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School of Behavioral Health

Feasibility and Effectiveness of an Online Mindfulness Stress Reduction Intervention

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By

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Each person whose signature appears below certifies that this dissertation in his/her opinion is adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Abstract

Health disparities in low-resource communities lead to poor physical and mental health outcomes. To reduce health disparities, the United States has looked to global health initiative and is starting to rely on lay health workers more consistently as a promising and sustainable force. Community Health Worker (CHWs) work alongside the local health care system to connect vulnerable populations to needed care. However, the demand of their role puts CHWs at risk for stress, burnout, and vicarious trauma. Mindfulness-Based Stress Reduction (MBSR) is a stress reduction intervention that has been empirically supported to reduce stress and burnout in numerous populations. To support CHWs, this study aims to evaluate a six-week, live, online, low-dose MBSR (MBSR-ld) training to help reduce stress and burnout. Findings supported hypotheses, such that participants identified mindfulness skills were feasible, appropriate, and acceptable for their work. Furthermore, Levels of perceived stress were statistically significantly less after receiving the intervention and at 3-months and 6-months follow-up. Participants who reported increased use of mindfulness, also reported decreased symptoms of burnout. These findings provide valuable information that may drive policy and training to support CHWs and other lay health workforces. This study is the first to explore a live online MBSR-ld intervention to reduce stress and burnout among Community Health Workers serving a critically under resourced region in the United States.

Keywords: mindfulness intervention, community health workers, paraprofessionals, stress and burnout, mental health, underserved communities

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Chapter 1

Introduction

Feasibility and Effectiveness of an Online Mindfulness Stress Reduction Intervention

Community Health Workers (CHWs) working in under-resourced communities are at increased risk of experiencing stress and burnout (Li et al., 2014; Nasiripour et al., 2023; Selamu et al., 2017). High levels of stress and burnout are associated with increased risk for physical and mental health disorders including depression (Lenzo et al., 2021), anxiety (Racic et al., 2017), and cardiovascular disease (Dar et al., 2019). Addressing stress and burnout concerns among CHWs is necessary for their mental health, overall well-being, and the betterment of outcomes for the communities they serve.

Health Disparities in Under-resourced Communities

According to the World Health Organization (WHO) (2021), social determinants of health are the environment and conditions where a person is born, lives, grows, and works, which includes the healthcare system. WHO reports that social determinants of health, as well as race/ethnicity, sex, sexual orientation, age, and disability, are all directly linked to health inequalities in under-resourced communities (WHO, 2021). Health disparities are differences or gaps in the quality of healthcare and the avoidable and unfair difference in health outcomes among groups (Odoms-Young et al., 2024; Riley, 2012; WHO, 202l). There is substantial evidence of health disparities in access to evidence-based medical health care (Brown et al., 2000), medical health care treatment (Shavers & Brown, 2002), food environment (Odoms-Young et al., 2024), and health

outcomes for under-resourced communities and ethnic/racial minority groups (Roll et al., 2013; Wheeler & Bryant, 2017; Zavala et al., 2020).

For ethnic/racial minorities, disproportionate rates in health care access and health care outcomes are prominent in cancer care (Brown et al., 2000; Zavala et al., 2021), diabetes (Cheng et al., 2019; Peek et al., 2007), infant mortality (Black & Health, 1985; MacDorman & Mathews, 2011), homicides and traffic fatalities (Black & Health, 1985; Raifman & Choma, 2022), regular health care visits (Flynn et al., 2020), and premature death (Riley, 2012). The literature consistently supports that ethnic/racial minorities are less likely than non-Hispanic White individuals to receive accurate diagnoses and appropriate treatment even when presenting with similar symptoms (Riley, 2012). Treatment disparities in pain management influence equitable medical health and directly impact progress and outcomes among patients, especially among Black patients (Knoebel et al., 2021). Although considerable progress has been made to address these crucial issues, racial and ethnic disparities in health outcomes have persisted, with disproportionate rates being found today as they were over ten years ago (Riley, 2012; Wheeler & Bryant, 2017; Zavala et al., 2020).

