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Research Article

Sexual Minority Men Living with HIV's Interest in Yoga vs. MBSR as an Adjunct to an App-Based Positive Affect Intervention: A Focus Group Study

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Abstract

Purpose: Sexual minority men (SMM) living with HIV experience significant mental health disparities. Studies show positive psychological interventions (PPI) and mindfulness-based interventions (MBI) can have a positive impact on people LWH, however, limited research has explored this among SMM LWH. The current study explores two MBIs (MBSR and yoga) as potential adjuncts to an app-based PPI, which was designed to reduce stress for SMM LWH. **Methods:** These data are from a sub-study of a proof-of-concept pilot. The pilot enrolled 22 SMM LWH, who used an app-based PPI for 90 days. Following completion of this initial study, participants were invited to participate in a focus group discussion, which explored SMM LWH's interest in MBSR vs. restorative yoga as adjunct programs to the app-based PPI. **Results:** A third of participants from the initial study attended the focus group (N=7). All focus group participants were racial minorities (71.4% Black, 14.3% Hispanic/Latino, 14.3% Multiracial), with an average age of 32.14yrs (*SD*=4.87). When asked about initial interest, most participants said they would prefer restorative yoga over MBSR. In the discussion that followed, three main themes and eleven subthemes emerged, which elucidated SMM LWH's attitudes toward MBI, as well as their perceived barriers and facilitators for both yoga and MBSR. **Conclusions:** The study provides insight into racial minority SMM LWH's comparative interest in two MBIs and suggests that yoga may be a feasible adjunct to the app-based PPI. However, inequities regarding access to yoga remain an important issue for SMM LWH and must be addressed.

Keywords: Qualitative research; Yoga; MBSR; Focus group; Sexual minority men

Introduction

Background

People living with HIV (PLWH) are disproportionately affected by stressful life events, including housing instability, unemployment, legal issues, injuries, and assault [1,2]. Further, PLWH commonly report chronic stress from experiences of family violence, neglect, childhood abuse, and poverty [2]. As a result, PLWH are also at an elevated risk for having comorbid physical or mental health issues. In a review of 45 studies between 2016 and 2021, depression was the most prevalent comorbidity reported in people with HIV [3]. Studies show that between 22-45% of PLWH have experienced depression in their lifetime [4]. However, some studies have reported prevalence rates for depression as high as 80% among PLWH [5]. Importantly, depression and stress both carry a biological burden and have a negative impact on HIV progression, resulting in a lower CD4 count and increased viral load [6-8].

In the U.S., the majority of individuals living with HIV are gay, bisexual, and other sexual minority men (SMM) [9]. For this subpopulation of PLWH, sexual minority stress adds to HIV-related and general life stressors, all of which contribute to SMM experiencing significant mental health disparities, including an increased risk for depression [6,8,10-13]. Notably, a recent analysis of pooled nationwide survey data revealed that depression morbidity has now surpassed HIV for SMM [14]. Minority stress theory asserts that hostile and stressful social environments are created through objective experiences of stigma and discrimination, as well as anticipated and internalized negative societal stigmas [15]. Intersectional minority stress, in particular - HIV stigma, poses a significant barrier to treatment and prevention efforts to end the spread of HIV [16]. Notably, SMM experience are 3.5 times more likely to experience objective discrimination, such as insults and threats [17]. Intersectional minority stress also includes experience of racial discrimination and microagression [18,19]. This is especially relevant, given racial minorities represent a majority of the SMM-LWH population [20,21], with Black and Latino SMM being particularly vulnerable to HIV related health risks, and accounting for the majority of new HIV infections every year [21-23]. Given SMM LWH's increased vulnerability and exposure to social stressors, developing interventions to buffer these daily experiences of minority stress is essential for improving the mental health and wellbeing of this population.

One approach that has demonstrated efficacy for improving mental health among PLWH, as well as SMM LWH, is positive psychology interventions (PPI), which often target positive affect. Positive affect refers to experiences of positive emotions such as joy, interest, and alertness [24]. It is important to note that while depression is often characterized by a *lack* of positive affect, this is not merely due to the presence of elevated negative affect. Positive and negative affect are distinct constructs, which can co-occur [25]. Further, positive affect in the context of stress is adaptive [25-30] and research consistently demonstrates the protective effect of positive affect in the association between stress and depression among PLWH, as well as the general population [31-35]. Further, given anhedonia is a key marker of depression [36], positive affect has been suggested as an important intervention target [37,38]. Positive affect also promotes better HIV related health outcomes in the context of stress. For PLWH, research indicates that positive affect is associated with increased odds of linkage to HIV care and treatment adherence [30]. One study found positive affect was associated with a significant decrease in AIDS-related mortality risk [39]. Positive affect is also a protective factor in the association between stress and HIV self-management and is linked to improved medication adherence and viral suppression among SMM LWH and other PLWH. Specifically, positive affect is also shown to lower HIV transmission risk behavior, such as medication non adherence [40,41]. More generally, for people living with a chronic illness, including HIV, positive affect interventions show a significant effect on medication adherence [42], and lowering stress levels due to diagnosis [27,43,44].

However, positive affect has been largely ignored in intervention research for stress and depression [45]. In a review of positive affect and psychopathology EMA research, it was noted ecological momentary interventions (EMI) targeting positive affect hold significant promise for improving depression in daily life, but have yet to be developed [37,38]. This is further confirmed by a recent metanalysis of 27 EMI studies focused on mental health (21 assessing depression) that showed none of the EMIs reviewed used positive affect induction as an intervention technique [46]. With this in mind, we adapted an evidence based positive affect intervention for app-based EMI delivery, using a just-in-time adaptive intervention (JITAI) design. Our positive affect JITAI EMI or PPI was a 90-day app-based program called *Positively Healthy* and included 7 modules (*noticing and savoring positive events, gratitude, mindfulness, positive reappraisal, personal strengths, behavioral activation, and acts of kindness*). We have, elsewhere, published data outlining the PPI's design and delivery mode, as well as demonstrating the acceptability and feasibility of this intervention with SMM LWH [47]. Notably, participants in this study and in other studies testing this PPI struggled with the *mindfulness* module due to the self-paced / independent learning style of this intervention. Given mindfulness is thought to be a key ingredient in our multicomponent intervention, in the current study we explored potential mindfulness-based interventions (MBI) that may serve as a useful adjunct for our app-based JITAI, to further

support participants in mastering this skill.

Further Rationale for MBI as an Adjunct to the PPI

As with our intervention, the broader field of Positive Psychology has also embraced mindfulness as a key intervention target for programs seeking to enhance wellbeing and positive emotion [48]. Mindfulness—both dispositional and cultivated—is known to buffer against stress for PLWH, and can also increase positive affect [28,29,48]. Research additionally suggests that mindfulness practices and MBIs can support the development of other PPI skills. Here we review evidence on how mindfulness and mindfulness practice support the 6 other modules (*noticing and savoring positive events, gratitude, positive reappraisal, personal strengths, behavioral activation, and acts of kindness)* in our intervention, *Positively Healthy*.

