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A DIGITAL INTERVENTION TO HALT THE NEGATIVE IMPACTS OF COVID-19 ISOLATION AMONG OLDER PEOPLE LIVING WITH HIV

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A DIGITAL INTERVENTION TO HALT THE NEGATIVE IMPACTS OF COVID-19
ISOLATION AMONG OLDER PEOPLE LIVING WITH HIV

by

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A capstone project submitted for Graduation with University Honors

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University Honors

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ABSTRACT

Reported levels of depressive symptoms among older people living with HIV (OPLH) have been heightened during the COVID-19 pandemic, mainly attributed to social isolation. In a collaborative project with six institutions, we developed a Virtual Village for OPLH to discuss their experiences and provide access to resources, with an aim to reduce depressive symptoms. This study is divided into two parts: the pre-pilot phase and the pilot phase. The pre-pilot phase consisted of the conjoint analysis for desired Virtual Village attributes, with sixty-two participants in the interviews and focus groups. Twenty participants successfully completed the pilot phase, which included the pre- and post-surveys. This study was conducted across three regions: Tampa, FL; Coachella Valley/Palm Springs, CA; and Los Angeles, CA. Participants in the pilot phase ranged from ages 51-88 years, with a mean age of 63. The Virtual Village was closely monitored over the span of four weeks while interventions were employed. Participants filled out pre- and post-surveys to gauge changes in quality of life and depressive symptoms. The pre/post surveys collected various data points, including responses from the Patient Health Questionnaire-9, Internalized HIV Stigma, and Affective Mood measures. Majority of participants reported none/minimal depressive symptoms in the pre-survey (63%) and post-survey (57%), with six individuals shifting severity categories. Affective mood and internalized stigma scores did not have substantial shifts. Scores on these measures were utilized to evaluate the Virtual Village's impact on improving quality of life and mitigating depressive symptoms.

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I would also like to acknowledge my family and friends for their support during this journey. This is dedicated to my loved ones and in memory of my grandma, Edelmira Alcalá. *Te quiero un chingo y un montón.*

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INTRODUCTION

“We can learn the art of fierce compassion - redefining strength, deconstructing isolation and renewing a sense of community, practicing letting go of rigid us-vs.-them thinking - while cultivating power and clarity in response to difficult situations.”

-Sharon Salzberg

BACKGROUND & SIGNIFICANCE

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) emerged in Wuhan, China in December 2019, raising concerns among health institutions around the world. As the virus spread rapidly, World Health Organization declared in January 2020 that the virus, also referred to as COVID-19, was a public health emergency that should be addressed as an international concern (Sohrabi et al., 2020) During March of that year, lockdowns ensued across the globe, resulting in widespread isolation. Although these shelter-in-place orders were proven to be successful in slowing the spread of COVID-19 transmission and protecting the physical component of contracting the virus, there were detrimental effects on the psychological aspects of well-being (Folayan et al., 2022; Wang et al., 2020). Additional stressors and cognitive decline in older populations may give rise to feelings of anxiety and agitation (World Health Organization, 2020).

COVID-19 and HIV/AIDS have resulted in some of the most devastating pandemics in the past decade due to their associated high mortality rate. That being said, it is reasonable to be concerned about the mental welfare of the HIV community, especially long-term survivors, as they are enduring another deadly pandemic that can trigger overwhelming emotions. Older people living with HIV (OPLH) are in a need of outlets to minimize the stressors that contribute

to their elevated depression. These sources of stress are often associated with isolation or issues that are specific to their community, such as stigma or shame of their diagnosis (Lesko & Bengtson, 2021). OPLH, an often-marginalized population, are obligated to isolate with more strict guidelines due to their immunosuppression compared to people who are not living with HIV. OPLH are predisposed to experiencing issues stemming from their comorbidities, such as cardiovascular disease, diabetes, and neuropathy (Marg et al., 2019), making them at higher risk for severe COVID-related complications. Other barriers imposed by the widespread isolation may impair HIV medication adherence (Nguyen et al., 2020), which can be further detrimental to their health. Mental health decline is another consequence of minimal socialization, and extra efforts such as social spaces should be made to connect people who are within marginalized populations (Galea, et al., 2020). This isolation epidemic is multifaceted, making it complex to combat. Nevertheless, it is crucial to recognize the trauma it reintroduces to the lives of long-term HIV survivors, and respond by creating interventions to prevent further psychological fatigue.