Mental Health Disparities in Under-resourced Communities

According to the World Health Organization (2020), mental health problems are rising at an alarming rate, with suicide being the second leading cause of death among adolescents and young adults. Women, youth, ethnic minorities, LGBTQ+ communities, older adults, and those in rural areas demonstrate significantly higher rates of mental illness (Chatterjee et al., 2023). Severe mental health disorders often lead to severe physical health outcomes including premature death (World Health Organization (WHO,

2020). According to WHO (2020), people with severe mental health conditions die approximately two decades earlier than people without severe mental health conditions. Unequal access to mental health care is prevalent in underserved regions both in the United States and in low- and middle-income countries (World Health Organization, 2008). As such, one of the primary concerns in global mental health efforts is access to evidence-based mental health care (U.S. Dept. of Human and Health Services, 2015).

In the United States, the mental health workforce rate shows disparate ratios from individuals to provider: (1) for psychiatrists the ratio is 1:10,000, (2) for psychologists the ratio is 3:10,000, and (3) even more concerning is the ratio for child psychiatrists at approximately 2:100,000 (World Health Organization, 2017). Other paid mental health workers such as social workers and counselors are more accessible at about 78:100,000 (World Health Organization, 2017). Alongside current rates, Health Resources and Services Administration (HRSA) states there are substantial shortages of addiction counselors, marriage and family therapists, mental health counselors, psychologists, psychiatrists, and school counselors projected into 2037 (Bureau of Health Workforce, 2024). With the growing number of mental health needs in the United States, the ratio from individuals to providers is insufficient to provide mental health care services to all who need it.

These mental health statistics place our most vulnerable populations at the greatest risk for lack of mental health care. While there have been advances in understanding the nuances of help-seeking preferences among minority groups (Gearing et al., 2024), research consistently demonstrates that ethnic and racial minorities are less likely to seek and receive mental health support than non-Hispanic White individuals

(Alegría et al., 2016; Alegría et al., 2008; Coker et al., 2009; Hines-Martin et al., 2003). According to the Substance Abuse and Mental Health Services Administration (2015), Black and Hispanic adults were significantly less likely to receive any type of mental health service than non-Latinx White individuals, after controlling for gender. Among adults ages 35 to 49 with any mental illness, approximately 29% of Hispanic adults and 34% of Black adults used any type of mental health service compared to 49% of non-Hispanic White adults. Accordingly, Cook et al., (2017), found significant differences in access to mental health care between minority groups and non-Latinx white individuals in a follow-up study analyzing data between 2004-05 and 2011-12. Although there are substantial advances in the use of telemedicine and telehealth post COVID-19 pandemic, research shows the likelihood of using telehealth is lower among Hispanic and Black patients than non-Hispanic White patients (Lasiello et al., 2023; White-Williams et al., 2023). Not only do their findings indicate the presence of significant disparities, but the results show evidence that, for Black and Latinx groups, rates of disproportionate access to mental health care and psychotropic medication are increasing (Cook et al., 2017).

Health disparities are prevalent in under-resourced communities for various reasons. According to the U.S. Department of Health and Human Services (DHHS) (2020), social determinants of health include a plethora of factors: socio-economic status (SES), race, sex, sexual orientation, disabilities, geographical location, access to health care, and mental health (Health & Services, 2001). The DHHS (2015), seeks to tackle these health disparities through an action plan that addresses several barriers to treatment for under-resourced minority communities. One of these priorities includes strengthening the mental health workforce (U.S. Dept. of Human and Health Services, 2015).

Barriers to Treatment in Under-Resourced Minority Communities

Numerous patient-level and provider-level barriers to mental health care in underserved populations have contributed to mental health disparities in the United States (Bureau of Health Workforce,2024; Roll et al., 2013). Roll et al., (2013), identified key groups at risk for mental health disparities in the United States: (1) working adult woman, (2) children, (3) uninsured persons with low income, (4) and having poor or chronic health conditions. Latin and Black minorities encounter disproportionally more barriers to receiving mental health treatment than non-Latin White individuals (Alegría et al., 2016; Coker et al., 2009; Hines-Martin et al., 2003). For youth and families in underserved communities, these barriers include (1) a shortage of mental health workforces (Bruckner et al., 2011; Thomas et al., 2012), (2) lack of adequate health insurance (Druss & Rosenheck, 1998; Mojtabai, 2009; Shi & Stevens, 2005), (3) issues of cultural competence (Whaley & Davis, 2007), (4) conflicts with work schedules and child care needs (Khanassov et al., 2016), (5) transportation needs (Wolfe et al., 2020), (6) geographical location (Alegría et al., 2008), and (7) stigma (Knaak et al., 2017).

