Toward Supporting the Mental Health of Underprivileged Youth Through Village-Driven Sociotechnical Systems

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Abstract. Children and adolescents from socially and economically disadvantaged backgrounds are significantly more likely to suffer from mental health problems. Underprivileged youth experience various stressors, including racism and exposure to violence, leading to more violence. Despite the wide adoption of mobile health platforms among the target population, the literature lacks evidence on using mobile health to support underprivileged youth. The community leaders of urban neighborhoods came together to share thoughts on how mobile solutions can best support the mental health needs of underprivileged children and adolescents. Through interviews with pastors, principals, and non-profit organization leaders, we show what is needed is a socio-technical solution that engages the community to create an ecosystem of village-driven support for youth mental health. We found a disparity between the outcomes the community is interested in improving (e.g., resilience, personal agency, mentorship) versus the clinical outcomes usually measured in mental health mobile health applications. The community desire to work on "village-driven" and engagement-based approaches rather than the intervention of clinical/treatments more common in existing mobile health solutions. We discuss

implications for the requirements for village-driven socio-technical systems in supporting the mental health of underprivileged youth.

1. Introduction

Children and adolescents from socially and economically disadvantaged backgrounds are significantly more likely to suffer from mental health problems than their peers from affluent backgrounds (DeFosset et al. 2017). Despite these alarming mental health disparities, overwhelming evidence reveals that underprivileged youth and children of color in the U.S. are the least likely to receive quality mental health services (Ho et al. 2007; Planey et al. 2019). Known barriers include stigma and shame, lack of trust toward healthcare providers, cultural differences, religious preferences, poor access to care, and concerns about cost (Breland-Noble et al. 2011; Graves 2017; Lindsey et al. 2013; Weiler, Boat, and Haddock 2019). These patterns are evident in countries around the world, including the U.K. (Kirby, Wright, and Allgar 2020), Sweden (Kim and Hagquist 2018), the Netherlands (Weinberg et al. 2019), and Germany (Reiss 2013). Across the United States and Europe, the prevalence of mental health problems is the highest among minority youth living with economic instability (Alegria, Vallas, and Pumariega 2010; Reiss 2013). For example, in the United States, Black and African American people living below poverty are twice as likely to report severe psychological distress compared to those living over twice above the poverty level (National Center for Health Statistics 2019). In the U.K., Deighton and colleagues reported that the odds ratios for experiencing mental health problems among school-age children and adolescents were much higher based on ethnicity and socioeconomic status (Deighton et al. 2019).

More than a quarter of the Philadelphia population lives below the poverty line [11]. Philadelphia also suffers from a gun violence crisis, where there have been 3,884 shooting incidences and 2,222 shooting victims in 2020, a staggering 66.1% and 53.7% increase from 2019 ("Crime Mapper: Philly Police," 2022). More than 100 victims were juveniles [12]. The city is the 4th most segregated city in the U.S. Philadelphia has over 100 separate neighborhoods with their own historical and residential characteristics. Those neighborhoods with a lack of community cohesion or experiencing transitions have consistently exhibited higher rates of gun violence than other neighborhoods [15–17]. Such disproportionate amounts of exposure to gun violence in specific neighborhoods adversely affect mental health (Smith et al. 2020).

Participating in community-building activities, mentorship, and community-led interventions can positively impact the mental health and emotional well-being of those who provide and receive the services (Castillo et al. 2019). Supportive social networks, existing relationships with therapists, and referrals and mandates by

parents and community-based gatekeepers facilitate seeking mental health care (Bannon Jr et al. 2008; Lindsey et al. 2006; Samuel 2015; Lindsey et al. 2013).

We conducted interviews with religious leaders, leaders of non-profit organizations for youth, teachers, and principals of K-12 schools to better understand how to best support the mental health needs of youth. The collaborative goal as a community was to plan, design, and develop a novel mobile solution that youth and people in the neighborhoods can use to improve the mental health of underprivileged youth. We present existing systemic challenges in supporting youth mental health and highlight the lack of research on how mobile solutions can effectively support youth mental health. We present "Village-driven support" as a viable solution to this challenging societal challenge and discuss the requirements for setting up a village-driven mobile technology to support the mental health of underprivileged youth.