The COVID-19 pandemic has been a trauma-inducing event for many, especially for OPLH who lived through the emergence of HIV/AIDS in the 80s and 90s. Many OPLH have experienced distinct trauma related to stigmatization and the significant loss of loved ones to HIV/AIDS, which can result in a cluster of psychological symptoms known as AIDS Survivor Syndrome (Anderson, 2020). Individuals who experience traumatic life events tend to experience higher severity of depression (Muscatell et al., 2009), which is especially prevalent in this community. Keeping this in mind, it is pertinent to construct a Virtual Village for OPLH that builds a community with an emphasis on the cohesion of experiences and shared interests. Virtual Villages can be utilized to support aging individuals by delivering a diverse set of

interventions (Brown et al., 2021). As reflected by previous studies, this form of digital intervention has been shown to successfully connect individuals to various types of support systems, such as medical providers, not solely among people living with HIV (Butler et al., 2000). In order to improve one's quality of life and decrease depressive symptoms during the pandemic, it is imperative for the Virtual Village to provide easily accessible positive social activities and resources.

OBJECTIVES

A Virtual Village was implemented to socially connect OPLH to one another while widespread social isolation ensued during the pandemic. This idea was proposed as a potential solution to address and reduce psychosocial issues among OPLH. The Virtual Village will serve as a means for these individuals to remain in touch with their community, and potentially mitigate overall depressive symptoms. By creating a virtual community for OPLH to openly discuss their life experiences, we hope there will be a reduction in reported internalized stigma, and a boost in affective mood.

In a collaborative project with the University of Southern California; HIV and Aging Research Project - Palm Springs; University of California, Merced; Northeastern University; University of Southern Florida; and the University of California, Riverside; we designed a Virtual Village to disseminate health-related information and other resources for OPLH. A Virtual Village was proposed as a solution by the HIV community several years ago to connect isolated individuals. Since this concept was put forth by the community, we expect the project to be sustainable. In the long term, once the server is established, the Virtual Village would be run by moderators within the community.

During the development of the Virtual Village, we ensured that participants were able to openly communicate by providing a safe space to formulate support groups and empower one another. We characterized matters associated with depression and isolation that were intensified by the COVID-19 pandemic, and applied this to the needs of a diverse set of OPLH. Virtual Village was co-developed to address the requests of the community, in addition to utilizing conjoint analysis in our decision-making.

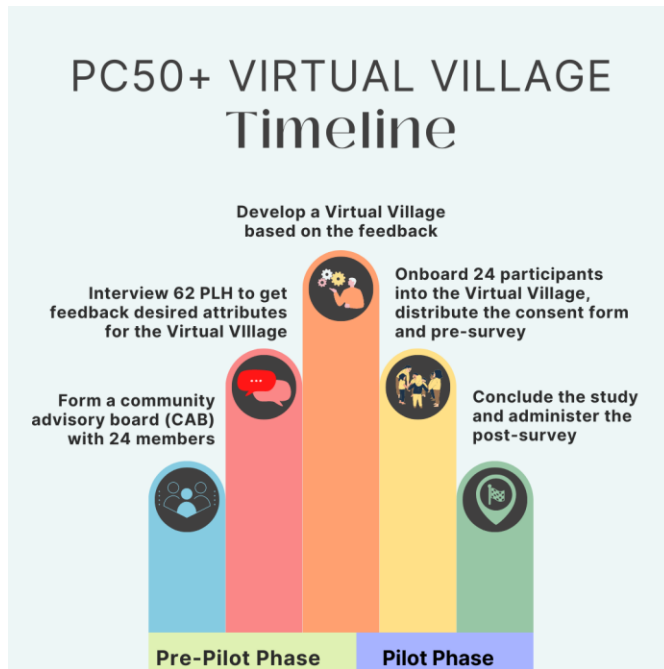
Resources and services were accessible online to users piloting the Virtual Village. Interventions were aimed at promoting healthy aging, meanwhile attenuating the negative impact of social isolation on OPLH. Various forms of interventions were provided, ranging from social events to educational content. The list includes social mixers, expert presentations, resources, guided discussions, a buddy system, subcommunities, mindful meditation Mondays, general and regional resources. Here, we explore the deployment of a Virtual Village for OPLH and its potential to mitigate depressive thought content and internalized stigma, while improving affective mood during stressful life events.