1.1 Cultural Competence. Cultural competence in health care is the integration and acknowledgment of the patient's culture, health care beliefs, prevalence of disease, and their relationship to treatment outcomes (Betancourt et al., 2016; Lavizzo-Mourey & MacKenzie, 1996). Cultural competence is a barrier to mental health treatment (Betancourt et al., 2016; Flynn et al., 2020). One reason may be due to the shortage of mental health providers from racially diverse backgrounds. The psychology workforce (doctorate level psychologists) is primarily comprised of White individuals, only 16.4% of active psychologists in 2013 were minorities (American Psychological Association

(APA), 2018). In 2023, 21.34% of the U.S. psychology workforce were minorities (American Psychological Association (APA), 2025). While the number of culturally diverse psychology workforces is changing, the change is gradual with an approximate 5% increase in culturally minority psychology workforce in the last 10 years. The mental health workforce (comprised of master's-level counselors and social workers) is at similar trends with non-Hispanic White individuals being the most common race or ethnicity (Data USA, 2017). While trends in the data demonstrate an increase in the mental health workforce from diverse backgrounds (APA, 2018), the lack of culturally competent delivery of therapeutic services is a barrier to mental health treatment for underserved minority communities (Rice & Harris, 2020; Whaley & Davis, 2007).

Cultural competency is also an issue that is of concern in the medical health care setting. Research shows that negative health care experiences with providers lead to poorer health adherence and dissatisfaction with providers (Betancourt et al., 2011; Flynn et al., 2020). For instance, Latina patients that perceive their non-Latinx White provider as less culturally competent had increased feelings of shame and embarrassment, which lead to a decreased likelihood of seeking medical care (Flynn et al., 2020). A second study explored implicit and explicit bias between Black and nonBlack patient-physicians' interactions (Penner et al., 2010). Black patients had a more negative experience with nonBlack physicians who demonstrated aversive racism (low explicit bias, high implicit bias) than interactions with nonBlack physicians with high explicit bias (Penner et al., 2010). One article reported on healthcare professionals' LGBTQ+ cultural competency, including that more diversity, intersectionality, and multiple minority identities appear to lead to higher levels of competency (Nowaskie and Najam, 2022).

Cultural competence is necessary to reduce perceived negative interactions between patients and mental health providers. Hines-Martin, et al., (2003) conducted a qualitative study to examine barriers to metal health services in low-income African American groups. They found that barriers to treatment can be categorized into individual (fear/mistrust), environmental (resources), and institutional barriers (gatekeepers/limitations). Moreover, there is a lack of culturally tailored services that exasperate the unequal access to mental health care for immigrant and minority groups (Pumariega et al., 2005; Saechao et al., 2012; Yu et al., 2023).

1.2 Geographical Location. Minority groups often live in underserved areas that, on average, have greater rates of poverty and worse rates of health insurance coverage compared to non-Latin white individuals (Alegría et al., 2008). Access to quality mental health care is also a challenge for people living in rural communities where there is a shortage of effective mental health workforces and high rates of unmet needs (Thomas et al., 2012; Thomas et al., 2009). One study examined access to licensed mental health providers and geographic location of underserved communities and found systematic variability with race, education, and economic status of those regions (Sharma et al., 2017). Geographical locations with the highest concentration of licensed mental health providers included areas that were wealthier, White, educated, and older (Sharma et al., 2017). This implies that there is greater distance between minority populations and mental health providers. The consequential travel time elicited from their geographical location is a barrier to mental health treatment for minority groups (Ronzio et al., 2006). Moreover, while telemedicine has emerged as a possible solution to increase access, technological barriers, regulatory hurdles, and patient acceptance remain a challenge

(Anawade et al., 2024). Arguably, individuals from low-socioeconomic backgrounds or those who live in more isolated areas often do not have the financial and work stability to access and or afford mental health care.