2. Background

Promoting positive outcomes and support for healthy behaviors for youth requires access to a variety of assets and protective factors across the family, school, and community system (Henderson, DeCuir-Gunby, and Gill 2016; Reupert 2017). Neighborhood environments play a crucial role in mental health through experiences of violence, social connectedness, and socioeconomic conditions (Reupert 2017; Hill and Maimon 2013; Cox et al. 2017; Stockdale et al. 2007). While evidence has emerged around neighborhood factors impacting youth mental health, little work includes the dynamic nature of neighborhoods and community-building activities or investigates community-based social interactions on mobile applications.

A systematic review revealed several essential barriers to mental health help-seeking among Black youth and their families, including negative experiences with clinicians, provider mistrust, perceptions that treatments were ineffective, or that health professionals did not respond to their needs (Mukolo and Heflinger 2011; Murry et al. 2011; Samuel 2015; Graves 2017). For instance, 31% of black mothers endorsed the following statement: "White professionals could not understand the problems of African American families" (Murry et al. 2011). Seventeen percent endorsed the item "I am suspicious that White professionals would not treat my child as well as s/he would treat a White child" (Murry et al. 2011). A focus group study of Black children from 6th to 8th grade found "several adolescents raised the negative expectation or fear that their 'parents might get taken away' if they tell a therapist that they were hurt or abused" (Lindsey et al., 2013, p.113). While barriers exist in access to mental health services for Black youth, other approaches, such as community-based social support activities, have positively affected their mental health and emotional well-being. This finding is in line with how facilitators to accessing mental health services among Black youth include social support, such

as religious leaders or past mental health service providers sharing the importance of early clinical intervention (Lindsey et al. 2010; Cauce et al. 2002).

A review of mental health apps suggested promise for feasibility and acceptability for marginalized and underprivileged populations, although large-scale efficacy testing and scaling potential are still lacking (Schueller et al. 2019; Naslund et al. 2020). A systematic review of mHealth studies for minority and low-income populations experiencing health disparities revealed very few applications beyond SMS text messaging (Schueller et al. 2019). Most mHealth solutions for mental health focus on individuals. Community-based mobile solutions are under-investigated despite their potential. Given the sparse evidence and support for mHealth apps with underprivileged youth, engaging the users and relevant communities earlier in the development process is critical to designing an acceptable novel solution.

Veinot et al. conducted an interview study to develop a trust-centered design framework that guides designing technological solutions for Black youth (Veinot et al. 2013). Trust was cited as a critical concern for Black youth. The authors concluded that we must move beyond the currently accepted trust-promoting strategies to reach underprivileged populations adequately. And it was posited that we should investigate the social context and align it with cultural trust patterns in personal, group, institutional, and technological realms.

Harrington and Dillahunt used community-based participatory design methods to engage youth in marginalized communities in speculative design (Harrington and Dillahunt 2021; Bray and Harrington 2021). They partnered with an existing organization already situated and invested in community engagement. Such co-design workshops took a collectivist approach and centered on community experiences to address inherent potential power imbalances among designers, researchers, and community members (Bray and Harrington 2021). More of this community-engaging, participatory work will be critical to understanding and supporting the population and their needs and rethinking how existing mobile solutions can or cannot help with what the community is experiencing.

3. Methods

Our team consisted of researchers, students, and the community advisory board (CAB). The CAB reached out to the lead researcher of this team during the COVID Pandemic in the summer of 2020 to seek a mobile solution that would be amenable and acceptable to youth. CAB's goal would be to help prevent the rising violence and the disintegration of the city's neighborhoods. The CAB consists of pastors and reverends of several churches in the city. They also work as college counselors and voluntarily advocate for youth and older adults who need support. Notably, the project was initiated by the CAB. The CAB has continued to direct the research questions (below) and provide access to recruiting the community's leaders who advocate for underprivileged youth.

RQ1. What are the current challenges and solutions to supporting the mental health of underprivileged youth in Philadelphia?

RQ2. What are the requirements for building a mobile solution to support youth mental health?

We investigated RQ1 to understand the gap and availability of the current resources in the school and the community. With the preliminary perspectives gathered from CAB members and the literature, we sought to elicit opinions from the interviewees regarding what kind of solutions seem viable to support the mental health of youth. Hearing from youth about their direct experiences was the next phase in the research. Given that youth is a vulnerable human subject population, the CAB and the research team agreed it is safe first to interview the leaders to make sure the research team understands the population and its potential challenges and risks in conducting research with the youth.