METHODS

STUDY DURATION

The total duration of the study was 24 months, and divided into two phases: the pre-pilot phase and pilot phase. The timeline is illustrated in figure 1 below. The first half consisted of IRB approval, interviews, focus groups, conjoint analysis for elements to include in a Virtual Village, community advisory board (CAB) meetings, and development of the Virtual Village. The second half of the study consisted of CAB meetings, implementation of the Virtual Village, pre- and post-surveys, data analysis, and subsequent publications. Community-based participatory action research processes were applied throughout the entirety of the project.

Figure 1: Timeline of the PC50+ Virtual Village Study



COMMUNITY ADVISORY BOARD

A CAB was formed in July of 2021, consisting of twenty-four OPLH from the three study regions: Tampa, FL; Coachella Valley/Palm Springs, CA; and Los Angeles, CA. These three sites were selected to promote the inclusion of varying sexual and racial populations. In doing so, we hoped to increase the generalizability of our results. The purpose

of forming a CAB was to allow members of the community to guide the researchers on what they envision a Virtual Village to be like. Congruent with our study team’s principles, we made it a priority to engage the community through monthly Zoom meetings. During these meetings, we attentively listened to their insight and took into consideration ways we could improve the study.

CONJOINT ANALYSIS

To ensure the Virtual Village included attributes that OPLH desired, we conducted a series of interviews, focus groups, and CAB meetings to obtain community feedback. The research team constructed a list of 28 attributes, which the CAB rank ordered to identify the top five based on what they would want to be incorporated into the Virtual Village. Afterward, sixty-two participants were recruited to rank the five components [private chat, communities, service directory, cost, registration] via choice-based conjoint analysis. Focus groups and interviews

were conducted to rank order these qualities and received \$50 upon completion. In order to qualify for participation, all individuals had to be English-speaking, resided in a study site, had access to the internet, had to be 50 years of age or older, and living with HIV. During these interviews and focus groups, participants compared various combinations of four scenarios that involved the five attributes at differing levels.

PRE-PILOT PHASE

We recruited participants throughout the study from three sites: Tampa, FL; Coachella Valley/Palm Springs, CA; and Los Angeles, CA. Sixty-two English-speaking OPLH were recruited to participate in focus group interviews, all of which had a minimum age of 50 years, resided in a study city, and had internet access. These focus groups consisted of four to eight individuals per session. During these interviews, most participants reported a need to navigate mental health symptoms and illnesses throughout the pandemic. Psychological distress was related to changes in behavior and daily routines, such as sleep cycles and lack of exercise. Focus group participants stated that online interactions assisted with easing feelings of loneliness, especially when emotional bonds were built.

Seven potential platforms were evaluated to determine their applicability to the needs of our target population. Besides the five attributes listed above, there were other considerations when deciding which platform was most suitable (i.e., moderation features, video chat, privacy mechanisms, and technological support). Discord was selected due to its ability to incorporate these components, as shown in table 1. Discord is a social media platform commonly used to build communities in academic settings, and to create social hubs to discuss leisure activities among friend groups. A server on this platform was established with various features based on community feedback.

Table 1: Seven platforms evaluated to host the Virtual Village

Virtual Village Preferred Attributes							
	Discord	Facebook	Slack	Helpful Village	Canvas	HeySpace	WordPress
No Cost	x	x	x		x		x
Chat Function	x	x		x		x	
Community Formation	x		x	x	x		
Community Resources	x	x	x	x			
Privacy Mechanism	x	x	x	x	x		
Accessibility Features	x	x	x		x		
Moderation	x	x	x	x	x		
Virtual Game Support	x		x				
Function Automation	x					x	
Video Chat	x		x	x	x	x	
Direct Messaging Function	x	x	x				
Technology Support	x	x	x	x	x		

PILOT PHASE

After the server was designed, twenty-four participants from the three study sites were recruited for the pilot Virtual Village over the span of four weeks. To participate in this study, one must verify they are 50 years old or older and living with HIV. The pre-survey included questions about demographics and the measures. Post survey once again included the measures to scale for potential improvements. All participants were requested to fill out a pre-survey with the consent form, and a post-survey after the completion of the pilot. Upon the completion of both surveys, participants received \$50.