The first module in our PPI focuses on *noticing and savoring positive events.* Research has found that mindfulness is significantly associated with a person's perceived ability to enjoy and savor positive events [49]. Specifically, it is thought that mindfulness gives us the tools to monitor on-going sensory events, which in turn facilitates the noticing and appreciation which allows us to *savor* a positive event [50]. As such, it makes sense that mindfulness based practices have been shown to increase one's capacity to notice and savor positive events [51]. The next module in our PPI is *gratitude.* Research shows a significant and positive association between trait mindfulness and gratitude [52,53]. Further, findings from one study show that gratitude mediates the relationship between mindfulness and positive affect [52]. One study found that a brief single session of mindfulness meditation has a significant effect on increasing levels of state gratitude [54]. The following module focuses on teaching skills for *positive reappraisal.* It has been suggested that the mechanism through which mindfulness lowers stress may function through changing stress appraisals, or promoting adaptive coping during stressful situations [55]. Research shows that positive reappraisal mediates the association between mindfulness and depression [56] and partially mediates the association between mindfulness and stress [57]. This is further supported by research showing engaging in mindfulness based practice promotes positive reappraisal [58]. In terms of our next module, *personal strengths,* mindfulness based practices offer the opportunity to notice and express one's personal strengths [59]. One school based program, found mindfulness practice was effective in enhancing students' strengths [60]. In a study of adolescents, the researchers conducted a pre-posttest evaluation of an in-school, 8-week mindfulness-based psychoeducation program, and found increases in character strengths [61]. Further, there is at least one MBIs that has intentionally integrated *personal strengths* as a part of the program (e.g., Mindfulness-Based Strengths Practice) [59,62,63]. Our PPI also includes a module on *behavioral activation.* Research has shown that trait mindfulness is associated with changes in patterns of avoidance in behavioral activation [64]. Specifically there is a negative association between mindfulness and avoidance, which has been shown in patients being treated for depression [64]. Another study found that mindfulness mediated the relationship between behavioral inhibition/activation system sensitivity and the outcome, emotional distress [65]. The majority of research on these constructs has been in the context of testing comparative effectiveness of behavioral activation therapy vs. various MBIs, with most showing that both programs are effective in improving quality of life and mental health outcomes such as reduced depressive symptoms, suicidal thoughts, cognitive avoidance, and anhedonia, as well as improved positive emotion and reward sensitivity [66-69]. Further there is also evidence to suggest a synergistic effect when administering a combined behavioral activation + mindfulness program [69,70]. The final module in our program was *acts of kindness*. Mindfulness is associated with increases in prosocial behavior [71,72], compassionate responses to others [73,74], helping behavior [75], and altruism [76]. Further, mindfulness based programs have been found to enhance altruism [77,78].

Effectiveness of MBIs for PLWH and/or SMM

In addition to enhancing the aforementioned PPI constructs/skills, MBIs have also been shown to improve mental health across various populations with chronic health diagnoses [79,80], including HIV [81-85]. Among PLWH, MBIs have shown support for decreasing emotional distress and feelings of depression [29]. MBIs also have shown promise for HIV-related health outcomes [86,87]. For example, engaging in a mindfulness-based practice has been effective in helping maintain VL suppression [86] and buffering against CD4 decline [83,87]. In an randomized control trial, patients receiving MBI had significantly higher CD4 counts 3-months postintervention [82]. However, despite the fact SMM represent a majority of PLWH in the U.S. and experience prominent, unique stressors, few studies have examined mindfulness-based practices and their potential mental health benefits for SMM LWH. Further, there is little to no research on what type of MBIs would be most appealing to this population.

One of the most widely tested MBI's is mindfulness-based stress reduction (MBSR) [88], which is a standardized 8 session intervention that incorporates meditation, yoga, and other mind-body activities [80]. There is a large body of research demonstrating the efficacy of MBSR across a variety of populations, including those with chronic illness [89-92]. A smaller, yet still substantial, body of research has examined MBSR in the context of HIV, which supports the acceptance, feasibility and efficacy of this program for PLWH [29,93-98]. For example, one systematic review and meta-analysis reported improvements in stress, depression and CD4

count for PLWH following MBSR [29]. However, there is limited research evaluating MBSR among SMM LWH. One MBSR study that focused on SMM LWH found increases in mindfulness was correlated with positive affect and lower levels of depression post program [99]. Another study piloted an online MBSR program with sexual minority men and women, finding that men experienced greater reductions perceived stress (40% reduction) compared to women (23% reduction) from pre-to-post program [100].

While MBSR is among the most studied MBIs, some scholars have critiqued its multicomponent design. More recently, researchers interested in the 'active ingredient(s)' of MBSR have tried to tease apart the various components of this program [88,101,102]. One study examined different MBSR components and found that compared to sitting meditation, yoga practice was more strongly associated with increases in psychological well-being, perceived stress, anxiety, and mindfulness [103]. Another 2013 study examined the effects of different MBSR components on various outcomes; notably, this study found that only yoga was associated with improvements in positive affect [104]. Other studies interested in MBSR's "active ingredients" have reported that compared to the meditation component, yoga practice was more effective at reducing stress and improving well-being [101,105].

In these studies, which have attempted to dismantle MBSR's various components, it is clear that yoga has been highlighted as a key ingredient in this program. Researchers have more recently examined the comparative effectiveness of yoga as compared to the full MBSR program. Results from a 2018 study showed that yoga alone was comparable to the multicomponent MBSR package, at least in improving stress related outcomes [101]. In addition to showing comparative effectiveness, the utility of yoga as a standalone MBI has also been supported elsewhere. In a study comparing various different types of mindfulness-based practices, yoga was associated with the greatest increases in psychological wellbeing [105].

There is a strong case to be made for using yoga to adjunct for our app-based PPI. In terms of the intervention's seven modules, research has shown that yoga can help enhance each of the PPI skills. For example, yoga practice has been positively associated with increased experiences of gratitude [106]. Qualitative studies examining participant experiences after a yoga intervention have also revealed themes which included increased feelings of gratitude [107,108]. Yoga also supports positive reappraisal. One study found yoga practitioners exhibit significantly more engagement when completing positive reappraisal trials for an affective image processing task, compared to control subjects [109]. Given the social and physical nature of group based yoga, scholars have suggested that it may act as behavioral activation for individuals with depression [110]. One study examining yoga as an intervention for people with 'persistent depression,' found significant enhancements in behavioral activation following yoga practice [111]. While limited research has examined the direct link between yoga and altruistic behavior, we do know that yoga practice is shown to increase mindfulness, which as noted above, increases altruistic behavior [75,76]. Perhaps most important, there is also a large body of research demonstrating that yoga practice can enhance mindfulness [112,113] and positive affect [114,115]. For example, one study found that participation in a yoga program predicted increased mindfulness, which in turn resulted in an increased quality of life [116]. There is also research to support yoga as an effective intervention with PLWH [117-120]. Relevant to this PPI, research has consistently shown that yoga is associated with increases in positive affect for PLWH [118,121,122].

Specifically, restorative yoga may be a promising MBI for SMM LWH and comorbid depression. There is already a large body of research demonstrating the acceptability, feasibility, and efficacy of yoga in reducing depression across various populations [110,111,114], including individuals living with HIV [122]. Restorative yoga is thought to be particularly useful treating depression among the general population [123,124] and has demonstrated efficacy in reducing psychosocial and physiological markers of stress [125]. Further, restorative yoga has been posited as more effective for populations affected by HIV [2,126], compared to other styles of yoga, and has demonstrated efficacy in reducing depression among other populations living with chronic illness [127].