We recruited eight leader interviewees with the following criteria: (1) aged 18 and older, (2) have an interest in supporting youth, (3) speak English, and (4) live in Philadelphia. The CAB provided a list of interviewees to contact, and we sent a questionnaire that consisted of the informed consent form and the screening questionnaire. Recruiting was highly challenging because of the COVID pandemic and the potential participants' work pressures and time constraints. We set up video-conference meetings with the recruited participants, where we recorded the interview for transcription purposes. The video-conference tool automatically transcribed the interviews. Students of the team went through the recording, fixed any errors, and deidentified any personal identifiers. We then imported the deidentified transcripts to NVivo (Richards 1999) for thematic analysis.

Using open coding analysis, three researchers went through one transcript and developed emerging codes grounded in the data (Strauss and Corbin 1994). Then, two researchers separately coded another transcript and shared the independently coded codes to understand the similarities and differences between the researchers. Three researchers then developed a codebook and conventions for coding, where we allowed new codes to be developed as the researchers encountered them in new transcripts. The two researchers then split the rest of the transcripts to conduct a thematic analysis based on the agreed codebook, which consisted of four classifications on systemic challenges to youth's mental health, existing community-based solutions, the gap in existing solutions, and the community's recommended solutions. The three researchers then came together to go through the codes together and conducted affinity diagramming to analyze common patterns and themes across the codes. These themes will be introduced in the findings. Table I indicates the participant demographics. The recruitment and the interviews were conducted after receiving approval from the university's IRB #2010108219A001.

Table I. Participant demographics

Participant#	Gender	Ethnicity	Age	Role in the community
P1	Female	African-American	74	A retired teacher, school director
P2	Female	African-American	39	Principal (grades 5-12)
P3	Female	White	65	Director of a health organization
P4	Female	African-American	51	Police staff inspector
P5	Male	African-American	N/A	Director of a non-profit organization
P6	Female	African-American	44	Principal (grades K-5)
P7	Female	African-American	N/A	Principal (grades K-8)
P8	Female	African-American	83	Reverend, community advocate

4. Findings

"Even if you do have mom and dad and grandmother and grandfather involved, there's so much to life. There're so many things you have to deal with in life that you really do need a village to survive." – P4

The community leaders attributed violence and mental health issues among the underprivileged youth in their community to systemic challenges children and families were facing. Because of its systemic nature, particular to this target population, existing solutions developed for the general public would not be something that would work. Instead, the leaders saw the 'village' as a solution to bringing support at the individual, family, and community levels. However, these activities were often unscalable or met with challenges in engaging and sustaining the support of stakeholders such as families, children, and volunteers. Given the prevalent use of mobile phones among youth, the leaders saw mobile technology as a potential solution to help fill those gaps in connecting people, increasing engagement, and reaching out to people with resources. The resulting benefits they wanted to see were to increase resilience, personal agency, and competency in the youth, rather than clinically oriented mental health outcomes.

In this section, we describe the systemic challenges to the mental health of underprivileged youth and what solutions the leaders perceived as helpful.

Systemic challenges to the youth's mental health

The systemic challenges the leaders saw that attributed to the mental health problems of youth included racism, trauma associated with violence, drugs, food insecurity, and poverty. These findings highlight the challenging context of the mental health of this population and suggest the need for different approaches than those used for other populations who do not experience these systemic challenges.

For instance, P3 explained how systemic racism and societal norms made "the inner city and youth of color" feel like "you are less than and feel like you don't

matter." The pandemic and recent injustice toward Black men aggravated these experiences:

> "Especially at the time we're in right now, children are angry. They're angry because they're stuck in their houses, they're angry because of social justice issues, they're angry just to be angry, they're angry just because. There's so much." – P2

As a result, P2 stated that students without coping skills exhibit signs of self-harm and struggle with depression. Furthermore, due to poverty, P6 shared that youth have experienced trauma from the loss of income, having to move multiple times in a single school year (e.g., called transients), being abused by parents, and witnessing their parents' abuse and witnessing a homicide. P4 also shared drug addiction in the community:

> "Individuals are suffering from meth addiction, so obviously their children will be impacted by, you know, these decisions that they've made." – P4

The environment in which the youth grow to suffer from food insecurity: "In [anon]'s community there's no supermarket, there is no place where people can go and give fresh produce. There are several corner stores or fast-food places, but you know healthy eating is an important part of a child's overall health." (P6) P2 shared how poverty leads to mental health problems exhibited in the classroom:

> "then you've got poverty now trickling into mental health because now that student is suffering from anxiety, and then they're exhibiting that in their classrooms. You know, failing to pay attention, distractions in the classroom, anger. So I would definitely say poverty and mental health are the two largest struggles I'm currently facing. The students who I used to lead at a different school, I believe they're facing that, but they're also facing a lot of violence that is like in the city." – P6

P8 shared how youth "truly think that they don't think they're gonna live long" and that this leads to the youth's inability to plan their career long-term. P8 attributed this mindset to witnessing homicides and gun violence daily:

> "I mean, if you're involved in a neighborhood where people getting killed five and six or day and people are shooting into neighborhoods, if you're having a 4th of July outing and somebody just ran, we come and shoot, that's kind of depressing and discouraging. They think that, oh, I could die any day. So I think that that deters their longevity of planning. In terms of a career." – P8

Due to its systemic nature, entirely removing these societal challenges would be difficult. Instead, a solution to this challenge would be to find ways youth can build resilience, personal agency, and community support through education, activities, and mentorship.

Approaches to the systemic challenges

The leaders saw solutions to the systemic challenges as support driven by the village. For example, thinking of the community as whole, engaging family members, and working directly with youth personalized to their interests and contexts.

At the community level: Village-driven support

P4, who has a doctorate and is the city's Police Staff Inspector, attributed family and the community as what helped her to overcome her personal experiences of systemic racism, violence, and poverty:

> "I witnessed violence. Individuals being shot. Individuals being stabbed. And the only thing that, although I felt traumatized in that instant, was my mother and my grandmother and my stepfather, we would go to church. The pastor would talk about those incidents. I know it sounds maybe a little strange, but I just never felt not protected. And those individuals who I was around, who, if they had a mother that was a substance abuser or father who wasn't around or a substance abuser or– there was always someone in that community in that village to look after them always." – P4

The leaders saw the community work as a 'village,' where the village becomes a resource for families. Being a resource required the community to be closely knit, where the members—adults and children—work together to support each other. Community members should act as support when a child's family cannot do so.

Being a resource included training people for peer mediation and conflict resolution (P1, P4), talking to youth about social issues that impact them (P4, P5), and being an outlet for aggression through arts and sports (P1, P3, P5). The key to these activities was that the community members were constantly engaged with the community. Children would gain the trusted resources they know others have tried (P2). When children feel equal to others, they believe it will help children become less violent (P5).

At the family level: Engaging parents

As the community builds cohesion, the community can target the families and individuals through various forms of mentorship activities between adults and children and among peers of children.

For a child to build good character, the leaders believed providing an environment with family values and high expectations and fostering positive engagement with family was a way to reduce violence, even within the family, such as domestic violence. The community's support towards families would create a suitable environment for children to feel protected and feel included. To foster this environment, the community should first help parents understand their child's situation if their children are at risk, provide opportunities to observe the child's behavior pattern, and assist the communication between parent and child. This activity should take a full-spectrum approach by coordinating teachers, counselors, and parents.

Furthermore, bringing human or technological resources to educate parents will be critical to help parents return to school or the workforce. It was essential to "get the conversation started" for parents, especially men, about their role in the family dynamic. The leaders shared using role-playing as a teaching method to engage parents further, talking about where they are, acknowledging their struggles, and doing things for the families. The leaders also believed pastors or community

ambassadors talking directly with the parents would help families feel comfortable and encouraged.

At the youth level: Finding interests and issues of scalability

Providing support at the level of families and directly to youth was critical. Examples included fostering talents and mentorship. However, these solutions are often met with a lack of resources and scalability challenges.

P5, who has run a non-profit organization to support underprivileged youth for 20 years, shared how community engagement reduced crime in the neighborhood they focused on:

> "The portion of which where [organization name] started, within about of six-block radius there's not a whole lot of serious crime. About two years ago, the police district captain even drafted a letter that there's not a lot of violent crime in our area. And one of the reasons is because we're out there all the time. We don't really have a Community Center, but we have a schoolyard, we have a basketball program out there every summer. But even during the basketball program, it's the mentorship that kids are not allowed to curse. I don't care; you know how old you are. If you coach coaches, you're not allowed to curse and argue and stuff like that either; if not, our children can hold you accountable, we gotta do push-ups, for example." - P5

