

“I was always at the library”: Teen Perspectives on Integrating Digital Mental Health Programs into Public Libraries

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Table of Contents

| | |
|---------------------------------|----------|
| Original Manuscript..... | 5 |
|---------------------------------|----------|

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Abstract

Background: Rising rates of anxiety among teens necessitate innovative approaches for implementing evidence-based mental health support. Public libraries, seen as safe spaces for patrons with marginalized identities offer free public services like broadband internet access, may serve as promising sites for implementation of digital mental health programs targeted to teens.

Objective: The purpose of this study is to examine how teens who attend their local public library experience anxiety, what support they are interested in receiving, and how digital mental health programs can meet their needs.

Methods: Teens who frequent the public library (n = 16, M age = 15.2) completed individual, semi-structured interviews designed to elicit recommendations for designing and implementing digital tools in libraries to improve teen mental health. Interview transcripts were coded inductively by multiple coders to synthesize key themes.

Results: Teens reported experiencing uncontrollability, unpredictability, and anger related to their anxiety, which they managed by using strategies such as guided breathing, distress tolerance, and social connection. They stressed the importance of context and anxiety severity in choosing anxiety management strategies when anxious. Teens underscored the centrality of the public library in their lives and their view of it as a safe space where they can easily access resources and connect with friends and trusted adults. When considering the design of a digital mental health program implemented into libraries, they suggested including personalization for different identities, gamification, and simple navigation. They also emphasized that their end goal was to use the skills learned in the digital mental health program “offline.”

Conclusions: Teens who frequent public libraries expressed interest in receiving digital tools via libraries to help them manage anxiety. The recommendations they provided will help inform future research on the adaptation and implementation of digital mental health programs for teens in public libraries.

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Original Manuscript

Title: “*I was always at the library*”: Teen Perspectives on Integrating Digital Mental Health Programs into Public Libraries

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Abstract

Background: Rising rates of anxiety among teens necessitate innovative approaches for implementing evidence-based mental health support. Public libraries, seen as safe spaces for patrons with marginalized identities offer free public services like broadband internet access, may

serve as promising sites for implementation of digital mental health programs targeted to teens.

Objectives: The purpose of this study is to examine how teens who attend their local public library experience anxiety, what support they are interested in receiving, and how digital mental health programs can meet their needs. **Methods:** Teens who frequent the public library (n = 16, M age = 15.2) completed individual, semi-structured interviews designed to elicit recommendations for designing and implementing digital tools in libraries to improve teen mental health. Interview transcripts were coded inductively by multiple coders to synthesize key themes. **Results:** Teens reported experiencing uncontrollability, unpredictability, and anger related to their anxiety, which they managed by using strategies such as guided breathing, distress tolerance, and social connection. They stressed the importance of context and anxiety severity in choosing anxiety management strategies when anxious. Teens underscored the centrality of the public library in their lives and their view of it as a safe space where they can easily access resources and connect with friends and trusted adults. When considering the design of a digital mental health program implemented into libraries, they suggested including personalization for different identities, gamification, and simple navigation. They also emphasized that their end goal was to use the skills learned in the digital mental health program “offline.” **Conclusions:** Teens who frequent public libraries expressed interest in receiving digital tools via libraries to help them manage anxiety. The recommendations they provided will help inform future research on the adaptation and implementation of digital mental health programs for teens in public libraries.

Keywords: public libraries; digital mental health; teens; anxiety; mental health; implementation; safe spaces

Introduction

Researchers, clinicians, and policymakers in the United States have declared a youth mental health crisis due to increasing rates of internalizing distress combined with limited access to mental health programs¹⁻³. The Centers for Disease Control and Prevention found that over one-third of youth in 2019 experienced persistent feelings of hopelessness, a transdiagnostic predictor of anxiety and depression^{4,5}. Anxiety is particularly common among youth, with rates increasing roughly 27% between 2016 and 2019⁶, and continuing to rise since the pandemic⁷. Prevention and treatment efforts for youth have the potential to reduce the likelihood that internalizing disorders will persist or worsen in adulthood⁸, but demand far exceeds the available supply of youth mental health

programs^{9,10}. Increasing the number of providers would not fully ameliorate the issue, as many youth face additional barriers such as high treatment costs, lack of transportation to clinics, and complex regulations regarding parental consent¹¹. Consequently, advocates call for researchers and clinicians to “*meet youth where they are*” by implementing mental health interventions in settings frequently used by youth¹²⁻¹⁴. In this paper, we focus on public libraries as a promising, yet understudied setting for delivering youth mental health programs, particularly programs targeting anxiety.

Many youth, especially those with marginalized identities, spend significant amounts of time in libraries¹⁵. Public libraries are a “third place,” where patrons can spend time without being expected to spend money^{16,17}. The commercialization of space, particularly in urban areas, has led to libraries being one of the few indoor spaces youth can inhabit for free without facing accusations of “*loitering*.” As a result, libraries have transitioned in recent years to become beacons of public services, offering health services, professional development classes, art workshops, and more¹⁸. An increasing number of libraries now offer teen-specific programming¹⁹⁻²¹. Libraries are also seen as a “safe space” for teens with marginalized identities, including historically underserved racial and ethnic (HURE) teens, teens who identify as lesbian, gay, bisexual, transgender, queer, intersex, and asexual (LGBTQIA+), teens living in lower-resourced and disinvested areas, and teens living with mental health conditions^{15,16,18,22-27}. Unsurprisingly, the youth mental health crisis is visible in public libraries; librarians report wanting more mental health support for teen patrons that is accessible, on-demand, and that requires little additional training for already overtaxed staff¹⁵. Accordingly, interventions that leverage digital technologies, or Digital Mental Health (DMH) programs, may be well-suited for use in libraries.