1.3 Insurance Coverage. Lack of health insurance was associated with a higher risk of dropping out of mental health treatment (Olfson et al., 2009). Without health insurance, individuals from under-resourced communities often cannot afford mental health care. This issue heightens the risk of severe mental health disorders, and may contribute to higher suicide rates (Hester, 2017). Unfortunately, people who have mental health problems are less likely to have insurance coverage (Garfield et al., 2011; Pearson et al., 2009). Pearson et al., (2009) discussed that having insurance coverage was 40% lower for individuals experiencing serious psychological distress than those not experiencing serious psychological distress. That is, those who need it the most have the lowest levels of access due to cost. For those who are insured, cost of mental health services is still a barrier to treatment because insurances may not completely cover the cost of mental health services (Rowan et al., 2013). The cost of mental health services is a barrier to treatment even for people who are already insured; therefore, the cost is a significant barrier for people from low-socioeconomic backgrounds who cannot afford health insurance (Rowan et al., 2013).

1.4 Stigma. Numerous studies identify mental health stigma as a critical barrier to seeking care and, thus, hinders positive mental health treatment outcomes (Corrigan et al., 2014; Eisenberg et al., 2009; Golberstein et al., 2008). Mental health stigma care is present (1) as self-stigma (Eisenberg et al., 2009; Mojtabai et al., 2011), (2) in interpersonal relationships (Corrigan et al., 2014; Pedersen & Paves, 2014), and as (3)

structural factors (policies or institutions) (Livingston, 2013). Self-stigma is when a person with a mental health diagnosis internalizes the negative public attitudes and social stigmas around their diagnosis (Bathje & Marston, 2014). With interpersonal stigma, there is the fear that others' will judge or harass them based on their mental health diagnosis (Corrigan et al., 2014). Structural factors that lead to stigma include institutional policies that may restrict opportunities of people with mental illness (Livingston, 2013). This is especially true for minority groups where stigma against mental health is pervasive (Eisenberg et al., 2009; Nadeem et al., 2007). Nadeem et al., (2007) found stigma was a significantly greater barrier to seek mental health treatment among immigrant women compared to non-Latin White women (Nadeem et al., 2007). Moreover, Latin groups may perceive others with mental illness as crazy (*locos)* (Rastogi et al., 2012) or dangerous (Brennan et al., 2005). There is also a general lack of understanding of mental health needs among minority populations that do not actively seek out services, including older minority adults (Paul & Kim, 2024).

Community Health Workers Reduce Barriers to Treatment

One possible solution to reduce some of the barriers described above is to leverage lay health workers such as Community Health Workers (CHWs) (Barnett et al., 2018). CHWs are recognized under different names: *promotores*, lay health workers, community health representatives, paraprofessionals, natural helpers, peer health educators, and more (Acevedo-Polakovich et al., 2013; Barnett et al., 2018). In the United States, CHWs work alongside the local health care system and act as a liaison between vulnerable populations and health care systems (WHO, 2007). They often share socioeconomic, ethnic backgrounds, and life experiences as the families they serve (U.S.

Department of Health and Human Services (DHHS), 2007). CHWs are trained through local programs and often do not have higher education beyond a high school diploma (L. Lee et al., 2019). Nevertheless, Community Health Workers (CHWs) are a promising workforce in bridging the gap in health disparities for minority and under-resourced communities, including addressing needs during the time that patients spend outside of the health care setting (Barnett et al., 2018; Loyd et al., 2020).

A persistent concern for mental health disparities is the lack of access to evidence-based mental health care in minority and under-resourced communities (Roll et al., 2013). CHWs may be part of the solution to this concern as their training is shorter-term and more cost-effective compared to Masters-level licensed clinicians (Campbell et al., 2015; Dower, 2006). There are several additional benefits to including CHWs as part of the mental health workforce in the United States including, culturally competent provisions of services (DHHS, 2017), improving access to care (Chang et al., 2018; Witmer et al., 1995), and addressing issues of stigma (Abraham, 2020). As such, research findings support incorporating CHWs into mental health service support and delivery (Acevedo-Polakovich et al., 2013; Barnett et al., 2018; Chavira et al., 2017).

1.1 CHWs Resolve Issues of Cultural Competence. According to Betancourt et al., (2016), increasing the ethnic diversity in health workforces can increase cultural competence and address health disparities for ethnic minorities. A culturally competent individual is able to understand the client's cultural background, language, and life experiences to deliver effective services (Betancourt et al., 2016). CHWs address cultural competency barriers because they often share the same community, culture, language, and ethnic background as the families they work with, which allows for culturally

appropriate delivery of services (DHHS, 2007). Of note, the CHWs may be trained in cultural humility (Belliard et al., 2021), that is, CHWs play a role as mediators between community members and the "systems" and equilibrate the power imbalance that exists in society. They are paraprofessionals that genuinely understand the unique life experiences of the community and can culturally tailor services to meet the needs of their communities (CDC, 2016; WHO, 2017; WHO, 2007).