P6 also believed in the importance of extracurricular activities that would attract youth to build on their talents to help them plan long-term career goals. But these resources are lacking in the community. P6 shared existing gaps in building the youth up based on their talents:

> "So many black and brown students come to school with so many talents, but unfortunately, we have not tapped into those talents and use their talents as leverage [to help them stay in school and build career]. They're coming to school because they have basketball at the end of the day, or because they love playing flute, or because they have an art Program. You're going to send a child to then a middle school experience that might not have those same types of things or programs that you've had at the elementary school." – P6

P3 similarly shared using sports to provide an outlet for talking with youth:

> "For example, through a community center, build a new set of friends who are struggling with the same things instead of getting the aggression out by beating the crap out of somebody, you can get your aggression out by playing hoops and then have a conversation about how you feel, why you feel when you're not so angry." - P3

However, finding volunteers who can steadily contribute to after school activities have been challenging for P7 because of the lack of resources:

> "I steer away from volunteers unless they're truly able to commit to a certain time every day, and it's hard to. Everybody has a life to live, and it's tough trying to depend on that when you have children sitting there [waiting for the volunteer to show up]." – P7

The resources to help the youth in overcoming the obstacles in their schools and communities, such as counseling or extracurricular activities that would engage children to stay in school, are scarce and not scalable:

> "It's mind-boggling that a seven-year-old child could have witnessed a homicide and has never had any type of counseling." - P6

There is a lack of staff training in schools and community organizations, where the staff may "put their mental health in jeopardy trying to assist a student" (P2). Staff who assist students may not know where to find resources, and they end up all seeking help from the leaders:

> "I'm their resource. And then me as a principal. It's like this trickling effect; if I don't have the resources to give them (40 staff members), they don't have the resources to give the kids." – P2

P2 continued to share the problem of lack of scalability:

> "There are only one or two people to support a district of 200 and some other schools. Even if there's five to support 200 schools, that's not realistic, especially when teachers really need that training now and then they need a refresher at the beginning of the year." – P2

Village-driven solutions to supporting youth's mental health

The leaders commonly discussed mentorship and community-based activities as feasible and sustainable community-driven solutions to supporting the youth's mental health. The leaders discussed finding the right mentor and what outcomes they would be looking for in supporting youth-centered, community-based activities.

Finding mentorship

The leaders considered mentor fit as a critical component in successful mentorship. The leaders discussed youth needing role models that might not be readily available for the child, such as a mother figure, a celebrity figure, or an older sibling (P2, P4, P5). Children should have common interests with the mentor (P2, P5) while having academic-focused mentorship with some discipline and more structure (P5). At the same time, peer mentors came up as potentially a better mentoring solution (P4, P5, P7) than older mentors because they respect the opinion of one another (P4). Mentors can have the skillsets and interests useful for youth for a career (P6) and those who excel and provide guidance (P2). P2 shared struggling youth should be paired with a mental-health competent mentor:

> "There are some real self-harm issues. [It would be helpful to have] someone who may have been through depression and worked through, and someone who understands what isolation looks like but know how to come out of it. Someone who can also help them see the brighter side of things" – P2

The leaders also shared what not to do, which is to "come on strong right away to turn the child off or frighten them" (P1), not always pair like-minded individuals but add contrast (P4), and find mentors who are committed (P5). P1 shared that solid discipline is not good because it brings trauma (P1). Leaders mentioned the importance of asking the child who they are looking for and focusing on their interests, not what they've done (P1, P2, P3): "Ask them what they want. Don't tell them what you think they want."

Community-driven activities as part of the mentorship

The leaders shared various activities the community can do as part of the mentorship in supporting the youth's mental health. Leaders shared activities and clubs youth will desire, including basketball and football camps (P3, P5), video games (P1), workshops to discuss topics and issues or learn about interests like trades, business building, stage production, or fashion show (P1, P4, P5, P8), or to take field trips (P4). For instance, P3 shared that they are trying to use comics to teach about HIV and its danger to the youth. To enable self-driven and peer mentorship, P5 shared youth hosting a talk show as an idea he had already started implementing.