DATA COLLECTION AND ANALYSES

CONJOINT ANALYSIS

Responses from focus groups and interviews were recorded through transcriptions. Sawtooth Software’s Hierarchical Bayesian Analysis (2021) was utilized to calculate the relative importance of each attribute.

PATIENT HEALTH QUESTIONNAIRE – 9 (PHQ-9)

The PHQ-9 was administered to quantify and monitor the change in depressive thought content and potential suicidal ideation. This is a nine-item questionnaire that asks about the person's experience in the past two weeks. Respondents rank the frequency on a scale from zero to three according to the statements (0 = not at all; 1 = several days; 2 = more than half of the days; and 3 = nearly every day). The PHQ-9 includes the following question and associated statements:

Over the last 2 weeks, how often have you been bothered by any of the following problems?

- I. Little interest or pleasure in doing things.*
- II. Feeling down, depressed, or hopeless.*
- III. Trouble falling or staying asleep, or sleeping too much.*
- IV. Feeling tired or having little energy.*
- V. Poor appetite or overeating.*
- VI. Feeling bad about yourself — or that you are a failure or have let yourself or your family down.*
- VII. Trouble concentrating on things, such as reading the newspaper or watching television.*
- VIII. Moving or speaking so slowly that other people could have noticed. Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual.*
- IX. Thoughts that you would be better off dead or of hurting yourself in some way.*

PHQ-9 SCORES AND CUT-OFFS

Table 2: PHQ-9 Categorical Cut-Offs

Categorical Cut-offs
0-4 = none, minimal
5-9 = mild
10-14 = moderate
15-19 = moderately severe
20-27 = severe

The PHQ-9 is divided into five categories with cut-offs varying on depression severity, as shown in Table 2. Severity is calculated by adding up the responses to the nine questions, with a minimum possible score of 0 and a maximum of 27 (Kroenke et al., 2001; Kroenke et al., 2002). No depressive symptoms fall into the 0-4 range, followed by mild depressive symptoms (5-9), moderate depressive symptoms (10-14), moderately severe (15-19), and severely depressed (20-27). In the analysis, categorical shifts were examined to determine if there were any substantial changes in depression levels. An example of a categorical shift: a participant's pre-survey PHQ-9 score was moderately severe, but moderate in the post-survey.

INTERNALIZED HIV STIGMA

Derived from the 16-item HIV Stigma Mechanism Measure (Earnshaw & Chaudoir, 2009). This condensed, 6-item subscale, gauges internalized stigma by asking questions about their HIV status. The selected statements address feelings of guilt and shame about their status, as well as underlying themes of discrimination.

Indicate whether you agree or disagree with the following statements:

- I. *It is difficult to tell people about my HIV infection.*
- II. *Being HIV-positive makes me feel dirty.*
- III. *I feel guilty that I am HIV-positive.*
- IV. *I am ashamed that I am HIV positive.*
- V. *I sometimes feel worthless because I am HIV positive.*
- VI. *I hide my HIV status from others.*

AFFECTIVE MOOD

This is a scale consisting of twenty mood adjectives to measure respondent's affective mood. Participants ranked on a scale of 1-5 (1 = very slightly or not at all; 2 = a little; 3 = moderately; 4 = quite a bit; 5 = extremely) the frequency of experiencing the given mood. Ten are relatively positive affects, meanwhile, the other ten are negative affects.

Indicate to the extent you have felt this way over the past week:

Positive	Negative
interest	distressed
excited	upset
strong	guilty
enthusiastic	scared
proud	hostile
alert	irritable
inspired	ashamed
determined	nervous
attentive	jittery
active	afraid

SPECIAL REQUIREMENTS

Our study involved human test subjects and the collection of sensitive information. Dr. Brandon Brown obtained approval from the University of California, Riverside Institutional Review Board to conduct this study.

RESULTS

PRE-PILOT PHASE

RANK ORDERED ATTRIBUTES

Data from the focus groups and interviews were inputted into Sawtooth Software's Hierarchical Bayesian Analysis, which ranked the components based on relative importance. As displayed in table 3, the cost of the platform was the most important factor (24.74), followed by chat function (22.91), ability to form communities (15.58), service directory (17.86), and some form of registration (18.9).