DMH programs are an ideal way to reach youth for several reasons. Youth commonly use the internet for mental health support and psychoeducation²⁸. DMH programs can be implemented in virtually any location at relatively low cost. Libraries offer free broadband/internet and computer access to all patrons, allowing DMH programs to be easily accessed in this setting. Self-administered DMH programs provide availability on-demand when youth need support, eliminating the need to involve a facilitator or caregiver, also satisfying needs of youth for independence and autonomy¹¹. Despite the promise of DMH programs, many face problems with user engagement and sustainment by organizations outside of the research context. This may reflect, in part, that DMH programs are typically designed for research contexts rather than for implementation in real world settings.

Across Community-Based Participatory Research (CBPR), Human-Centered Design (HCD), and Implementation Research (IR) frameworks, the first step in creating interventions that are engaging and sustainable is to understand and center the needs, goals, and preferences of end-users, their communities, and eventual deployment settings^{29,30}. The frameworks improve the likelihood that DMH programs will have a meaningful and sustained impact beyond research. Therefore, the purpose of this study is to use CBPR, HCD, and IR methods to understand the lived experiences of teen library patrons related to anxiety, elicit recommendations on what teen patrons would like to see in a DMH program for anxiety, and understand contextual factors of the public library as a deployment setting. Our goal is to use this information to inform the adaptation of DMH programs that can be implemented into public libraries to meet youth where they already are and help alleviate the youth mental health crisis¹⁵.

Methods

Setting and Participants

Building on our previous needs assessment with library workers,¹⁵ this study examines teen patrons' needs and preferences related to the implementation of a DMH program for anxiety within a public library that serves communities in the west side and west of Chicago, Illinois. We will use “teens” or “teen patrons” to describe the youth who use the library frequently, as this is the term the library community and teens use. The library serves community members from diverse racial and

economic backgrounds, prioritizing the needs of marginalized patrons and those most affected by health inequities in their programming and what they offer the community. We interviewed sixteen teens aged 12-18 years ($M = 15.2$ years) who use the library frequently at the time of the interviews. In interviews, teens reported diverse experiences with mental health treatment and resources – some described experiences with formal therapy, others used smartphone apps for mental health, some had experiences with both, and others had no prior experience engaging with these resources. Of these teen patrons ($n = 16$), 56% identified as female, 31% as male, and 13% as non-binary; and 44% identified as white, 25% as Black or African American, 13% as Hispanic or Latino, 13% with two or more races, and 6% as Chinese American.

Procedures

All participants were recruited from the library between 2020 and 2021. The library's Teen Services staff coordinated with the research team to post study flyers in the library common areas, promote in the library's Teen Services programming, post in the library's newsletter, and receive referrals from other teen patrons. Sixteen teen patrons participated in a 1-hour, individual needs assessment interview with members of the research study team. All research protocols were approved by the Northwestern University Institutional Review Board before study enrollment. Both the interested teen and their caregiver provided permission to take part in the study.

Due to COVID-19 restrictions, all interviews were conducted over the phone or using audio-only Zoom calls. The semi-structured interviews covered how participants experience and manage anxiety, current use of technology, and current/future library programming focused on teen mental health (see Supplemental File 1: Interview Guide). Participants were also asked about what resources or features within a digital program may help them better manage anxiety. All interviews were audio-recorded, transcribed, and uploaded to Dedoose³¹ for qualitative data analysis. If teens expressed thoughts of suicide or self-harm behaviors during the interview, a pre-determined safety procedure was in place to assess risk of imminent harm and take appropriate action (including safety planning for those deemed low risk and connecting the teen with emergency services for those at high risk). While some teens expressed experiencing self-harm thoughts in the past, no teen expressed current suicide or self-harm thoughts or behaviors, so the safety protocol was not enacted.

Statistical Analysis

Three (AAK; MH; CW) researchers conducted an inductive qualitative analysis of the transcribed interviews. These coders all had training in qualitative analysis, all had master's degrees and one also had a doctoral degree. Coders used an iterative approach to create and refine the codebook. First, coders read and annotated three interview transcripts each, labeling relevant words, phrases, or sections with codes. Then, coders met to discuss and conceptualize the annotations, to identify highly salient codes, and to group codes into broader categories. The coders met regularly to discuss application of codes, resolve discrepancies in code application, and refine the codebook accordingly. Next, coders were randomly assigned to apply the updated codebook to five or six additional interview transcripts each, after which they met to resolve discrepancies and further refine the codebook by removing codes that were underutilized or not present within the transcripts. After these iterations, the final codebook was applied to all transcripts, encompassing the following key themes: 1) public libraries and mental health, 2) teen anxiety experiences and management, and 3) DMH program design for teens and implementation considerations. The summary of key themes is depicted in Table 1.

