthermore, among Black and Latino communities, families play an important role in physical activity [5]. Thus, for fitness technologies to make a positive social impact, they must be designed for families of low-SES, Black, and Latino communities.

To that end, I conducted an eight-year research project to understand how technologies can positively impact physical activity among low-SES and racial/ethnic minority families in Boston, U.S (n=57 families, 61 adults, 59 children). While this project was not specifically guided by Asset-Based Design principles [4, 15], through multiple in-depth fieldwork, I found that assets and asset-based design elements play an important role on the impact of physical activity technologies. More specifically, social relationships and social interactions helped families to be engaged with their fitness data and also helped them be motivated to be active.

In the remainder of this paper, I will discuss two sub-projects. Each includes a formative study that informs an asset-grounded design element as well as the evaluation of the design element. These subprojects are focused on two important aspects of physical activity technologies: motivation towards engagement and self-efficacy. Through these subprojects, I unpacked the process of identifying assets and translating assets to design. More specifically, I discuss (1) how open-ended and empathic qualitative inquiries tend to naturally elicit the assets that communities have, and (2) how those assets can be translated into digital health technologies.

SUPPORTING MOTIVATION TOWARDS ENGAGEMENT

Engagement is central to the impact of fitness apps. If people do not use the fitness app, then they will not benefit from the fitness interventions. However, engagement is a major concern in fitness tracking apps, especially that people tend to abandon their trackers over time [6]. Through my formative, design, and evaluation work with families, I show that families hold valuable assets that can support the motivation to engage with fitness apps.

In 2014, I designed a prototype of a fitness data dashboard for families called *Spaceship Launch* [14]. This dashboard is gamified and collaborative. Family members must be active and meet their goals to unlock the fuels that launch their spaceships to new planets.

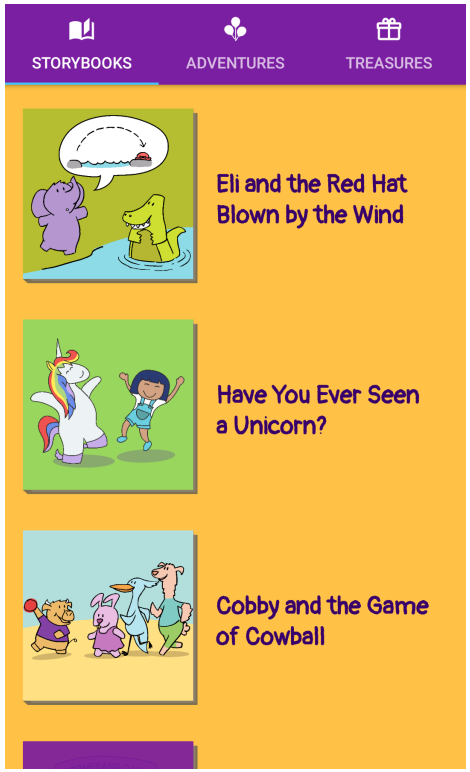

Figure 1. Storywell gives storybook chapter rewards for families who completed their fitness goals (as tracked by their fitness sensors).

By evaluating Spaceship Launch with 13 families of low-SES neighborhoods for five weeks, I found that caregivers sought family competition because competition was seen as an opportunity to bond as a family. Informed by a psychology theory of motivation, Self-Determination Theory (SDT) [10], I suggest that supporting families to bond is an opportunity to enhance the motivation towards engagement.

Guided by this design hypothesis, I designed and developed Storywell (Figure 1), a fitness and storytelling app for families [12]. The Storywell app came preloaded with storybooks for young children. When a family finished reading a chapter, the next chapter is locked until the family completed their fitness goals that were tracked using fitness sensors (each chapter ends with a cliffhanger). The actual interventions are the reflection questions inside each chapter that help families cognitively engage in the positive aspects of family physical activity.