Objectives

Few studies have directly compared the acceptability, feasibility, and effectiveness of standalone yoga vs. MBSR. It is also important to note that the existing comparative effectiveness studies have been on more general populations. Further, research has yet to explore the acceptability and feasibility of engaging SMM LWH to participate in MBSR or yoga as an adjunct to another program. The current study is a first step in assessing the acceptability and feasibility of using either of these MBIs to adjunct our existing PPI. Specifically, we explore SMM LWH's comparative interest for participating in these two MBIs as an adjunct to our app-based PPI. In addition to exploring interest, this study also addresses an important gap in the literature by elucidating SMM LWH's perceived barriers and facilitators to participating in MBSR and yoga.

Materials & Methods

Participants and Procedures

The protocol and procedures for this study were reviewed and approved by our university's Institutional Review Board. This

focus group study was conducted as a follow up to our proof-of-concept pilot where we tested the acceptability and feasibility of an app-based JITAI designed to increase positive affect for SMM-LWH [47]. Specifically, this focus group was designed to elicit feedback regarding participant's interest in participating in a mind-body program (e.g., yoga vs. MBSR), as an adjunct to the app. For this sub-study, we recruited participants from the proof-of-concept pilot. Data from this initial study has been published elsewhere [47]. In the initial study, a phone-based screening survey was used to assess participant eligibility. To be eligible, participants needed to: (1) be at least 18 years of age, (2) identify as a cis-gender male, (3) identify as gay/bisexual/queer, (4) be living with HIV, (5) be prescribed ART medication, and (6) have daily access to the internet via smart phone. Participants from the initial study who completed both the baseline and follow-up appointment, and consented to being contacted about future research opportunities were deemed eligible for this sub study and were invited back for the focus group.

The focus group invitation was sent via email. We asked eligible, prior participants to 1) indicate their interest in joining the sub-study, and 2) provide their availability to join the in-person focus group session. After receiving responses, the research assistant then coordinated with those who indicated interest in finding a time that worked best. We note that due to scheduling conflicts, not all the participants from our initial study who expressed interest were able to join the focus group. Demographic characteristics for those who participated in the focus group (N=7) are provided in Table 1.

Variable	%	M	SD
Age (range: 26-40)		32.14	4.87
Years living with HIV (range: 5-17)		9.86	4.49
Race/Ethnicity			
Hispanic /Latino	14.3%		
Black	71.4%		
Multiracial	14.3%		
White	0.0%		
Relationship Status			
Single	57.1%		
Partner or Lover	28.6%		
Boyfriend	14.3%		
Has Internet Access via Home Computer	57.1%		
Has Internet Access via Smartphone	100%		
Phone Type			
iPhone	42.9%		
Android	57.1%		
Employment			
Full-Time	14.3%		
Part-Time	28.6%		
Unemployed	57.1%		
Income			
Less than $10,000	42.9%		
$10,000 - $19,999	28.6%		
$20,000 - $29,999	14.3%		
$30,000 - $49,999	0.0%		
$50,000 - $74,999	14.3%		
Over $75,000	0.0%		
Education			
Some college	85.7%		
4-year college degree	14.3%		
Parents Socioeconomic Class			
Rich	0.0%		
Upper Middle Class	0.0%		
Middle Class	0.0%		
Working Class	71.4%		
Poor	28.6%		
Grew up in…			
Large City (> 250k population)	14.3%		
Suburb of Large to Medium Size City	28.6%		
Small City (10K – 50K population)	42.9%		
Town/Village or Unincorporated Area	14.3%		

Table 1: Focus group participants' demographic data and descriptive statistics (N=7).

Participants were consented individually before joining the focus group. Participants were encouraged to use a pseudonym and were instructed to protect the groups confidentiality (e.g., not repeat anything said within the group session). The focus group was facilitated by the first and second authors (K.M.S. and A.T.), both of which had prior experience as moderators. The focus group was semi-structured, and moderators used a discussion guide. As an icebreaker, the moderators first provided printed materials of the different app features for participants to review. Participants were

then asked to discuss their favorite aspect of the Positively Healthy mobile app. Following this, the moderators stated, "*Based on your feedback at earlier visits, we are thinking about adding a weekly in-person group activity or workshop to the Positively Healthy program*." The moderators then provided a description of MBSR and restorative yoga, which they also outlined on a white board. The descriptions provided were as follows:

"One option is mindfulness-based stress reduction classes. This is a structured eight-week program that offers rigorous mindfulness training. You would meet weekly for 2.5 hours; the program also includes homework assignments, some yoga, and at-home meditation exercises."

"The other option is weekly yoga sessions. The type of yoga we are considering is Restorative yoga, which is a mindfulness based practice to calm your mind and body. This style of yoga involves five to six poses, which are supported by props (blankets, and blocks), and held for 5 minutes or more."

To avoid group bias, participants wrote down which of the programs they preferred and why. Following this, participants were asked to raise their hand if they selected MBSR or yoga. Next, participants went around the room discussing the reasons for selecting the MBSR vs. yoga. The moderators probed participants to discuss the pros and cons of each, as well as to discuss which program would best complement the app. The focus group session was audio-recorded and lasted 2 hours. Participants were compensated $50 for their participation.

Measures

Demographic Questionnaire

Participants responded to a demographic questionnaire, which asked about their age, number of years living with HIV, race and ethnicity, relationship status, employment status, income, and education. Participants also report on what they perceived was their parents' socioeconomic class background growing up (i.e., rich, upper middle class, middle class, working class, or poor). Participants were also asked to share what type of city/town they grew up in. Additionally, given intervention was delivered on a mobile app, we also asked about internet access via home computer and smartphone, as well as phone type.

Modified Elixhauser Comorbidity Measure

Lifetime comorbidities were assessed using a modified version of the Elixhauser Comorbidity Measure [128]. The measure included 20 items assessing various mental health (e.g., depression, anxiety, etc.) and physical health comorbidities (e.g., stroke, diabetes, hypertension, etc.). The item for HIV was omitted from the survey, as all participants were HIV positive. Thus, responses for this item were manually entered into the dataset. The stem for this measure was "*The following questions will ask you about a variety of health conditions – please respond with whether you have ever experienced each."* Participants indicated yes (1) or no (0) for each health condition. Responses were summed to provide an overall lifetime comorbidity index, with possible scores ranging from 0-20.

Analyses

Quantitative Analysis

Descriptive statistics (means, standard deviations, and frequencies) were estimated using SPSS 24. Given the qualitative nature of this study, quantitative analyses were limited to reporting demographic and descriptive data of participants from the focus group.

Qualitative Analysis

The focus group discussion was later transcribed verbatim by a trained research assistant, and Q.A.'d by another member of the research team. The focus group moderators each reviewed the recordings and independently read the transcript. Qualitative content analysis was used for analyzing the data [129]. During open-coding, the first author (K.M.S.) first analyzed the data for indicators (parts of participant responses) [130,131]. Based on the focus group guide, we separately coded sections of the transcript pertaining to 1) participant attitudes toward MBIs, (2) barriers to MBI practice, and (3) facilitators to MBI practice. Similar indicators were grouped together, with tentative labels given for each thematic grouping. Consistent with qualitative methods, all coding notes and memos were kept for reference throughout data analysis [132]. This process resulted in a smaller set of subthemes [130]. Following coding, the primary coder developed a corresponding codebook identifying themes and subthemes, which included a description of each, as well as example text. Inter-rater reliability was established by having the third author (A.K.) code 80% of participant responses in the transcript. Specifically, the inter-rater coder was given a subset of responses from the transcript and the codebook, which was developed from the initial coding. The inter-rater coder then independently coded the transcript data. Given this was a focus group, participants were not identified by their unique ID in the transcript. As such, both coders were masked to participants' demographic characteristics during coding. The measure of inter-rater reliability for the overall themes indicated almost perfect agreement between coders (Cohen's Kappa = 0.967). We also calculated inter-rater reliability at the subtheme level, for which coders showed strong agreement (Cohen's Kappa = 0.832) [133].