Table 1. Summary of Key Findings.

| Themes | | Key Findings |
|------------------|--|--|
| Public Libraries | | • Most teens liked the centrality and easy |

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| and Mental Health | | <p>access of the library and that it served as a community access point with many connections and resources.</p> <ul style="list-style-type: none"> • Library provides teens easy access to reliable mental health resources to connect with other teens on this subject. • Teens from HURE backgrounds and marginalized identities (e.g., LGBTQIA+ teens; shared experiences around mental health; shared experiences related to living in lower-resourced and disinvested areas) perceived libraries as safe spaces. |
| Teen Lived Experiences of Anxiety | Uncontrollability | <ul style="list-style-type: none"> • Teens identified catastrophizing, overthinking, and a lack of control over thoughts, emotions, and actions as feelings of anxiousness. • For some, anxiety led to feelings of sadness, depression, and thoughts of self-harm. • The cyclical pattern resulting from the co-occurrence of anxiety and depression severely impacts teens' drive and motivation, leading to detriments on their academic and social lives. • The uncontrollability of anxiety led teens to feel burnt out and tired with senses of dissociation and derealization from reality – such as zoning out, operating on autopilot, and shutting down. |
| | Unpredictability | <ul style="list-style-type: none"> • New experiences are a major source of unpredictability causing anxiety for teens. • Experiencing an unpredictable situation prompted urges to escape the situation or avoid future anxiety-provoking situations (like new experiences) |
| | Anger | <ul style="list-style-type: none"> • Anxiety can lead to teens getting easily frustrated, having a short fuse, and feeling very angry. • Sources of anger ranged from self-irritation over mistakes to frustration and bitterness towards personal anxiety. • External annoyance and bitterness usually ended in arguments with family and friends, amplifying feelings of anxiety and feelings of isolation. |
| How Teens Manage Anxiety | Breathing and progressive muscle relaxation | <ul style="list-style-type: none"> • Breathing exercises helped teens manage anxiety in-the-moment. • Teens used apps with guided breathing, in-the-moment breathing exercises prompted by devices tracking physical changes (like an |

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| | | increased heartrate), and progressive muscle relaxation to help regulate high anxiety levels. |
| | Grounding and distress tolerance | <ul style="list-style-type: none"> • Grounding techniques were used to disrupt uncomfortable thoughts and feelings, allowing levels of anxiety to return to more manageable conditions. • One method is the 5-4-3-2-1 technique, where one names things related to each sense. Paired with breathing exercises, it calmed teens' minds and made symptoms more manageable. • Another anxiety-managing technique utilized the sense of taste, namely salty and sour tastes. |
| | Social Connection | <ul style="list-style-type: none"> • All teens spoke to the importance of social connection in dealing with their anxiety. • Engaging in various activities with loved ones, namely talking to and connecting with family and friends through conversation, helped with easing anxiety. • Teens with anxiety felt validated and less isolated when sharing experiences with other teens or mental health professionals. • Teens suggested an anonymous social component in a DMH program serving as a safe space to for them share experiences and advice with one another. • In addition, teens wanted access to a mental health professional to provide professional advice in a safe space. |
| | Journaling and mood tracking | <ul style="list-style-type: none"> • Teens used journaling and mood tracking to relieve and better understand their anxiety. • Teens used journaling to work through and release their anxiety, helping them gain confidence and motivation to address stressors. • Teens appreciated when mood tracking was used to portray patterns, such as relationships between their anxiety and daily activities. They liked this because it emphasized behaviors they could change or control that led to effects in their mood. • Some teens desired a pop-up mood tracker when first opening the program that could tailor mood management techniques to their inputted responses (e.g., high anxiety reported, program directs teen to in-the-moment anxiety relief techniques). |

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| | Psychoeducation and crisis resources | <ul style="list-style-type: none"> • Teens found psychoeducation and crisis resources to be useful in contextualizing and learning patterns and origins of their anxiety. • The importance for warm handoffs and easy access to reliable resources when in crisis was emphasized by teens. |
| | Strategy choice and context | <ul style="list-style-type: none"> • Teens wanted a wide subset of anxiety-mitigating techniques as different strategies work better/worse for different individuals. • Having variety will allow for teens to experiment and figure out what works best for them. • Teens noted that context and anxiety levels played important roles in choosing a technique. • Some strategies are better suited for high anxiety moments (physical activity), and other for low anxiety moments (listening to music). • The main goal of the resources should be to allow practicing skills to eventually be used without technological assistance when in-the-moment anxiety occurs. |
| Desired DMHI Features | Personalization | <ul style="list-style-type: none"> • Teens found importance in both personalizing and receiving tailored information from apps. • Teens liked app algorithms that curated/suggested content based on feedback, usage, and data entry, as well as reports on patterns. • Emphasized need of understanding who the program is targeting and providing resources specific to that population. |
| | Aesthetics and layout | <ul style="list-style-type: none"> • Teens preferred simple and concise app layouts that made navigation of the resources easy. • Apps should also be low commitment, as longer materials were hard to keep up with and became overwhelming. • Content should be delivered in teen-friendly language to keep the program more relatable and up to date |
| | Gamification and animations | <ul style="list-style-type: none"> • Videos, animations/graphics, and mini games were the best modalities for information acquisition and engagement for teens. • Content would be even more compelling if they featured teen celebrities or popular social media influencers. |

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| | | <ul style="list-style-type: none"> Teens liked interactive digital features where they could touch the screen while practicing skills. |
| | Privacy and accessibility | <ul style="list-style-type: none"> Protecting teens' privacy was a top priority – teens worried about parental access and surveillance of their phones, concerning their anonymity and privacy with their mental health issues. Teens noted limited broadband access and restricted phone access by parents/caregivers. Paid subscriptions, an overt mental health focus in case of onlookers, and phone limits (low storage, inconsistent broadband access, etc.) were access barriers to resources on apps. |

Results

Public libraries and Teen Mental Health

Teens discussed resources they enjoyed at the library, the impact the library has had on them, and their opinion on how libraries should support teen mental health. Most teens talked about the *centrality and easy access of the library*. P13 stated, *“Because of where I get off at the train on the metro, I get off right across the street from the library so I can go to the library and just chill there.”* Other teens described the library as a *community access point*. They noted that the library has many connections throughout the community and serves as a hub for resources.