Through the three-month evaluation of Storywell with 18 families of low-SES neighborhoods, I identified three satisfying moments that caregivers experienced while using Storywell: bonding, discovering, and educating moments [12]. Informed by SDT, I argued that experiencing these moments can satisfy caregivers' psychological need of relatedness (i.e., social connectedness) that will enhance their motivation to continue using Storywell. Thus, I suggest that relatedness is perhaps an asset that families have because relatedness can motivate them to engage with fitness interventions. Furthermore, the drivers of the more eudaimonic moments (i.e., discovering and educating moments) are caregivers' innate aspirations for their children. These aspirations include seeing their children getting good jobs when they are adults and also experience opportunities that the caregivers had to miss because of growing up underprivileged. The importance of aspirations also resonates with Toyama's work that highlighted the sustainability of aspiration [15].

In short, assets that could support the motivation to engage with health interventions are caregivers' relationships with and aspirations for their children. For example, a health app that includes tools teach reading skills may be more engaging for than generic health apps.

SUPPORTING SELF-EFFICACY USING SPATIAL SOCIAL MODELING

From the social cognition perspective, human cognition shapes their behavior (and vice versa) [1]. Thus, supporting health behavior begins by positively supporting health attitudes. Decades of health research show that self-efficacy is a key health attitude that correlates with increased physical activeness [7, 16]. Furthermore, self-efficacy can be enhanced through social modeling — learning from other people's successful experiences [1].

In 2017, I conducted a two-month formative study to understand the practices and experiences of using wearable fitness trackers among families of low-SES neighborhoods [11]. One of the goals of the study was to investigate in families' preference to be active outside (and benefit from using the fitness trackers) if they live in neighborhoods with higher rates of crime. This goal is informed by prior studies that show crime rate in one's neighborhood is influencing physical activity [2, 3].

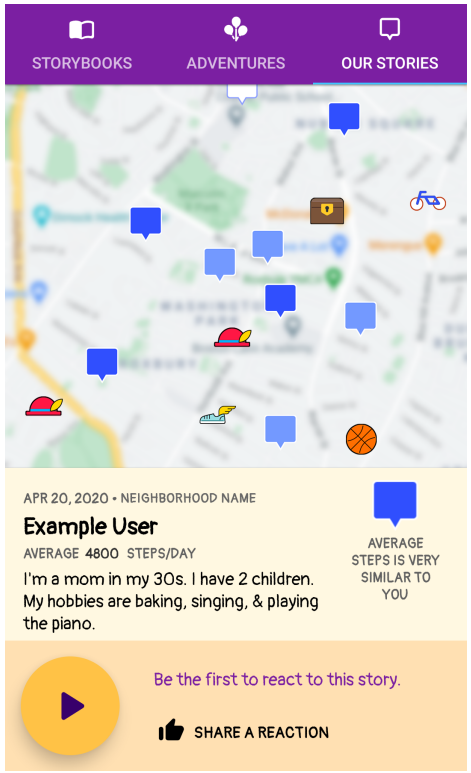

Figure 2. In Storywell 2, families can listen to other families' success stories in being active. These stories are placed on a community map. The map is blurred for this position paper to protect the participants' privacy.

Through this study with 11 caregivers, I found that the perception of safeness is nuanced. Caregivers agreed that crime is a major concern, but they feel comfortable being active outside in some circumstances. As I probed the data further using the perspectives of urban sociology [8], I found that families appeared to develop zones (realms) in their neighborhoods where they can feel safe. These zones are marked with histories of social interactions that families had with the people in their neighborhoods. For example, one father was not comfortable for his children to go to one part of their neighborhood (because one of the houses "*gets raided twice a year*"), yet he felt comfortable with the other parts of the neighborhood (because he trusted the lady who lives in one of the houses). I suggest that social interactions in places can support families to develop relationship assets that made them more comfortable to be physically active.

Guided by this second design hypothesis, I refined my initial prototype to Storywell 2 (Figure 2). I added a feature where caregivers can share physical activity success stories with other families and place the stories on a neighborhood map. The goal of this design was to enhance physical activity self-efficacy. Sharing success stories is aimed to support social modeling, whereas sharing the stories spatially on a map is aimed to support social interactions in neighborhood places.