1.2 CHWs Resolve Issues of Geographical Location. CHWs work and live in the communities they serve and deliver home-based services (Lohr et al., 2018). They are able to provide services to people living in rural communities where there is a shortage of effective mental health workforces and high rates of unmet needs (Thomas et al., 2012). That is, they eliminate the transportation needs that arise when obtaining mental health services. In doing so, they also address the barrier of child care because CHWs' work schedules are flexible enough to support families' work schedules (Lohr et al., 2018).

1.3 CHWs Resolve Issues of Access to Care because of Insurance Coverage. CHW programs in the United States are funded through federal, state, and foundation grants (Rural Health Information Hub, 2021) and their services are free or of low-cost (MPHSalud, 2014). In an effort to address access to care because of lack of health insurance, one of their roles is insurance enrollment (MHPSalud, 2014; (Perez et al., 2006). They also refer families to appropriate and affordable resources and are effective in delivering evidence-based services (WHO, 2017), which reduces the need to seek costly medical or mental health provider services. Thus, they address the issues that come with inadequate insurance coverage.

1.4 CHWs Resolve Issues of Stigma. Community Health Workers are trusted members of the community (Katigbak et al., 2015) and have the unique opportunity to build connections with clients that is often deeper than the clients' rapport with their primary mental health care providers (Bashoura et al., 2020). For instance, a CHW that participated in a needs assessment that informed this study stated: "*[The families] share really private stuff you know, and they like talking to me. They say they don't feel comfortable sharing some of these things with their [doctor or therapist]*." The level of trust and intimate connection CHWs have with the families they serve is a suitable opportunity for CHWs to address the stigma engrained in some of our ethnic minority communities. Because they are trusted members of the community, families may be more receptive to CHWs (MHPSalud, 2014). For example, CHWs can provide increased psychoeducation on mental health, provide adequate resources, and address misinformation that increases stigma in these communities (Lohr et al., 2018)

Community Health Workers Can Effectively Deliver Care

On a global scale, CHWs provide support in rural communities and low-and middle-income countries (LMIC) (World Health Organization, 2007). They deliver an array of services as paraprofessionals: (1) mental health (Rahman et al., 2008), (2) managing chronic diseases (Campbell et al., 2015; Shah et al., 2013) improving health outcomes (CDC, 2016), (3) linking families to resources (Bashoura et al., 2020; CDC, 2016; WHO, 2017), and (4) advocating for individual and community needs (Bashoura et al., 2020). In low- and middle- income countries where access to standard care may be limited (Jeet et al., 2017), CHWs have been trained in a variety of disease prevention initiatives. For instance, in India, Jeet et al., (2017) found that using CHWs in health

programs was effective for tobacco cessation, diabetes and blood pressure control. In South Africa, CHWs play an important role in supporting HIV/AIDS treatment programs (Mottiar & Lodge, 2018). In South Asian countries (including India, Bangladesh, Pakistan, Nepal, and Afghanistan), CHWS have been trained to deliver maternal, newborn, and child health services to most rural districts of their countries (Bhutta et al., 2018). Their work helps improve health disparities to promote access to necessary health care services.

Although delivery of evidence-based medical health services by CHWs in the United States is less developed, they are capable of delivering effective health services including prevention and control of heart disease and stroke (Brownstein et al., 2005), diabetes (Hunt et al., 2011; Shah et al., 2013), dementia (Au et al., 2019), medication adherence (Banderia et al., 2025), and neonatal care (FORSYTHE & Willis, 2008). Brownstein et al., (2005), discovered that incorporating CHWs to the primary care health team improved access to and continuity of care and adherence to treatment for hypertension. Incorporating CHWs as health advisors for patients with type 2 diabetes showed improvement in knowledge, hemoglobin A1C, blood pressure, and physical activity (Hunt et al., 2011). Au et al., (2019) used paraprofessionals to deliver telephone-based intervention for family members with dementia and found significant increase in relationship satisfaction. Moreover, CHWs made important contributions to the COVID-19 pandemic response, including community education and ensuring patients had access to needed medication before lockdowns (Salve et al., 2023). Last, CHWs use evidence-based principles to facilitate education and supportive home visits that promote optimal

health outcomes for preemies and their parents, with consistent positive satisfaction from families (FORSYTHE & Willis, 2008).