When reflecting on the role public libraries should have in teen mental health, all teens agreed the library is a great place for teens to access *reliable mental health resources* and to *connect with other teens* about mental health via library programming. While some teens had specific ideas for new mental health offerings, such as creating a website or smartphone application to connect teens to resources to manage their mental health, they also spoke about resources the library already had in place. For example, P8 described:

“like obviously books are a resource – and kind of just having that level of flexibility whether it’s mentorship or whether it’s grounding yourself in a story or whether it’s a pamphlet... having those different opportunities for how people have different or how different people interact with their own mental health and coping mechanisms.”

Teens emphasized how the library was a *safe space* for them because of the *trusted adults* that worked there, friends they made at the library, and the library’s intentional teen programming. P12 summarized this nicely:

“I was always at the library, and I was always doing these groups and these fun summer clubs. I had a lot of friends from the library.... I do think that the library is a great resource place. There’s a lot of good, trusted adults. It’s quiet. And sometimes in a hectic household or a hectic friend fight, you might just wanna go to a place and feel welcomed and feel quiet and feel calm.”

Another teen, P2, underscored their admiration for the trusted adults available via their teen programming at the library, *“Even though you’re talking to an adult, you’re just talking to people you know that care about you.”*

The library was perceived as a safe space in particular by teens from HURE and LGBTQIA+ backgrounds, as well as those teens most experiencing inequities. Several of these teens mentioned that a social justice program within the library led by a local activist helped to create a safe space in

the library. In addition to weekly meetings for this program, teens researched and led townhall meetings educating the public on issues like climate change's disproportionate effect on lower resourced communities. When asking P3 what they liked about this program, they responded:

“for well me as like you know like a black, queer individual in every sense of the word, obviously because we [the group] love each other and stuff it's great, but it's also like I can just talk about this stuff ... about stuff that I usually wouldn't talk to normal people you know your average Joe or whatever about – talking about the oppression and the prison system and mass incarceration and all that stuff ... But it definitely just helps so I can get all of those problems or frustrations out and also just for mental health just seeing these people [in the group]... It's just like we're a family and that's really nice.”

As can be seen in this quote, HURE teens found solace in the shared experiences and similar backgrounds within this group. Another teen, P13, described, *“It's just nice to have a space where I can be Black and annoyed and then there's other people who get it.”* Teens in this group also emphasized their appreciation for the trusted adult who led the group, highlighting that the local activist empowered them and elevated their voices, challenging them to think critically while researching and reporting on current issues.

Teens' Lived Experiences of Anxiety

Teens shared about their experiences with anxiety, which impacted them in terms of physical sensations (e.g., racing heart, difficulties breathing, and feeling shaky/flushed) and socially (e.g., easily embarrassed in public, worried about disappointing or being judged/rejected by others). They also shared experiences less addressed in the teen anxiety literature; specifically, they spoke to their feelings of uncontrollability and unpredictability and the role of anger in their anxiety. As there is already a robust literature on physical sensations and social anxiety, we focus on these less-explored aspects of teens' experiences of anxiety.

Uncontrollability

Teens spoke to *catastrophizing and overthinking* as part of their anxiety as well as feeling like their thoughts, emotions, and actions were out of their control. For example, P15 described, *“My thought train is just going a million miles an hour. It's like this thought leads to this other thought and it turns into a big fireball of negative thoughts... like out of control”* [P15]. In addition to feeling a lack of control, some teens' anxiety led to *feelings of sadness, depression, and thoughts of self-harm*. P13 stated,

“For me, it's usually like the anxiety comes and then the sadness once I cool down. So, I guess comparing it to a storm, it's like the anxiety is the hurricane and then the sadness is kind of like the eye of the storm and then the anxiety comes back and then there's a hurricane that follows it.”

This teen highlighted the cyclical nature of anxiety and depression, an experience shared by many others. Teens went on to describe how the co-occurrence of anxiety and depression had a severe impact on their motivation, ultimately taking a toll on their grades and relationships with friends and family.

Lastly, the uncontrollability of anxiety led some teens to feel burnt out and tired, causing them to zone out, operate on autopilot, and shut down. They described feeling a sense of *dissociation and derealization* because of their uncontrollable anxiety. P4 describes *“dissociating and not feeling like I'm really present. Just kind of I become less aware of my surroundings.”* They went on to describe an escalation in which they felt completely detached from reality.

Unpredictability

In addition to the uncontrollability of their anxiety, several teens spoke to the unpredictable nature of their anxiety, especially when it came to new experiences. For example, P7 explained:

“If I go somewhere new, I think like, ‘Where is everything?’ because I don’t know where anything is and then like, ‘What’s gonna happen? What am I gonna do? What are people gonna be like? Are people gonna judge me?’”

Teens commonly described that experiencing an unpredictable situation led to urges to *escape* the situation or to *avoid* future anxiety-provoking situations, such as new experiences. P9 describes their reaction to new social situations, *“I feel like people are staring at me. And all I wanna do is just hide usually. So, I try to get out of the situation, like wherever I am in public.”*

Anger. Several teens described getting easily frustrated, having a short fuse, and feeling very angry when anxious. Some internalized their anger, becoming irritated at themselves for making a mistake, or experiencing frustration and bitterness towards their own anxiety and anxiety-provoking situations. Other teens described feeling annoyed and bitter externally, like they *“needed to go punch something [P16]”*. This usually ended in arguments with family and friends, adding to their anxiety and feelings of isolation.