During these fun moments, academics and religion can be integrated, start conversations (P4), and bring opportunities to discuss incidents using the bible to help children cope (P4). These activities would give children an outlet for their struggles (P3): "get your aggression out by playing hoops." Youth can "build a new set of friends struggling with the same things." Bringing athletes, celebrities, city constituents, and experts to visit and talk to the youth would also help:

> "We had a former [player from a famous basketball team]. They came they talked to the kids we had. [anonymous], who was the former coach of [a university], for you know 36 years, talk to the College men and women." -P3

> "We have a lot of partners, so one of our partners because through [a local hospital's] healthcare network, so we had a guest come on and talk about the importance of physical activity" – P4

However, these resources are not always available to the youth, and appropriate training would be required to ensure the safety of everyone involved in establishing community-based mentorship relationships.

Community-based outcomes of interest

As a result of the community-based support, the leaders were not necessarily looking for clinically oriented mental health outcomes. Instead, they were interested in the outcomes integrated into the youth's career and life skills founded upon "resilience" and "personal agency."

The leaders emphasized "self-worth" as a critical element (P1, P2, P3, P4, P6). Academics are important, but P4 believed "adjustment" drives success in college enabled through resilience. The leaders shared how abused children could become resilient through encouragement, love, and praise by the community, for instance, despite their upbringing.

The personal agency would be built through uncovering gifts, talents, and abilities (P1). The goal is to stay in school, graduate from high school, pursue higher learning, excel in their careers, and become leaders (P1, P4, P5, P6, P8):

> "[The goal would be] to have a game that reversed being a violent person to being an angelic person, so to speak, the person that goes around and spread great and goodness into the Community." – P1

The key was to foster children who would grow up to return what they received from the community and "teach and train other children" (P1, P7) once they grow and build their careers. P8 shares good examples of such community-based ecosystem that the community was able to build:

> "[One struggling child] have gone on to college to be achievers. They're in school now, and some of them have turned their lives around. They've given up being social marijuana smokers and now have active job careers, and so the work that we have done has proved fruitful." -P8

The findings showed what the community needed to support the youth: community-driven mentorship. Building on the needs assessment, we discuss the implications of building socio-technical solutions to address these gaps.

5. Discussion

Systematic reviews of mobile health solutions for supporting mental health show very little evidence for those from underprivileged backgrounds who experience economic constraints, social stigma, and racism. Most mental health supporting systems have focused on clinically oriented domains specific to diagnoses, such as depression, anxiety, or substance abuse, and their direct outcomes, such as scales to measure reductions in symptoms of depression, physiological changes, or craving levels. However, the literature highlights that existing clinical approaches known to be effective for addressing mental health disorders lack evidence on whether the results generalize to minority populations. For instance, cognitive behavioral therapy is a well-known approach that has demonstrated effectiveness in many areas, such as post-traumatic stress disorder (Mendes et al. 2008), depression (Huguet et al. 2016), and insomnia (Trauer et al. 2015). At the same time, this approach has rarely been tested with low-literacy populations (Kuhada et al., 2011)

While these clinical outcomes may support measuring mental health status, the community instead focuses on the direct but long-term outcomes that they can observe as helpful for the individual and the community at the macro level. The community wants to create an ecosystem of community-driven, positive, and encouraging atmosphere for the children to grow in, regardless of their specific family or the societal and economic context that systemically hinders their positive growth.

Research shows the importance of being part of a community and participating in community-building activities. For example, community-led interventions can positively affect the mental health and emotional well-being of those who deliver and receive the services (Castillo et al. 2019). Such activities can increase a sense of belonging and social connectedness (Castillo et al. 2019). Furthermore, literature from the past 25 years indicates that appropriately matched mentors and youth can be effective in facilitating a range of positive developments and outcomes for many young people, including behavioral, social, health-related (e.g., emotional well-being), interpersonal, motivational, and academic outcomes (DuBois et al. 2011).

Our findings pointed to the community's need for a solid community-based mentorship program. Rhodes proposed that mentoring affects youth through three interrelated processes: (1) enhancing their social relationships and emotional well-being; (2) improving their cognitive skills through instruction and conversation; and (3) promoting positive identity development through meaningful connection to role models and advocates (Rhodes et al. 2006). In understanding when the mentor-mentee relationship is effective, little is known about the process by which matching characteristics influence the outcome of the match. Some data supports more enduring relationships and better outcomes when mentees and mentors have a voice and choice in selecting their partner (Rollin et al. 2003). The similarity of interests between mentor and mentee is another factor that has resulted in enhanced program outcomes as assessed by the length and quality of the relationship (Weiler, Boat, and Haddock 2019). Given the scattered evidence on how mentoring matches work, any sub-populations, especially with cultural sensitivity, will need additional research into what factors affect successful mentoring activities, especially for populations who lack evidence for important preferences.