Through the four-week preliminary evaluation of Storywell 2 with 16 families of low-SES neighborhoods, I found that sharing stories on a map can enhance caregivers' self-efficacy and outcome expectations in being active [13]. These stories made impacts in three different ways. They (1) convey the steps to be active, (2) convey the joys that families had while exercising, and (3) convey positive caregiving norms that validate caregivers' efforts in supporting their children's wellbeing. I suggest that learning these pieces of information enhanced the listeners' intention of being active as a family. These "inspirations" appeared to be vital especially that the evaluation study was conducted in 2020 during the COVID-19 pandemic when social-distancing was enforced.

In short, an asset that can support positive physical activity attitudes for families is their caregiving community that holds the potential to provide strategies to be active, echo the joys of family exercises, and validate the efforts in supporting family health. This finding resonated with Cho et al.'s work on the cultural asset of Latinx families in sharing educational opportunities [4]. Health technologies, and specifically personal health informatics [6], can be more impactful by incorporating tools for sharing stories that embody the caregiving community's assets.

THE THIRD ASSET: COMMUNITY ORGANIZATIONS

So far, I have discussed two important assets that can support physical activity among families of low-SES backgrounds in Boston, US. These assets are *family relationships* and *caregiving community*. While these assets can enhance technology engagement and health attitudes, families often face fundamental barriers to being active. Some families faced burdening duties due to burdensome caregiving duties, other families faced life disruptions from housing and job instability [12]. Families who live in apartments with no access to backyards also had limited opportunities to be active because of the social distancing mandate during the COVID-19 pandemic.

These fundamental barriers cannot be easily addressed with the aforementioned two assets. Housing instability or burdensome caregiving cannot be reduced simply by having deeper family and community relationships. Those assets can help, but these barriers are forceful impediments.

However, it should be noted that the studies I conducted since 2017 were done in collaboration with local community organizations that did health and parenting programs. These programs include walking events, financial literacy seminars, weekly school readiness meetups, employment training, etc. They also provide advocacy (or connect families with advocacy groups) for families who faced housing issues. Broadly, these organizations play a vital role in enhancing the wellbeing of families in Boston, especially those who come from low-SES backgrounds. Thus, given that these community organizations are important assets for the families, health technology research should investigate how technology can amplify and broaden the impact of community organizations.

CONCLUDING REMARKS

Through multiple studies and design work that span for over eight years, I identified the assets of families in low-SES neighborhoods, particularly assets that support physical activity. These assets are *family relationships*, *caregiving community*, and community organizations. Through the studies, I also show how to implement the assets into technology designs and investigate their effects.

Indeed, these aforementioned studies were not conducted specifically to identify the assets that families and communities have. Nevertheless, these studies helped surface valuable assets that can support physical activity. Perhaps, it was our open-ended, data-grounded, and long-term inquiries that enabled these assets to take center stage. Thus, I will briefly reflect on how these methodological decisions affected the surfacing of family assets.

First, by conducting open-ended inquiries, I did not specifically seek to confirm a hypothesis. Rather, by examining the processes that were already in place and that can be enhanced by health technologies, I was able to identify vital processes that have yet been investigated. Second, by closely grounding the inquiry with the data, the findings I reported did not shift away from the participants' thoughts and experiences. Finally, by conducting long-term inquiries with multiple interviews, I had the opportunity to verify my preliminary analysis in the follow-up interviews. As a result, the findings might have been closer to the ground experience. Put simply, these three approaches helped direct my inquiries to the resourcefulness of communities' strengths rather than being drawn to a set of needs that I may have preconceived as an external researcher [15].

Furthermore, the salience of the aforementioned assets shows that asset-based design approach is essential in the impact of community health development. However, it is also likely that my inquiries also missed other assets that could have been surfaced, given that the study designs were not focused on assets in the first place. Through this workshop, I am interested to collaboratively explore the methods to further surface community health assets and also how to translate these assets into technology-based solutions. More specifically, how to responsibly translate these assets into technologies that made impacts in towards achieving health equity

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