Teen Anxiety Management Strategies

Teens described using multiple strategies to manage their anxiety that included internally focused strategies for self-management as well as externally-focused strategies for connecting with others and seeking resources. We describe teens’ experiences below to inform future interventions that can promote and reinforce strategies that teens already feel comfortable using and that are already integrated into their daily lives. These methods of coping are well aligned with evidence-based strategies.

Breathing and Progressive Muscle Relaxation

Most teens mentioned that breathing exercises helped them manage anxiety in-the-moment. For example, P7 described using breathing exercises while having catastrophic and overwhelming thoughts, *“Because I focus on my breathing instead of my thoughts. It kind of clears my mind too.”* Teens also described using apps with *guided breathing exercises* (e.g., facilitating box breathing and deep breathing), alongside interactive visualizations. P6 described, *“I really like the ones that are like circles that tell you to hold it in – that says to breathe in and hold it, then breathe out and hold it (P6).”* Other teens enjoyed apps that used inputs from other devices, such as smartwatches or exercise wristbands, to trigger breathing exercises when their heart rate increased. Other teens found utility in using breathing exercises as a supplemental strategy that could help once they had regulated their high anxiety levels using other strategies described in this section. Another anxiety-reducing technique teens reported using in apps was *progressive muscle relaxation*. When describing a smartphone app that included this technique, P7 stated,

“My favorite is where you tighten your muscles, which is like you ball your fists up and then relax them and stuff... I just kind of like it because it’s like you have all your stress and all your feelings and then you just let them go”.

Grounding and Distress Tolerance

Several teens spoke to grounding and distress tolerance techniques, which were used to disrupt uncomfortable thoughts and feelings and then return to a more manageable level of anxiety. Some mentioned using the 5-4-3-2-1 technique when at their highest levels of anxiety, or as P7 called it *“the five senses thingy”*, where they named things related to each sense (e.g., name five things they saw, four things they felt, etc.). When paired with breathing exercises this technique made their anxiety manageable. Another teen, P6, described a unique technique:

“When I feel really anxious, what I do is put salt on my tongue. So, that kinda just it distracts me from everything that I’m thinking about... It just disconnects me from reality for a bit because of the strong taste of salt messes up everything else that I was thinking about.”

This teen mentioned doing the same exercise, and achieving the same results, with sour tasting things

like lemons, limes, or vinegar.

Social Connection

All teens spoke to the importance of social connection in dealing with their anxiety, even if social contexts brought on anxiety. P8 described this phenomenon, *“As much as I do have social anxiety, I’m a very social person.”* The activities with friends and family that helped ease their anxiety ranged from low-key, in-person activities (e.g., watching/listening to movies and music together) to virtual activities (e.g., where teens would play video games together online). The simple act of talking to, and connecting with, friends and loved ones was the most mentioned social activity that helped in easing anxiety, with teens emphasizing how these types of *“conversations are really key in those [high-anxiety] moments”* (P2). P8 described how conversations like this helped:

“whether it’s just completely rambling you know like distracting me – or guiding me through breathing exercises or going on a walk with me and make sure I keep moving and that I’m paying attention to my surroundings like, “Oh, do you see that over there?” and that kind of thing and just helping to ground me and stuff.”

Teens were asked to brainstorm how a DMH program could provide social connection to help with anxiety. Teens reflected that they felt validated and less isolated when reading about other teens’ experiences of anxiety and how they dealt with it. Accordingly, most teens suggested including an anonymous social component within a DMH program that would serve as *“a safe space to talk to each other and see what people are going through (P5)”*. In addition to these *shared experiences and advice*, some teens wanted connection to a mental health professional and/or monitors to provide professional advice while also keeping it a safe space. P8 spoke to the benefits of this kind of platform, *“being able to ground yourself in other people’s experiences so that you can ground yourself in your own and feel more validated or feel making anxiety more approachable.”*

Journaling and Mood Tracking

Teens shared how journaling and mood tracking helped them alleviate and/or better understand their anxiety. P3 describes how they used journaling to work through their anxiety, *“After I’m done being upset in the moment, I’ll just write about that moment and it just kind of just helps me release those emotions – get them down so I remember them, remember what happened.”* This cathartic nature of journaling was shared by most teens who used journaling as an anxiety management strategy. P14 had a unique technique, where they would create characters and storylines based on a hardship or anxious situation they were experiencing. This teen garnered confidence and motivation to address stressors through these stories. P14 describes how their story creation helps:

“Yeah, it definitely takes me out of the moment and then it also it just feels like if I can beat this big milestone and do that and achieve that and then have it, homework’s nothing. I can finish that homework assignment because I can do this. I can do this. I’m more powerful than this homework. I will squash it, you know? Like a bug... It’s just a confidence thing.”

Other teens saw value in reviewing patterns in their mood tracking data, such as relationships between their anxiety and daily activities. P4 described, *“it’s nice to see a daily tracker so you can see the bigger trend of what causes your stress and what periods and times you’re more stressed.”* Teens desired a mood tracker that pops up when first opening the program so that their answer(s) could tailor their interaction with the program. For example, if they entered a high anxiety rating, the program might direct the teen to in-the-moment anxiety relief techniques.