Results

Descriptive Findings

This focus group sub-study included 7 participants from the initial

study (N=22). All participants were SMM LWH. The average age for participants was 32.14 years old (*SD*=4.87, *range*= 26-40 years old). Across participants, the average number of years since HIV diagnosis was 9.86 years (*SD*=4.49*, range*=5-17 years*)*. Out of those who participated in the initial study (31.8% Black, 31.8% Hispanic/Latino, 18.2% Multiracial, 18.2% White), focus group participants were all racial minorities (71.4% Black, 14.3% Hispanic/Latino, 14.3% Multiracial) who had completed some college (85.7%) or had a four-year degree (14.3%). A little under half of the focus group participants reported being employed (14.3% full time, 28.6% part-time), compared to 57.1% unemployed. The majority of participants reported an annual income of under $20k/per year (71.5%). All participants reported that their parents' SES/class background growing up was either working class (71.4%) or poor (28.6%). Most participants shared that they grew up in a small city with a population of 10,000-50,000 people (42.8%), which was followed by suburb of large to medium size city (28.6%). While all participants reported having access to the internet via a smart phone, just over half said they had internet access via a home computer (57.1%). In terms of smartphone type, all focus group participants used either an iPhone (42.9%) or Android (57.1%). Additional demographic and descriptive data are presented in Table 1. In terms of comorbidities, depression (57.1%), anxiety (57.1%) and other mental health issues (42.9%) were reported as the most common comorbid health conditions in our sample of SMM LWH. The full list of reported comorbidities is reported in Table 2.

Variable	%	*M*	*SD*
Lifetime Comorbidity (range: 0-5)		3.43	2.23
HIV	100.0%		
Depression	57.1%		
Anxiety	57.1%		
Other Mental Health Issue	42.9%		
Diabetes	14.3%		
Hypertension	14.3%		
High Cholesterol	14.3%		
Respiratory Condition	28.6%		
Drug or Alcohol Problem	14.3%		

Table 2: Focus group participants' reported comorbidities (N=7).

Note: No focus group participants reported the following comorbidities: Cancer, Heart Attack/Failure, Stroke, Gastric Ulcers, Rheumatoid Disease, Liver Disease, Bacterial/Viral Infections, Alzheimer's, Nervous System Condition, Thyroid Condition, or Kidney Disease.

Focus Group Findings

When asked about their preference of MBI, the majority of focus group participants expressed interest in yoga (n=4; 57.14%), compared to MBSR (n=2; 28.57%); one participant was torn and stated they could not choose (n=1; 14.29%). The focus group discussion that followed elucidated participants' general interest in MBIs, as well as their perceptions of the pros and cons of each (i.e., MBSR vs. yoga). Three main themes arose from the focus group discussion: 1) Attitudes toward MBI, 2) Barriers to MBI, and 3) Facilitators to MBI. In addition, across these three main themes, eleven subthemes emerged. A summary of themes, subthemes, and example quotes are presented in Table 3.

Themes *Subthemes*	**Participant Quotes**
Attitudes toward MBI	
Improve Mental Health	"I feel like yoga would be something that would help, something positive with mental health...it's something that helps you destress."
Yoga as a Physical Form of Meditation	"I also think, it's just like, it's a perfect way to, it's a perfect way to reflect. And when you are physically reflecting and you can feel it physically as you are mentally doing things then it just it helps so much better."
Barriers to MBI	
Environmental Access	"And you [should] have multiple locations so it's convenient to travel, in case somebody has to travel too far."

Time and Commitment Burden	"It's too time consuming, like a lot of people were saying. It's the time factor, you know? It's critical."
Cost Concerns	"I mean, if it's a way to do it so that people don't have to pay that much, it would be good but I would see the [MBSR] classes being, probably maybe about 4 or 5 times more expensive than the yoga."
Group Settings	"Sometimes when people are presented with something physical they start comparing themselves to others especially in a group setting."
Facilitators to MBI	
Accessibility	"I think for the yoga you can get people here on a consistent basis. I know I'm going to yoga or something, you know if I go to the gym already."
Integration with App	"If we were able to upload the sessions afterwards onto the app or just some key points of things that people, like if we had a discussion after we got done doing the yoga poses or like how did you feel before the session, how did you feel during and then how did you feel after, and then being able to upload that on the app. That way if a person did miss a session, you know by 9 o-clock that night the session is uploaded.....And again I feel like you know we could have reminders within the app on this as well."
Flexibility and Convenience	"It's only an hour out of your time and you're consistently being reminded and you have that option and you can say, you know, today I don't feel like doing it or today I do feel like doing it . Let's go."
Social Connection	"And the tone, I think it will be a little more social because also personal interconnection is important."
Importance of Choice/Options	"I feel like it's based on the people and what would work best for them …Cause what might be suitable for one person might not be so suitable for the next one."

Table 3: Themes and subthemes expressed by focus group participants (N=7).

Attitudes toward MBI

After being presented with the information about restorative yoga and MBSR, participants shared their perceptions of the two MBIs. Within this theme, two subthemes emerged: 1) Yoga/MBI to improve mental health, and 2) Yoga/MBI as a physical form of meditation.

Yoga/MBI to improve mental health

Participants felt that MBI's in general would have a positive impact on their mental health. One participant commented on how MBSR might help with their own depression, "*It'll [MBSR] shed some positive light onto whatever you are going through above all. A lot of people dealing with depression, myself included. So… you can say that there is light at the end of the tunnel, you know? And empathize with others that may be going through a greater [inaudible]. Just to give yourself a pat on the back and say it's gonna be okay*." Others talked about restorative yoga and its potential to improve mental health outcomes and reduce stress. For example, one participant stated, "*so I'm like a hour once a week is something that's quiet that's like you trying destress, you know?* " Another participant commented that yoga can help with stress that takes physical form in the body, *"One thing that a lot of people forget is stress is like a silent killer and stress also takes physical forms on our body, so when you are doing the restorative yoga you are actually counterattacking those stressors that you have gone through throughout the day."*

Yoga as a physical form of meditation

Along with acknowledging that stress can take a physical form, participants described yoga as a "physical form of meditation" that could help address this. For example, one participant said, "*For restorative yoga, thank you so much because this is actually what yoga was originally made for. It was supposed to be an extension of meditation and it presents a physical form of meditation to be able to center yourself and hone in yourself."* Participants discussed the importance of physically reflecting to center oneself. One participant noted that, "*A one hour session is perfect, it burns calories, you're able to center yourself, you learn balance, you learn about your body but you'll also be able to learn about others*."

Barriers to MBI

Another prominent theme was "Barriers to MBI." Participants outlined several concerns that need to be addressed to remove these barriers and increase engagement in MBIs. In discussing this, four subthemes emerged: 1) Environmental access, 2) Time and commitment burden, 3) Cost concerns, and 4) Group settings.