Table 3: Relative Importance of Attributes - Sawtooth Software's Hierarchical Bayesian Analysis (2021)

Attribute	Relative Importance
cost	24.74
chat	22.91
subcommunities	15.58
service directory	17.86
registration	18.9

Furthermore, participants were asked to elaborate on their preferred level of the attributes. Each one was defined as the following and split into two options to clarify the preferences of the group:

- I. Private chat: users can use the chat with others*
 - A. Yes chat*
 - B. No chat*
- II. Cost: what you would pay to use the Virtual Village*
 - A. Free*
 - B. Monthly fee*

- III. *Subcommunities: users can create groups based on interests*
 - A. *Subcommunities can be formed*
 - B. *Subcommunities cannot be formed*
- IV. *Service directory: users would have access to a social service resource directory*
 - A. *Directory available*
 - B. *No directory available*
- V. *Registration: users must register their HIV status and confirm they are 50 years old or older to join the Virtual Village*
 - A. *Registration required*
 - B. *No registration required*

Table 4: Preferred Level of Attributes

Attribute	Preferred Level
cost	free to use
chat	chat function available
subcommunities	have subcommunities
service directory	have service directory
registration	registration required

It was noted that cost to users was an important consideration, as many reported that they did not want to use a platform that requires a monthly subscription. Table 4 above shows the preferred level of each attribute according to the responses. One-on-one chat functions were desired by many respondents, as well as the ability to create subcommunities, social service directories, and a registration process to vet users. This registration process ensured that all users meet the minimum age of 50 or older and are living with HIV.

PILOT PHASE

DEMOGRAPHICS

Table 5: Demographics Age, Gender Identity, Sexual Identity, Ethnicity, and Race (n=20) of the Pilot Phase

Age		
Mean; S.D. (range)	62.7; 9.01 (51-88)	
Gender Identity		
	N	%
Man	15	75
Woman	5	25
Sexual Identity		
	N	%
Gay	13	65
Straight	5	25
Bisexual	1	5
Other	1	5
Ethnicity		
	N	%
Not Hispanic or Latinx	15	75
Hispanic or Latinx	5	25
Race		
	N	%
White	13	65
Black or African American	5	25
Biracial	1	5
Other	1	5

Twenty participants successfully completed the pre- and post-surveys, and their responses were analyzed. Participant demographics are displayed in table 5. Mean age was 62.7 (range 51 – 88), with a standard deviation of 9.01. Seventy-five percent of the participants identified as male ($n = 15$) and five percent as women ($n = 5$). The majority of participants identify as gay ($n = 13$), and non-Hispanic or Latinx ($n = 15$). White participants made up a large percentage of our sample population (65%), followed by Black or African American (25%), then biracial (5%) or other (5%). The individual who responded with “other”

identified as “Chicano”.

Depressive Symptom Prevalence

Table 6: PHQ-9 Categorical Shifts

Shifts
N increase = 3
N decrease = 3
N no shift = 14

Depressive prevalence (PHQ-9 \geq 5) was 37% in the pre-survey and 42% in the post-survey. As shown in table 6, out of the nineteen people who completed the PHQ-9, three decreased by one category, three increased by one category, and most remained constant without substantial shifts (74%).

In table 7 below, each participant’s demographical information is placed side-by-side with their PHQ-9 scores. The majority of scores (>55%) were categorized in the none/minimal range (PHQ-9 \leq 5). Depressive symptom severity in the pre-survey were: none/minimal (PHQ-9 = 0–4): 63%; mild (PHQ-9 = 5–9): 16%; moderate (PHQ-9 = 10–14): 11%; moderately severe (PHQ-9 = 15–19): 5%; and severe (PHQ-9 = 20–27): 5%. In the post-survey: none/minimal (PHQ-9 = 0–4): 57%; mild (PHQ-9 = 5–9): 32%; and severe (PHQ-9 = 20–27): 11%.

Out of the three participants who exhibited overall categorical increases, two identified as gay, white and male. Both shifted from none/minimal to mild. One participant, an African American woman who identified as straight, increased from moderately severe to severe. 61.7 was the average age for this group. Meanwhile, among the three participants who reflected a categorical decrease, all three identified as white, gay males. Two shifted from moderate to mild, and one decreased from mild to none/minimal, and this group had an average age of 59.3. Two of the nineteen participants reported scores of severe depression (PHQ-9 \geq 20), and responded to the statement “thoughts that you would be better off dead or of hurting yourself in some way” with “more than half of the days”. The scores and responses from these two individuals indicate possible suicidal ideation.