Our findings uncovered what the community needs in selecting a mentor and what activities mentorship can support. The leaders have already been working hard to enable this ecosystem of village-driven support—trying to bring youth to after-school activities, connecting them with positive influences, and exposing them to educational environments. However, the leaders uniformly shared the lack of resources to scale these efforts that the community volunteers entirely drive.

The role of mobile technology for village-driven, the socio-ecological solution here, would be to connect people, expose them to positive environments, and engage stakeholders at all levels: youth, family (parents and guardians), staff of organizations involving youth, and community members and neighborhoods. Instead of approaching the gap with existing notions of mental health mobile health apps, the outcomes should focus on the factors that further sustain the community's ecosystem of social support and mentorship. The key theme of the support was connecting humans—connecting with people for positive influence. The technology solutions should not attempt to replace this social relationship but augment further connections that would otherwise have been difficult to achieve due to the limitations of physical space and the isolated nature of the pandemic. Youth will need engaging, fun, and creative ways to start conversations about their career, and interests, and share any challenges. Appropriate preventative help can be provided before the problem becomes more severe and difficult to remediate outcomes. Some concrete design requirements include, but are not limited to:

Recruit influential mentors with scalable and feasible solutions: The COVID-19 pandemic facilitated a wide adoption of mobile solutions to social interaction (e.g., mobile-based video conferencing tools, an app for voice-based communities), even among underprivileged communities (Al-Maroof et al.

2020; Clipper 2020; Finkelstein, Cha, and Wood 2012; Dey, Al-Karaghouli, and Muhammad 2020). Broad adoption of various asynchronous and synchronous social systems easily accessible through mobile phones provides opportunities for recruiting influential people to support the youth in creative ways. Examples of these high-impact people include celebrities, sports stars, peers, or former community members. These mentors can participate in the mentorship activities at various levels of engagement, from a recorded video to video-conferencing sessions or asynchronous chat sessions. For instance, celebrities can be available in an interactive system, such as chatbots, informing a celebrity's stories about overcoming adverse times. Youth can interact with this chatbot and ask questions, for instance.

Match mentors with youth based on user-informed algorithms: Technology can extract preferences from volunteers and youth in creative ways (e.g., have them write diaries, stories, or poems and use that to develop common interest points; or answer questions on interests and hobbies). Like dating apps, mentors and youth can state preferences for who they would like to be matched with, and the system will generate algorithms to find the best match. However, experts should closely monitor and moderate the process to ensure safety. It should also help facilitate communication between the mentor and youth and assist mentors with resources and training. The system should receive real-time user feedback, which can be immediately incorporated into the algorithms.

Foster location-based community-driven activities: Technology can facilitate online youth communities or a mix of community leaders and youth shaped by geographic neighborhoods. We should use theories on building online communities to build an interest-based community that would naturally evolve into neighborhood and inter-neighborhood activities that youth can enjoy. Effective promotion of accessible extracurricular activities based on location near the youth also will be helpful. Especially given the underprivileged population's lack of access to regular transportation, such location-based activities enabled by mobile solutions will be critical.

Promote immediate responsiveness: Technology should help youth immediately find solutions to any problems they feel stigmatized from sharing with others. If needed, the system could connect the youth with trained mentors or extracurricular activities that can address negative moments in real-time. For instance, youth can find peers to talk to who might have similar interests or mentors who built positive reputations by the peers for a talk to take aggression away in real-time. The technology should create immediate responsiveness to the requests, an essential part of the village-driven ecosystem supporting youth.

6. Conclusion

In this paper, we conducted interviews with community leaders advocating for underprivileged youth in a highly segregated city in the U.S. We identified village-

driven solutions as a sustainable, feasible solution to support youth at risk for mental health problems and exposure to community violence. We showed the unique outcomes the community was interested in, which vastly differ from existing mental health mobile health solutions. Furthermore, we highlighted the importance of using extracurricular activities to foster conversations among youth and mentors rather than framing the mentoring activities as mental health support. We also noted the importance of considering peers as mentors. Finally, we discussed implications for what socio-technical systems can do to fill the gap and what example systems might be helpful for youth in supporting and improving mental health.

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8. References

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