Psychoeducation and Crisis Resources

Several teens described the benefits of including psychoeducation and crisis resources in a DMH program embedded within the library. Teens found psychoeducation helpful in contextualizing and learning patterns and origins of their anxiety. P1 expanded on their idea for integrating psychoeducation and resources in a DMH program, *“I think it would be helpful to have a resources*

page ... articles on anxiety, quick advice, I guess, and then maybe also a hotline page.” Teens also mentioned the importance of warm handoffs to reliable resources and the need for easy access to these resources when in crisis. For example, P16 suggested the future program should, *“definitely start off with, definitely a phone number to a social worker that if someone is feeling anxious, or they wanna hurt themselves, you can talk to them.”*

Strategy Choice and Context

Overall, teens wanted a variety of anxiety-mitigating strategies to choose from, as different strategies could work better/worse for different teens and as variety will allow them to experiment to find what works best for them. Context and anxiety level played important roles in choosing a technique. For example, some teens described that they typically have their phones with them in public and will use social media or other apps to deal with their stress in the moment. P7 describes *“It depends on where I am, but if I’m at home I’ll play my guitar, listen to music, or I’ll do meditation sometimes and sometimes I’ll draw... But if I’m in a public place, then I’ll do deep breathing.”* Other teens expressed that their approach depended on how anxious they were, with some strategies (e.g., physical activity) being better suited for high anxiety moments and others (e.g., psychoeducation; listening to music) were better suited for lower anxiety moments. Regardless of the coping skill, or how it was taught, the consensus from teens was that the main goal should be practicing skills to then use them without technological assistance when in-the-moment anxiety occurs. One described, *“it’s not just about the technology or about the app”* (P8). Most teens appreciated the supportive technologies they had previously used that helped them practice exercises, which in turn made it easier to use the accrued skills outside the app/in real-life.

Desired DMH Program Features

In addition to specific anxiety management strategies, teens also discussed the top features they would like in a DMH program embedded within the library. These desired features fell under 4 broad themes: Personalization, aesthetics/layout, gamification/animations, as well as privacy/accessibility.

Personalization

Teens discussed the importance of being able to both personalize and receive tailored information from programs. For example, P15 suggests,

“you know how you can type something into WebMD and it will show what the problem is and also how to fix it. I think that’s what this app should look like. If you have anxiety over a bad grade, you can do like, “What can I do to overcome my anxiety about that or stress?”

As this example suggests, teens liked when apps used algorithms to curate and suggest tailored content based on their feedback, usage, and entry of data into that app. Teens also appreciated reports on their particular use patterns (e.g., features most used) and shortcuts to view this data. Additionally, it was important that the program offered resources specific to the population it was designed for. For example, P13 described:

“One thing that I notice a lot with resources where people put resources for like, “Did you know about this and blah, blah, blah?” I’d be going through it, and it would be like, “This is clearly meant to educate white people”.

Several HURE teens underscored that current resources were catered for a small group of people, white teens in particular, and did not reflect them or their mental health needs.

Aesthetics and Layout

Many teens preferred simple digital program layouts that were easy to navigate. They described being overwhelmed if the home screen of the program had too many options. For example, P11 said they did not want:

“a lot of folders or that you have to click a lot of things to get to something. I think it should be the important things, and then from there it can branch into more specific ways to cope with types of stress or recommendations or things like that.”

Other teens emphasized that apps should be low commitment. Apps with higher commitment and longer materials were difficult to keep up with and quickly became overwhelming. Further, teens shared that it would be important to have regularly updated content in teen-friendly language. P8 said, *“teens can be turned off by aesthetics that just feel kind of like dated or they feel like they were made by people much older than them.”*

Gamification and Animations

Several teens underscored that the best modalities for information acquisition and engagement were videos, animations/graphics, and mini games. P5 said:

“like a video lesson or something that the user could interact with or participate along with because there are many resources out there for a number of things... words don't help as much as seeing the person or listening.”

They went on to describe that using teen actors in videos could become cheesy, but videos could be compelling if they featured teen celebrities or popular social media influencers. Teens also enjoyed interactive smartphone or tablet features where they could touch the screen while practicing skills. Teens gave examples that ranged from using the notification vibrations on the phone to guide deep breathing exercises, to dragging their finger across the screen until an image is revealed.

Privacy and Accessibility

Protecting the teens' privacy was among the top priorities. P6 emphasized *“Making sure that my information's safe and only to me. It's not shared with anyone else, especially, random people.”* Other teens expressed worry around their parents' access and surveillance of their smartphones and potentially finding out they were struggling with mental health issues. P16, for example, stated:

“It's just my parents, every week, they checked my phone. And if they saw I was searching, “How to overcome anxiety,” I wouldn't want them to make me the center of attention. And make them drop everything that they're doing”.

Some teens had their smartphone use restricted by caregivers or school rules. Policies ranged from not using smartphones during school hours to caregivers taking away teens' phones as punishment (e.g., when teens said *“something bad”*) or at specific times (e.g., cannot use anything other than the music application on their smartphone after 8pm on weeknights). Teens were also concerned about paid subscriptions, onlookers being able to see that the program was for mental health, and smartphone-specific barriers (e.g., low battery, storage, and data of phone; inconsistent access to broadband). Many teens spoke to liking a particular app, such a mood tracking app, but reported that they stopped using it because the free version limited their use and they had to use their cellular data, further limiting their use.

Discussion

Principle Results

On average, it takes 17 years³² for research evidence to reach real-world settings and change practice. These statistics have not significantly changed in decades, highlighting the need for innovative solutions to address this research-practice gap. Partnering with public libraries to design and implement evidence-based programs holds promise to help bridge this gap. Within the last decade, the American Library Association has shifted their priorities to focus more on mental health through actions like employing social workers within public libraries and providing patrons with mental health programs^{25,26,33}. Results from the needs assessment interviews with teens who frequent the library provided critical information on their perspectives of the library's function and

programming. Teens underscored the centrality of, and thus easy access to, their public library. They also referred to their library as a hub for connecting patrons to community resources and services. This is consistent with our prior research in which library workers identified a main function of the library to be a conduit to guide patrons to desired resources¹⁵.