Environmental access

Participants noted that the physical location of in-person MBIs could be a barrier, citing issues with travel time and inconvenience. For example, one participant felt that a long commute, in addition to a 2.5-hour MBSR class, would be too much, stating, "*Especially when I guess some of us you know, if we had to come into the city or whatever, some of us live in Brooklyn or the Bronx, you know that's already a commute here, stay here for two and a half hours then we have to commute back home , if we come from work or whatever the case may be, so. That's like a 4-hour thing right there."* Other participants agreed this was a barrier and offered potential solutions to address it. One suggestion was to make sure it was centrally located, *"I think as long as it's centrally located and you know like this building would be fine right here, just pull down the shades."* Another participant built on this and suggested a location near a well-connected subway line may help address this barrier, "*Like near a subway, or you know everybody knows 36th Street. Even between Brooklyn and the Bronx.*" Another potential solution suggested was to offer the classes in multiple locations. This was suggested by a few different participants. For example, one suggested, *"Yeah maybe instead of doing it once we can have two classes and they have them in different locations or something."*

Others offered suggestions for holding classes in community centers, which would not only be centralized in terms of location but would also offer a centralization of sexual minority health services offered. For example, one participant suggested, "*Or the center, the LGBTQ center. Have it in one of the large rooms there. It's a great place to network, there's food downstairs, there are trains readily available all up and down 14th Street*." Another participant suggested that it may be more convenient to offer the classes in their place of work, "*would be great to market it with like certain workplaces, um because there's a couple of places in Tribeca where we teach our self-defense classes where they actually have an entire space that's like a recreational space where they have yoga classes, they have dance classes to um help with productivity at work, and it creates just a better work environment."*

Time and commitment burden

The participants noted that time and commitment burden were significant barriers to MBI. Participants were concerned with being able to fit the MBI into their already busy lives, as one participant stated, "*Some people's lives are already too preoccupied and busy [to do MBSR or yoga]."* This was sentiment more clearly articulated by another participant who followed up with, "*you know, as adults and stuff we already busy as it is with a lot on our schedules. You know like I work, I go to school, I just got a new puppy, that's all a lot in one day. So it's like to go even two and a half hours once a week it still like dang, what do I got to move out the way to do something for two and a half hours that's a lot,"* in reference to MBSR. For participants who said they would prefer yoga, most felt that MBSR would be too time-consuming, with one participant commenting *"yeah that 2.5 hours is crazy."* One primary concern with MBSR was the additional time commitment for the homework, as another participant explained, "*that's why I went more with that cause it was a lot with the time and I feel like it was um, like with the homework and all that stuff, I wouldn't have time for that. So, I was just like I'm not (laughs) that wouldn't be for me.*" Others echoed this sentiment, also mentioning that having homework, in addition to weekly classes, was too much of a commitment. As one participant said, "*For the mindfulness, you know the 2.5 hours and having to do homework, I'm working all day last thing I wanna do is come and sit in another 2-and-a-half-hour class."* Another barrier participants noted with MBSR was the need to commit to an eight-week program, stating that it lacked the flexibility of yoga, which you could more easily take a break from if needed. For example, a participant stated, "*I guess that is a con that you would, like you said, need to be there from start to finish and you can't take a break or if something happens you messed up your process or whatever."*

Cost concerns

All participants expressed that cost was an important consideration and potential barrier to engagement in MBI. In comparing costs between the two MBIs, one participant noted, *"I mean, if it's a way to do it so that people don't have to pay that much, it would be good but I would see the [MBSR] classes being, probably maybe about 4 or 5 times more expensive than the yoga."* Others discussed more systemic issues, stating, "*we're a low-income population so either one [MBSR or yoga] is going to be difficult*."

Participants made several suggestions for mitigating these cost concerns. For example, participants suggested that if offered for free, the MBI would likely be more successful. This was suggested by one participant who stated, "*For the thing to be most successful I would say - I know it's probably not possible - but I mean keep it free, use a building that you guys have on campus. Call every research you can in to get somebody to volunteer and do it every week and have some cookies and snacks and just, you know cause."* Another participant seconded this idea, stating that "*the [NYC CBO] offers yoga classes for example but they are on volunteer basis so they are not consistently offered and the [sliding] scale is no good for me.*"

The group also brought up the idea of sliding scales, which some participants thought was a good option to help mitigate costs. One participant shared their own experience in providing a sliding scale for the classes they teach, "*with the self-defense classes that I teach we get grants to go out and teach the classes for certain demographics and what we used to do was we used to do sliding*

scale charging for the classes . ...And we would base the amount off of the person's income to make sure that they would always be able to afford the classes because self-care and being able to defend yourself is something that everyone should invest in, when investing in yourself.... Maybe charge on the sliding scale." The participant went on to also suggest donation based classes as another option, continuing with, "*Or even with like the donation setting because we've started to do that too, just have like a base level of where you want to start the donations at. Maybe 10 or 12 dollars to start off with, and I think people would definitely be extremely comfortable with that. I have been finding that when I go out and teach classes I let people know the donations always start at 10 dollars and I've had people come up to me and after the class was like hey here's 50 dollars I really enjoyed the class this was great this was awesome."* Others agreed this may be a better option, with one participant commenting, *"If anything I would say have it donation based."* Participants also offered the caveat that if they are paying to join classes, they will also likely have higher standards for these classes, as one person said, "*I don't know, cause I know if I start paying for the yoga class I'm gonna have certain expectations especially somebody who's done yoga before. It can't be all frilly, or—you know if I'm paying for it I want a real class."*

Another idea was to have classes paid for by their employers or insurance company. For example, one participant suggested it would be nice to have the classes paid for by their work or to have their employer pay for them to take classes, noting *"I think being able to take like a class at work, especially when you're getting paid to take the class too, and being able to take the class and having the corporation pay for the classes and offering it to the employees so that employees can have like a better sense of the corporation caring for their employees as well as you know being in a better mindset when you're at work because work is stressful."* Another participant floated the idea of having insurance cover the classes, stating "*They are going to be paid through the insurance companies because we have these kinds of problems. I changed to metro plus but metro plus also has other things that are offered through that and I think they pay it so that would be a good idea."* However, this idea was not received well by others in the focus group who noted that having to use insurance to cover the cost of classes could introduce additional barriers. They went on to say, "*You are dealing with populations that, because of this—we don't have insurance, right that we have to go to public insurance or how the ones that have any insurance they might have to pay a lot of fees, a lot of things.*" Others felt that having to deal with their insurance would be too much of a hassle, noting "*if I gotta start bringing in my pay stubs, dealing with my insurance, I'm not gonna do it to take a yoga class I already got too much to deal with. So I say keep it simple as possible and just see you know if anybody shows up at first, and if you start to get a crowd then maybe it could turn into something."*

In addition to the barrier of covering the cost off classes, participants also expressed concern about having to purchase their own materials to participate in the MBIs. One participant offered the suggestion that we, *"have it [materials] for people who can't get it or people who really don't know much about buying the materials and stuff like tha . So they'll get more comfortable with it before they go out and make a bad purchase."* Others agreed with this suggestion, with another participant stating, "*Yeah, I think it's best to have a base set of materials and to just have people come in and use them and leave them there so nobody aint gotta pay for nothing. Nothing gets lost or stolen."*

Group settings

Participants expressed concerns about the group nature of the MBI activities. For example, some participants said they may feel self-conscious about doing physical activity like yoga in a group setting. One participant reflected on this feeling, stating ""*Um I guess like he said some people might be a little self-conscious or anxious with the group setting or that they might not be able to get the poses or whatever right off the bat or be able to center themselves or hold themselves up with the poses."* Participants discussed the importance of members having a positive and welcoming attitude in the group classes the help mitigate this concern. For example, one participant followed up with, *"I guess we just have to make sure we give positive vibes and positive—you know, when we're in the group setting, cause I don't know nothing about yoga so I'd be up in there like (laughs) what am I doing? But um, I guess you know just that, but. I don't know"*

Importantly, not all participants were worried they may feel self-conscious or compare themselves to others. However, these participants brough up concern around confidentiality as it related to the group nature of these MBIs. Others expressed interest in group activities and suggested a confidentiality waiver be signed to mitigate this potential issue, stating "*Being able to have the props, and the blocks, the blocks and blankets. It's perfect because when you are first doing it not everyone's body is going to be able to do the same things. I also think it would be great if you know, like, people signed a confidentiality wavier.* "

Facilitators to MBI

The final theme was "facilitators to MBI," from which five subthemes emerged: 1) Accessibility, 2) App integration, 3) Flexibility and convenience, 4) Social connection, and 5) Importance of choice and options.