Table 7: PHQ-9 Scores with Demographics (n=19)

	Age	Sexual Orientation	Gender	Race/Ethnicity	Pre-Survey Scores	Post-Survey Scores	Categorical Shifts (Cut-offs)
	53	Gay	Man	Black or African American	2	2	No shift
	59	Gay	Man	White	23	26	No shift
	57	Straight	Woman	Black or African American	0	1	No shift
	56	Straight	Woman	Black or African American	16	20	Increase [1] *
	54	Bisexual	Man	White/Hispanic/Latinx	2	4	No shift
	57	Gay	Man	White/Hispanic/Latinx	5	4	Decrease [1] *
	51	Gay	Man	White/Hispanic/Latinx	6	9	No shift
	65	Straight	Woman	White/American Indian/Alaska Native	3	2	No shift
	66	Straight	Woman	White	2	3	No shift
	60	Gay	Man	White/Hispanic/Latinx	10	9	Decrease [1] *
	68	Gay	Man	White	4	8	Increase [1] *
	71	Gay	Man	White	4	4	No shift
	88	Gay/bisexual experiences	Man	White	2	1	No shift
	60	Straight	Woman	Black or African American	0	0	No shift
	61	Gay	Man	White	13	9	Decrease [1] *
	62	Gay	Man	Chicano/Hispanic/Latinx	4	1	No shift
	61	Gay	Man	White	3	5	Increase [1] *
	79	Gay	Man	White	0	1	No shift
	69	Gay	Man	White	7	8	No shift
Median	60.5						
Mean	62.7						
Min.	51						
Max.	88						

*[1] indicates categorical shift (i.e., “decrease [1]” = decrease by one category)

Internalized Stigma Subscale

For the most part, reported internalized stigma levels remained constant from the pre-survey to the post-survey (table 8). There was a 10% improvement between the surveys with the statement “It is difficult to tell people about my HIV infection”. Otherwise, no notable shifts were observed.

Table 8: Internalized Stigma pre-survey and post-survey scores (n=20)

statement	pre-survey	post-survey
It is difficult to tell people about my HIV infection.	55% disagree	65% disagree
Being HIV-positive makes me feel dirty.	90% disagree	90% disagree
I feel guilty that I am HIV-positive.	85% disagree	85% disagree
I am ashamed that I am HIV positive.	90% disagree	90% disagree
I sometimes feel worthless because I am HIV positive.	85% disagree	85% disagree
I hide my HIV status from others.	60% disagree	60% disagree

Affective Mood Measure

As shown in table 9, negative affect mean scores decreased between the surveys. These results indicate that by the end of the study, participants were less likely to feel distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery, or afraid in the past week. On the other hand, the positive affect means do not demonstrate a pronounced shift from week one to week four. Between both surveys, participants reported relatively positive affects.

Table 9: Affective Mood Measure pre-survey and post-survey scores (n=20)

	pre-survey			post-survey	
	Scale	Range	Mean (S.D.)	Range	Mean (S.D.)
Negative Affect	10-50	10-43	20.4 (8.63)	10-34	18.15 (6.82)
Positive Affect	10-50	19-49	33.15 (7.93)	10-50	32.0 (10.18)