Teens talked about the teen-specific programming they attended at their library, indicating this is where they met a lot of their friends and fostered relationships with the trusted adults leading those programs. These factors led teens to view the library as a “safe space,” which is consistent with several other reports by library workers and researchers underscoring that communities see public libraries as safe spaces^{27,33}. HURE teens and teens with marginalized identities (e.g., LGBTQIA+ teens; teens living in lower-resourced and disinvested areas; teens living with mental health conditions) found belongingness, companionship, and solidarity in library programming that spoke to different aspects of their identity. Given there are more unsafe spaces for these groups due to marginalization, it is critically important to invest in and maintain safe spaces that bring folks with shared experiences and similar backgrounds together and that celebrate the different aspects of their identities, especially within the teen population.

Teens shared the nuanced experiences they had around their anxiety. They spoke to the uncontrollable and unpredictable feelings associated with their anxiety, which led some teens to catastrophize, feel depressed, or have thoughts of self-harm, which then cyclically fed back into their anxiety. Other teens described dissociating to cope with adverse feelings or feeling the need to avoid or flee anxiety-provoking situations. The uncontrollable and unpredictable nature of teen anxiety has not been frequently described in the literature and is worthy of future research. More research is needed to better understand these two variables and their potential role as risk or maintenance factors, which could then be used as targets for DMH programs, for anxiety and other mental health conditions in teens^{34–38}.

Other teens talked about their anger in relation to their anxiety. Some described the internal aspects of anger that may be expressed as frustration towards their own anxiety or frustration about making mistakes. Others described the external aspects of anger as experiencing frustrations that often led to conflicts with friends and loved ones. This finding is aligned with extant literature showing that anxiety and depression commonly manifest as anger and irritability in youth^{4,34–39}. Additionally, there is evidence in the literature suggesting anger can be a prominent symptom co-occurring with several internalizing disorders⁴⁰. Stress and anger as a mood symptom may be connected to experiences of racism among youth⁴⁰. Similar to other studies^{40–42}, our study shows that anger and racism-based stress plays a role in the emotions of teens who may feel disenfranchised by the current status quo in society. Given most of the teens in this study identified as HURE or multi-racial, along with the literature suggesting anger is a known response to stress related to structural racism and discrimination, additional research is needed to better understand the relationship between anger (as a valid stress response to racism) and anxiety among teens who are Black, Indigenous, and/or hold other racial identities. While the most potent intervention would be to address the ultimate problem of structural racism and discrimination, interventions that provide support and validation to HURE teens in the face of systemic racism and oppression are critical. For example, these programs could provide teens with acknowledgement about factors such as privilege, oppression, discrimination, and ways to curate social safety as well as coping strategies to alleviate the mood symptoms caused by racism^{37,43,44}.

Teens described a variety of coping strategies (e.g., guided breathing, muscle relaxation, social connection, distress tolerance; mood and behavior tracking) that they used to help feel more in control of their anxiety, lessen their symptoms, increase knowledge around anxiety patterns, and increase their motivation to approach, rather than avoid anxiety-provoking experiences. For example,

teens gained knowledge around their anxiety when mood tracking was used to portray patterns, such as relationships between their anxiety and daily activities. They liked this because it emphasized behaviors they could change or control that led to observable effects in their mood. When applied to the design of a DMH program for teens, it may be beneficial to include some of these strategies as on-demand activities. Leveraging haptic and touchscreen features to actively engage teens in these strategies, especially strategies they are familiar with and already integrated into their daily lives, may also be worthwhile^{45,46}.

In terms of overall goals of a DMH program, teens wanted to learn a variety of anxiety-management strategies and to ultimately be able to choose the most effective strategy in particular contexts (e.g., exercise for high-anxiety moments, listening to music for low-anxiety moments; playing guitar at home, deep breathing exercises in public). Interestingly, while they wanted the DMH program to facilitate learning of skills, they ultimately wanted to be able to practice these skills without technological assistance when in-the-moment anxiety occurs. This use goal is consistent with other reports from the DMH literature; for example, Latino and Latina⁴⁷ youth indicated that their main goals of using DMH programs were to practice skills within the program, and then ultimately be able to use the learned skills “offline.” If teens are using DMH programs with these goals in mind, this could have implications for how we interpret engagement metrics with teen DMH programs⁴⁸. Teens’ low, sporadic, and/or drop-off in engagement with a DMH program may not necessarily reflect a poor outcome or poor retention; rather, it could be that teens used the program as much as they needed to incorporate the skills learned into their daily lives. Mixed-methods research is needed to better understand the patterns of teen engagement with DMH programs, how those patterns map on to teens’ actual use of skills accrued in real-life, and ultimately which patterns are most helpful in mental health management.

Teens shared their feedback on additional features they would like to see in a DMH program for anxiety. It was important to teens that the aesthetics and function of the DMH program had the characteristics of clean design and easy navigation. Teens also stressed the importance of protecting their privacy, making the program accessible (e.g., free; aligned with caregiver and school restrictions on devices), and designing discreet branding; all of which are consistent with several previous reports describing teens’ or therapists’ design recommendations regarding a teen DMH program^{49,50}. Additionally, teens reflected on the characteristics that increased their engagement in an online program, which included gamification, videos/animations, and buy-in from teen celebrities or social media influencers. Other pediatric fields have found that partnering with teen social media influencers to be a helpful strategy in increasing knowledge, and even outcomes, of healthcare delivery⁵¹. In addition to the other features mentioned, partnering with popular teen social media influencers who are known for speaking about their mental health on social media outlets may be a promising strategy for increasing awareness, and potentially intervention effectiveness, of teen DMH programs. However, as teen culture and preferences rapidly and constantly shift (particularly regarding social media content), DMH developers must balance ensuring relevance and timeliness of interventions while ensuring content still addresses theoretical mechanisms of change.