Accessibility

Participants discussed their perceived accessibility of the two MBIs and their capability of reaching "everyday people." Overall, participants felt that, compared to other mindfulness-based

practices, yoga seemed to be the most accessible. This was most clearly articulated by one participant who stated, *"I was gonna say I feel like the yoga I guess would be more accessible then. It seems like with the MBSR class that sounds like something that requires maybe like an instructor and you know somebody that is certified, a doctor or something. (laughs) And so um, if it was more like everyday people who just want a little stress reliever something that can help them meditate and stuff like that. I definitely feel like yoga would be something more accessible to just people—regular everyday people who just want to get a little stress off or whatever with the classes."* Participants felt the minimal materials needed for yoga made it more accessible, noting, "*for yoga you just need a mat and if you want to do something at home you just can do it. It's not like you need full equipment or gym equipment. It's easy."* They also mentioned that it may be easier to het participants engaged in a regular yoga practice, stating "*I think for the yoga you can get people here on a consistent basis."*

App integration

Participants also suggested that integrating the MBI programs with our app would help facilitate engagement for the potential adjunct programs. Participants suggested that we record the in-person classes and discussions, then upload the sessions to the app, so that participants would have the option of participating from home. Participants also liked the idea of being able to track what they had "missed" in the app. For example, in reference to MBSR, one participant stated, *" I feel like if you missed a session you can definitely upload the session onto the app and the person would be able to login and see what things that they missed and still be able to keep up with the homework."* This participant further described how the current app already had meditations built into it, and saw integrating the MBI program as a natural extension, stating *"I think it's a great idea to also ask the person to do at home meditation since some of the activities in the app already were to stop and do brief meditations and then when they come to the group the following week they can say okay this is what I did for my meditation just to update you guys, can I hear what some of the things you all were saying."* This was echoed by another participant, who also expressed interest in being able to do the meditations at home, and suggesting this should be integrated in the app, *"It's something I wanna do and … maybe we can have some at home meditation integrated component integrated into [the app]."*

Several participants suggested that it would be easier if we integrated the yoga sessions into the app as well, with one participant first stating, "*Just integrate it into the app and just you know even with this, with the yoga."* Other participant echoed the same sentiment and, as described above, suggested filming the yoga instructor to upload a video of the yoga session to the app. One participant also went on to suggested that the app should include a schedule of the in-person yoga classes being offered, stating, *"And like he said maybe film the moderator, and the list of classes, load it up [to the app]."* Building on this idea, participants also suggested that adding reminders in the app for in-person classes or sessions would be especially important for facilitating engagement. This was reflected in one participant's comment, in which they said ,*"I definitely think that it would also be great to put reminders in the app about the events, and when the events are going on, so this way like not only do the person put it on their own calendar, sometimes if you forget you'll have that reminder as well."* On a similar note, another participant suggested "*Or to add onto that, like a self-care check in [in the app]."* In addition to suggesting we include reminders and self-care check ins; another suggestion was to use the app to encourage at home practice between sessions. Specifically, participants suggested that the app would send notifications between in-person sessions recommending an at-home yoga or meditation session. This idea for app integration was described by one participant, who proposed, *"Like after you do the class, let's say you do the class at the beginning of the week and then periodically throughout the week the app asks you would you like to recall the yoga session, and would you like to redo the yoga session today via the app and that way not only are you consistently accessing the app but you're consistently, you know, doing yoga, you're meditating, you're getting your body and stuff together. It's only an hour out of your time and you're consistently being reminded, and you have that option."*

Flexibility and convenience

Participants discussed flexibility and convenience as key facilitators to MBI engagement. Participants agreed that having the flexibility to do the program when it was most convenient for them in their daily lives was especially important. Participants felt yoga would offer more flexibility, as it would be easier to do on their own and at home by themselves. One participant stated this simply in their comment, "*You can do the yoga and stuff at home yourself ."* Another participant elaborated on this, stating, "*People can still do the yoga at home throughout the week, maybe you can learn different poses each class and you know they take that home with them and they have their little 15-30 minute sessions at home every day. If they want, then they come next week learn some new poses and stuff like that so you can be able to build."*

Participants also talked about the importance of having flexibility with their time investment, as they felt that the time they'd be able to commit to the MBI might vary from day to day. This was reflected in one participant's comment, which stated, *"If you are not able to do a 1 hour session maybe you can have like 5-8 minutes of just quick yoga and reflection within the app and have someone doing the demonstration of the poses."* Similar to this, participants also liked the flexibility of yoga, as compared to MBSR, because it didn't seem to have a defined start and end date and thus would

allow new people could join throughout the program. For example, one participant noted, *"With the yoga, you can come and go, new people can come in . It could be like you know keep it fresh."*

Participants were also attuned to scheduling, which led to a preference for yoga among the group. For example, one person said, *"yoga is not that hard to squeeze it into your schedule."* In talking about the class or session schedule, it was suggested that different time slots should be offered to further support the program's flexibility and help participants find a class that fit into their busy schedules. For example, one participant suggested, *"Two different times might be good,"* while others agreed.

Social connection

Participants talked about social connection as a key facilitator to MBI engagement. A common theme that emerged throughout the focus group discussion was the importance of "interconnection" and social support, which was illustrated through one participant's comment, which stated "*Sometimes I really feel like some people just need to be reminded that they're not alone and that it's also great and awesome that there is someone else there with the same mindset in that moment…. sometimes having that video presence there, and just knowing that someone else is there."*

Most participants indicated a desire for a social component to be included in the study. For example, participants expressed that in the current study, they would have liked to have had an opportunity to discuss the program with other participants. One stated, *"You know, like afterwords you let people know how you were feeling before and how it was helping you and after people discuss how they feel different or if they feel different."* They also expressed their interest in being able to discuss their experiences in the program and/or in their MBI practice with others in the future, as noted by one participant who said, *"If we had a discussion after we got done doing the yoga poses or like how did you feel before the session, how did you feel during and then how did you feel after…….You can hear from your fellow peers like okay these are some great things that this person said and that person said."* Participants also noted the importance of keeping group discussions on the shorter side, suggesting a light de-briefing discussion after group activities. One person suggested, "*It'll be fun, it might be you know, a communal activity, and maybe it's like a 15-20 minute talk afterwards about, I think you would have more success with that one."*