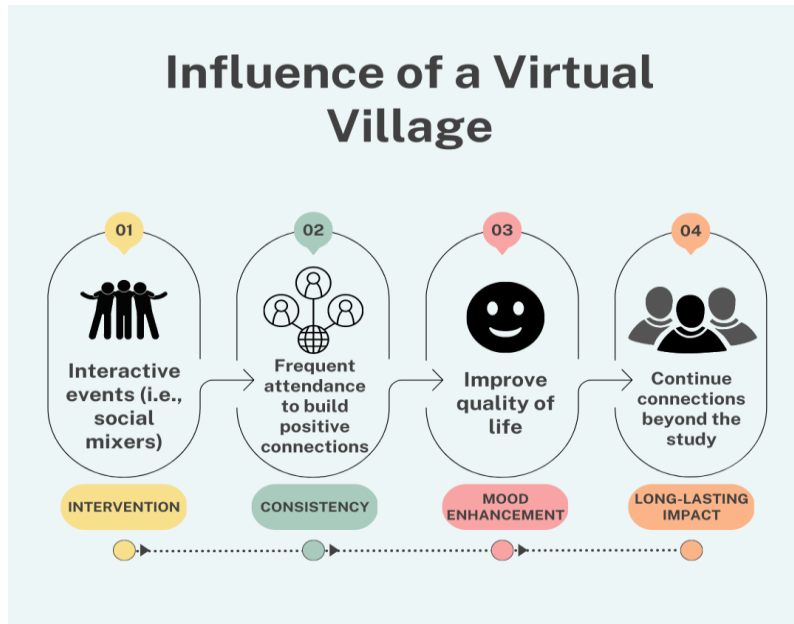
DISCUSSION

Community-based engagement through the formation of a CAB is a fundamental component to ensuring that the needs of the target population are adequately being considered. From beginning to end, our research team ensured transparency and actively included community members in the development of the Virtual Village. By preserving an open line of communication, we were able to successfully construct a Virtual Village that fulfilled the needs of OPLH, while creating positive and meaningful connections. Online socialization during the pandemic can strengthen emotional support systems, which was reflected in participant feedback.

PHQ-9, Internalized Stigma Subscale, and Affective Mood scores from the pre- and post-surveys did not reflect substantial changes overall. Although these findings did not statistically reflect an improvement in participants' quality of life, important lessons were learned, which are forthcoming in a publication (Lopez et al., 2023). Maintaining a good rapport with the community allowed for open conversations between the research team and study participants. Many Virtual Village users verbally conveyed to the team that they were content with the social nature of the study, and decided to extend online friendships to in-person ones. Furthermore, attending interactive events often allowed participants to find others with similar interests and expand their social network. If a future study were to build off of our methodology, we would suggest a longer duration to examine the long-lasting effects.

IMPLICATIONS

Figure 2: Flowchart describing the effectiveness of interventions on quality of life



Virtual Villages are intended to assist with the development of long-lasting connections while individuals age. Interventions in the virtual space could potentially lead to positive connections to attenuate the effects of social isolation, illustrated in figure 2. Although

there is no substantial influence on depressed thought content according to the scores, participants did find certain interventions to be uplifting. The addition of more social events or engaging activities could lead to positive connections that extend past the study. If studies similar to this one were to include a wider range of participants, there could be a greater impact on depression and suicidality. Additional data on interventions and their success is explained in a forthcoming manuscript that I led entitled, 'Lessons learned in co-creating a Virtual Village for people aging with HIV'. The manuscript expands on the implications of the Virtual Village, and the interventions that participants found to be most beneficial. It is currently under revision for the Journal of the International AIDS Society.

LIMITATIONS

Despite multiple attempts to recruit a more diverse set of participants, there were technological barriers that complicated the onboarding process for certain users. Hence, our study sample primarily consisted of individuals who identified as white, which limited the scope

and applicability of our results. Furthermore, the majority of our participants identified as males. Due to the scarcity of female participants, it would be worthwhile to replicate a study that emphasized the perspective of a primarily female sample. The manifestation of HIV in physical aspects, as well as social challenges, differ among the sexes (Gianella et al., 2022; Scully, 2018), further supporting the idea that there should be a Virtual Village designated to cultivate a safe and inclusive space for women to discuss their unique experiences. It is also important to consider household responsibilities and other barriers that women face, as these factors may worsen feelings of loneliness and burden during the pandemic (Jones et al., 2021).

Participants took the PHQ-9 twice over a span of four weeks, once during the pre-survey and the second time during the post-survey. These surveys were distributed four weeks apart. The PHQ-9 specifically asks questions that measure depression and suicidal ideation in the past two weeks, as it is intended to track the duration in accordance with the Diagnostic and Statistical Manual of Mental Disorders. Therefore, the questionnaire should have been distributed at least every two weeks. Keeping this in mind, the scoring of this measure could be inaccurate because it is uncertain if there were any major shifts mid-study.

Limited accessibility to technology should be addressed in future studies. It would be worthwhile to include lower-income individuals in the study, which could be done by providing devices with access to the internet. This could result in the diversification of participants and provide differing views on the impact of the Virtual Village on their quality of life.

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