As for the additional feature of personalization, HURE teens underscored that the available teen mental health resources are white-centric, and they did not feel that *their* lived experiences were represented in current mental health resources. This suggests we as scientists and designers need to intentionally improve inclusion of populations who are underrepresented in teen mental health research, in particular HURE and LGBTQIA+ teens, as well as teens from lower-resourced and disinvested areas (e.g.,⁵³⁻⁶²). Teens advised that developers get to know the audience for the program and work with that population to personalize it to their needs and preferences. This feedback raises an important design question: how do we equitably design DMH programs in community spaces that

serve people with different identities as well as with different mental health needs and preferences? There are calls in the literature to move away from a “*one-size-fits-all*” model when developing DMH services^{63–66}; however, more discussion and research are needed to better understand the best practices of DMH service development that is intended to meet the mental health needs and preferences of heterogeneous audiences (e.g., one program encompassing tailored versions for subgroups within the heterogeneous audience; different programs for different subpopulations)⁶⁷.

Limitations

We would be remiss to not include a discussion on study limitations. The public library we worked with was well-resourced with existing social services (e.g., employed social workers; mental health and teen services budget; free mental health assessments). Accordingly, results from this study may not be able to generalize to other public libraries that have different infrastructures and resources. More research is needed to better understand the teen resources offered by different public libraries and their branches across the United States. Further, we interviewed teen participants residing in a large, socially and politically progressive, and racially and ethnically diverse urban area. HURE teens living in areas with different sociopolitical environments and sociodemographic compositions may have different perspectives on whether and how they would like to engage in library-based DMH services.

Conclusions

Disseminating and implementing DMH programs into public libraries is a promising strategy to increase access to care among teens in need of support for their anxiety. By understanding teens’ perspectives and designing tools with their needs centered, the promise of this approach may be realized. To the best of our knowledge, this is the first report elevating teen voices and opinions on implementing DMH programs into public libraries. Future research is now needed to test whether DMH programs adapted in accordance with the suggestions presented in this paper is acceptable, useful, and sustainable.

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**Conflicts of Interest**

David C. Mohr, PhD has accepted honoraria and consulting fees from Apple, Inc., Otsuka Pharmaceuticals, Pear Therapeutics, and the One Mind Foundation, royalties from Oxford Press, and has an ownership interest in Adaptive Health, Inc. RS and LJ are employed by Oak Park Public Library. None of the other authors have conflicts to declare.

**Abbreviations**

HURE: Historically Underserved Racial and Ethnic

LGBTQIA +: Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, and Asexual

DMH: Digital Mental Health

CBPR: Community-Based Participatory Research

HCD: Human-Centered Design

IR: Implementation Research



Supplemental Materials

Design Opportunities for Mental Health Technologies for Youth Semi-Structured One-on-One Telephone Interview

Defining and Managing Anxiety

People can have very different experiences when they feel anxious, stressed, or nervous. Some feel really uncomfortable, others feel their anxiety is like a really heavy weight on their shoulders. Some worry a lot about one specific thing, while others worry about more general things that could happen in the future. Some feel it in their bodies, they get sweaty and can't catch their breath, or their heart starts to beat really fast. Others experience other kinds of emotions along with their anxiety, like feeling embarrassed or self-conscious in front of others. Some experience difficulties at school and with their friends and families, and most feel a combination of all of these things.

I am interested in how you experience anxiety and stress, and then what you usually do when feeling really anxious or stressed to work through those feelings. Please think of day in which you felt really anxious or stressed. If this is hard to remember, imagine the most recent time when you were feeling stressed or anxious.

Can you tell me about that day?

What was going on around you at the time?

What were you most stressed or worried about?

What kinds of thoughts, emotions, and bodily feelings did you have when you were stressed?

Which of these thoughts, feelings, or experiences were the worst and/or the hardest on you?

What is the biggest challenge in your life these days, that makes you feel anxious or stressed?

To feel less stressed or anxious, some people do activities like go outside, text with a friend, meditate, or listen to music. What do you do to help feel less anxious or stressed?

How do these things help you when you feel anxious or stressed?

Technology Use

Now, we are going to chat about technology. Think about the technology you use the most each day, such as a cell phone, computer, or tablet.

What technology do you use the most and what do you use it for?

What do you like most, or are your favorite features, of [most used technology] and why?

Have you used technology to make yourself feel better when you were really anxious or stressed? If so:

What technology did you use and how?

What about the [specific technology] helped with your stress?

Where did you use this technology (e.g., at school, at home, with friends or family)?

Have there been times when you are not allowed to use technology, like at school or at home (or as punishment), when it would have been helpful to deal with stress and anxiety?

I am also interested in learning why you might not use technology for stress and anxiety. For example, some people have said they have not used technology to help when anxious or stressed because they have spotty internet at home, or share devices with other family members, or because their cell phone is broken.

Are any of these true for you? If so, which ones?

What are other reasons, besides those we already talked about, why you have not used technology for anxiety or stress?

Let's say you are going to design a smartphone app for teens to help with stress and anxiety. What would that app look like? What features would this app have?

If you could provide advice to a research team about to begin work with youth at the Oak Park Public Library to design a smartphone app, what would that advice be?



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