In addition to in-person social activities and discussions, the focus group members also expressed interest in participating in online discussion forums with other study participants. Participants felt these online discussion formus offered an important opportunity for them to connect with others in the LGBTQ community, while also providing a platform for them to give/receive real-time support to/from their peers. One participant shared their positive experiences using a SMM social media discussion board, stating "*I am in a group on Facebook where different gay guys that I know around from different states, and once a week what we do is we get on the messenger and everybody comes into a video chat and we check on each other, make sure everybody's where they need to be mentally, emotionally, you know. And we make that a priority for all of us to collectively you know look out for one another, so I just think that would be a great idea."* Others provided more practical suggestions for how to best structure and implement an online discussion form. For example, one participant suggested we model it after existing sites that already have successful engagement in their online discussion forms, stating, *"That one site... they have like a forum that's really good so maybe something where you could leave a message and somebody gets back to you, so everybody's not like waiting around to be on it at the same time. I think a forum would be really good, I've seen it on other sites and it works really well."*

Importance of choice and options

Participants commented on the importance of acknowledging that everyone has different needs. References were made to the importance of choice and suggestions were given for providing participants with options to better facilitate engagement in MBIs. For example, one person stated, *"Everybody deals with different things, some people may need that restorative yoga and not the 8 weeks but some may need the 8 weeks and all that, you know, versus the other."* They also went on to reflect on their prior experience as a participant in a different study, and recalled being randomized to a specific condition, stating *"I remember I thought about when I first did a study here, they randomized me into a group based on what I needed, and I think that both will be nice."*

In addition to providing choice in terms of assigned intervention conditions, participants also offered suggestions for how to incorporate choice throughout the study. For example, when talking about yoga and meditation classes, most participants agreed that the study team should provide mats and props to alleviate any cost concerns. However, one participant pointed out the importance of offering choice here as well, stating that, "*Some people might want to bring their own which maybe should be an option*." It was also suggested that, for group interventions, polls be used to offer different social activities and meeting times to the group. This was clearly articulated by one participant who stated, *"You can do polls, and um then we can see what times and dates are great for everyone, so that it won't just be okay let's start an event, and then everyone's like oh shoot I can't go to that event, you know. We can take polls, we can see what times and dates are best for everyone and like what activities people like to do, like a group meditation, a yoga session, bowling, a paint and sip."*

Discussion

This focus study explored SMM LWH's comparative interest in MBSR and restorative yoga as an adjunct to our app-based PPI. After participating in a study piloting the PPI app for 90-days, we invited participants to take part in the focus group. Participants were a diverse sample of SMM LWH with regard to race. The majority up participants were low income, with nearly three quarters of the sample reporting an annual salary under $20k. It is important to note that all participants resided in New York City at the time of the study, during which the poverty line was around $35k. Over half of the sample were unemployed, with just over 14% being employed full-time. These demographic statistics are consistent with the larger body of HIV literature showing PLWH are disproportionately affected by stressful life events, including unemployment and housing instability [1,2]. Further, research also shows PLWH experience chronic stress from experiences of family violence, neglect, childhood abuse, and poverty [2]. Our data also supported this, with over half of the focus group participants reporting a history of childhood sexual abuse (57.1%) and all participants in the study reporting that they grew up either working class (71.4%) or poor (28.6%).

Survey data revealed that just over half of the sample said they had access to internet via a home computer. This finding is likely reflective of the samples financial circumstances and reaffirms/validates our more recent decision to adapt the web-based PPI for mobile app delivery. Further, this provides support for the idea that mobile health interventions, particularly mobile apps, are one of the most accessible forms of eHealth. This assertion is also backed by research showing even the most disadvantaged populations have access to a mobile phone and rely on their mobile phones more than any other group for health information [134].

Descriptive findings from the survey also revealed the mental health issues were the most common comorbidities reported, with depression and anxiety being tied for most prevalent in this sample. This finding was consistent with prior research showing that depression is the most prevalent comorbid condition for PLWH. However, in a review of the literature it was reported that estimates were between 22% and 45% [4]. The prevalence of depression in this study was higher. However, prior estimates re: the prevalence of depression in this population have been derived from studies focused on the broader population on PLWH. It has been suggested that SMM LWH are at an increased risk for depression, compared to PLWH, given their experience of intersectional minority stress. These findings provide some support for that, at least in reference to current estimates that have been reported.

While all participants felt both MBIs would positively impact their mental health, there was more interest in restorative yoga, as compared to MBSR. Participants felt yoga would help reduce stress and depression, which has been reported in other focus group studies examining attitudes toward yoga [135,136]. Participants also expressed that they liked how yoga was a "physical from of mindfulness." These finding are consistent with the existing literature; in a review of 88 yoga studies, most reported that participants perceived yoga as beneficial for one's psychological (reported in 85.2% of papers reviewed) and physical health (reported in 79.5% of papers reviewed) [137].

Participants also felt yoga was more accessible and feasible, compared to MBSR. They also said that MBSR seemed like it would be significantly more expensive, as compared to yoga. This finding was not surprising, given yoga is considered one of the most accessible [138] and cost-effective MBIs [137,139]. Yoga classes can be hosted in various settings and do not require special equipment [137,140,141]. Further, from a provider stand point, yoga can be delivered in a group format, which lowers the cost for per-patient time [139]. In turn, this allows providers to offers yoga classes at a reduced cost, compared to some other MBIs. Also, yoga programs do not necessitate the clinical training that is required to deliver traditional mental health treatment, including certain MBIs (e.g., MB-CBT) and is thus more cost-effective [139].

However, inequities regarding access to yoga and other MBIs remain an important issue for SMM LWH and must be addressed. Our findings identified specific barriers that prevent SMM LWH from accessing MBI. Despite the general cost-effectiveness of yoga, all participants endorsed cost as a significant barrier. In prior studies, cost concerns have been frequently identified as a barrier to participating in yoga [137,142,143]. A recently published scoping review examined the barriers (N=38 studies) and facilitators (N=88 studies) of yoga participation [137]. Findings from this review indicated that participants across 21.1% of studies perceived yoga as being a costly and expensive activity [137]. In addition to negative perceptions of yoga being a barrier, this review identified several other barriers, which are also consistent with our focus group findings. For example, 41.4% of the studies reviewed reported "lack of resources" as an important barrier, which included issues related to time (36.8%), environmental access (29.9%) and money (9.7%) [137]. Consistent with finding from this scoping review, in our study, perceived time and commitment burden also emerged as a significant barrier associated with participation in MBI. This theme has been found in other focus group studies examining barriers and facilitators to yoga practice among more general populations [135]. However, in our study, this barrier was mostly discussed in relation to MBSR, given the 8-week commitment to the program, as well as other program details (2.5 hour sessions, homework, etc.). Environmental access also came up in our study as a potential barrier to participating in in-person MBI classes or sessions. Other focus group studies evaluating barriers and facilitators to yoga have reported similar

findings, showing environmental access as a barrier [142,143]. For example, one study conducted a focus group with a sample of low income, African American women, who reported that logistical challenges, such as the location of yoga classes, were a significant barrier to participation [142].

Another theme that emerged was concern regarding the group nature of classes. Participants were primarily concerned with this in relation to yoga, stating that physical activity in a group setting may make them feel self-conscious about their body or lack of knowledge of the yoga poses during class. Self-consciousness has been reported as a barrier in at least one other focus group study, which examined adolescents' perspectives on yoga [136]. Further, findings from the scoping review revealed that 18.4% of studies reviewed found lack of self-confidence to be a barrier, and 13.2% reported lack of knowledge about yoga as a barrier [137].

In order to alleviate this concern and address these barriers, an at-home or in-app option could be offered, in addition to or as an alternative to the in-person classes. This may also have important implications for app-integration, which was another facilitator discussed by the group. Participants made several suggestions for what they envisioned, re: integration of the app with an MBI. The most common suggestion was that the instructor should record the MBI sessions/classes, to upload on the app, which would allow them to participate at home if the missed a session. They also liked the idea of being able to practice yoga or meditations at home, between the in-person sessions. Other suggestions included adding reminders for the classes and providing a schedule of different classes offered. Participants felt that app integration could enhance the flexibility and convenience of the MBIs, which was another theme that emerged when discussing facilitators. Overall, participants felt that yoga provided more flexibility and convenience, as compared to MBSR. Participants were put off by the time commitment required for MBSR (a key barrier), as well as the need to complete the program over an 8-week period. In contrast, they viewed yoga as being more convenient, in the sense that they could easily come and go from classes, it is only one hour – and was thus easier to schedule. They also felt yoga would be easy to do on their own at home. They appreciated the flexibility of not having to commit to a set time or schedule, and mentioned that they could practice a brief yoga session at home when they were too busy to fit in the schedule or practice on the app later that evening if they missed a class.

Another facilitator discussed was social connection. While concern about in-person group-based physical activity yoga was a perceived barrier in our study, we do note that this finding was contrary to results from other studies in which participants reported the lack of a group environment as a barrier to home practice for yoga [137]. This is more aligned with our theme of social connection, which included the discussion of facilitators such as interconnection, social support and connection to the LGBTQ community. Looking back at the scoping review referenced above, of the 88 studies include, 42% found "social benefit" to be an important facilitator of yoga practice, with 23.9% of referring to social interaction and 28.4% focusing on the sense of community/belonging experience in yoga class. Interestingly, this review found that social benefit, as a facilitator of yoga practice, was most salient in studies involving mostly female participants; though most studies included in the review (77.3%) had a majority of female participants [137].

The desire for flexibility and social connection also highlighted the importance of providing options and choice, which was another facilitator identified during the discussion. Participants felt that providing options for different classes (various times and locations), as well as options for in-person vs. online participation, could increase engagement with the MBI. Participants also suggested we offer different opportunities to connect with other participants in the study, including holding a brief in-person group discussion after the MBI activities, community social events (e.g., bowling, movie), as well as an online discussion board. The overarching sentiment was that everyone needs something different, and having options and choice is important, especially in the context of a research study. This was mentioned in reference to MBSR vs yoga, with participants stating that in future studies, they'd like to have a choice for which MBI they participated in. This finding is consistent with self-determination theory, which posits that perceived afforded choice and autonomy are important predictors of psychological wellbeing and quality of life [144,145]. In studies of depression, participants who are given a choice of treatment show significantly lower rates of drop-out, more engagement and greater treatment satisfaction [146-148]. Other studies have shown patient preference also has an effect on treatment outcomes, where those who receive their preferred choice show substantially more improvement following treatment [146,149]. Patient preference studies have become increasingly popular, as the field of mental health has shifted to a more client centered approach, engaging patients in treatment planning [150].

Strengths and Limitations

While the qualitative design is a strength, there are some limitations to working with focus group data. In this study, we were able to provide a snapshot of the study sample's demographics. However, unlike some qualitative studies, we could not provide a demographic context for the specific quotes cited in this paper. Had we been able to do this, a mixed methods analysis examining proportional demographic differences across themes and subthemes could have provided important insights. Specifically, such analyses could be used to more closely examine which participants were most likely to endorse specific barriers

and facilitators, which is information for guiding implementation. For example, prior research examining specific sociodemographic barriers shows that lower educational attainment is associated with less engagement in MBI [151]. Additionally, males, compared to females, were half as likely to engage in MBI; Black and Hispanic participants were also less likely to participate in MBI [151].

Despite this limitation, there are several strengths related to the demographic makeup of our sample. First, the sample was comprised of only racial minority participants. Racial minorities are underrepresented in MBI research. In a systematic review that examined participant demographics across randomized control trials of MBIs, only 56/69 articles reported the proportion of White/Caucasian participants; of those that did report this data, 79% of participants identified as White/Caucasian across studies [152]. As such, need for additional research on MBI efficacy and approaches to reduce barriers for racial minorities has been noted by others as an important priority area [153]. Also, as noted above, this sample of SMM LWH share several demographic characteristics which are associated with lower engagement in MBI (racial minority, sexual minority, male) [151,154]. Specifically, our sample was comprised of predominately Black SMM LWH (71.4%), with representation for Latino (14.2%) and Multiracial (14.3%) SMM LWH as well. This is a strength, as Black SMM are disproportionately affected by HIV, compared to other race/ethnicities, and Latino SMM follow closely behind in prevalence and incidence rates for HIV. While other research has examined the barriers and facilitators of MBI exclusively in samples of racial minorities [142], racial minorities LWH [155], and sexual minorities [154,156], few, if any, have done so exclusively with racial minority SMM LWH.

However, we also recognize that the generalizability of these findings is limited. As noted above, our sample included Black, Latino and Multiracial SMM LWH only. Given this sub-group of the larger SMM LWH population experiences an additional intersectional minority stressor (racial minority stress), as well as structural oppression, this likely influenced the discussion of barriers and facilitators in this study. As such, these findings may not be fully representative of the larger SMM LWH population. Further, it should be noted that some participants may have had prior experience with MBSR and/or yoga, which could have influenced the focus group discussion. Unfortunately, we did not collect data on participants' prior knowledge of, experience with, or biases toward these MBIs, which also limits the generalizability of these data.

Further, given this was the sub-study, there is also an element of self-selection that is apparent in the focus group. Participants first completed 90-days of app use and were later invited to participate in this focus group study. The sample of participants who responded to the invitation to join our focus group may have been more engaged in the initial study, or just generally more responsive and interested in the study topic. We also only inquired whether participants would hypothetically be interested in the two MBIs as an adjunct to the app-based program. Again, on one hand this is a strength, because participants already had experience with the app and were able to respond to this question from an informed position. On the other hand, these results should only be interpreted in reference to the original intervention and may not reflect participants' general interest in MBSR and yoga as standalone programs (i.e., not as adjuncts to the app). We also only asked about restorative yoga only, these findings should not be interpreted as reflecting SMM LWH's attitudes toward other types of yoga.

Conclusions

Implications and Directions for Future Research

Despite the limitations on generalizability, the results from this study offer important implications for future research, including study design, app integration, and the implementation of MBIs. This project also was among a limited number of studies examining yoga/yoga interest among a sample of male participants. There is an over representation of female participants in yoga research. A review of yoga research reported that 77.3% of studies had samples that were majority female and only 9.1% had a sample with a majority of male particpants [137]. This study was also among the first to examine SMM LWH's interest in yoga and MBSR. Future studies with larger and more generalizable samples should further explore the barriers and facilitators to MBI among this population.

Participants in this study also highlighted the importance of choice, which provides an important insight to SMM LWH's experience in research. This finding also has implications for study design. Patient preference trials integrate a theoretically based approach while allowing for patient choice within the context of a controlled trial. Should future research choose to examine the comparative effectiveness of MBSR and yoga among SMM LWH, this design should be strongly considered.

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Ethical Guidelines

The protocol for this research project complies with the ethical guidelines for human subject research. This study was reviewed and approved by the university's Institutional Review Board.

Conflict of Interest

The authors have no conflicts of interest to declare.

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