Studies conducted with CHWs serving in the United States demonstrate that they are also capable of delivering effective mental health services including proving psychoeducation (Barnett et al., 2018), emotion regulation in children (Wyman et al., 2010), early intervention (Barnett et al., 2018), and depression and anxiety (Montgomery et al., 2010). Barnett et al., (2018) explored the roles of CHWs in delivering interventions and report that in most cases, CHWs were the sole provider and delivered evidence-based treatments where CHWs demonstrated positive health outcomes for underserved communities. Wyman et al., (2010) used paraprofessional mentors in class settings to strengthen emotional self-regulation in children with emerging mental health problems and found positive outcomes including reduced behavior issues and improved social skills.

While it is more common for CHWs working in low- and middle- income communities to deliver evidence-based interventions (Barnett et al., 2018), Montgomery et al., (2010) explored the efficacy of CHWs in delivering cognitive-behavioral therapy (CBT) to individuals with depression and anxiety. Their study findings indicate CHWs delivering stepped care CBT support were as effective as professionals in reducing depression and anxiety among clinical patients (Montgomery et al., 2010). While a number of barriers prevent evidenced-based care access to underserved groups, CHWs have demonstrated a readiness to serve as members of the clinical paraprofessional workforce (Lee et al., 2019; Lewis et al., 2019). They demonstrate a willingness to go out of their role to address the needs of the families they work with (Barnett et al., 2018),

with an unfailing commitment to social justice (Murray & Ziegler, 2015). That is, CHWs are a workforce capable of supporting dissemination and implementation efforts of mental health care services, while addressing barriers to treatment and gaps in health disparities (Balcazar et al., 2011; Barnett et al., 2018; Rosenthal et al., 2010).

Stress and Burnout among Community Health Workers

The negative effects of stress and burnout on mental and physical well-being are well-documented and include an array of concerns from acute distress to severe physical and mental health disorders (McEwen, 2006; Van der Kolk, 1994; Yaribeygi et al., 2017). According to the American Institute of Stress (2014), 77% of people regularly experience physical symptoms caused by stress and 48% reported that stress had a negative impact on their personal and professional lives. Maslach et al., (2001) define burnout as a "prolonged response" to "emotional and interpersonal stressors on the job." Chronic feelings of burnout interfere with effectiveness at work (Maslach et al., 2001). Both burnout and stress are associated with anxiety and depression (Maslach et al., 2001; Vedhara et al., 2003). Although research on stress and burnout among CHWs in the U.S. is limited, the levels of stress among CHWs are, arguably, similar to the high levels of stress and burnout observed in other mental health providers, given the nature of their role as a helper and the families as help receivers (Awa et al., 2010).

Indeed, the demands of their role and intimate experiences with families place CHWs at risk of experiencing stress, burnout, and vicarious trauma (Bashoura et al., 2020). Literature findings from low-and middle-income countries indicate CHWs are at high levels of risk to experience stress and burnout (Edwards et al., 2000; Haq et al., 2008; Li et al., 2014; Selamu et al., 2017). For CHWs working in Ethiopia, their main

stressors included role ambiguity, workload, and economic self-sufficiency (Selamu et al., 2017). Edwards et al., 2000 reported similar stressors including increased workload, increased administration, and lack of resources. One review that explored burnout, distress, and mental health symptoms among CHWs in low- and middle-income countries during the COVID-19 pandemic, highlighted disorders and symptoms such as depression, anxiety, fear, burnout, worsened stress, and fatigue reported among CHWs (Ndulue et al., 2024). Anh Hoang et al., (2024) found a substantial increase in stress levels among CHWs in Vietnam probably due to their COVID-19 related work, including less sleep, working in unfavorable environments, and being involved in daily exposure activities.

As frontline care providers and members of the communities they serve (Barnett et al., 2018), CHWs create valuable relationships with the families and, while this makes them effective in their work (Chavira et al., 2017), CHWs have reported feeling overworked because they feel a high sense of responsibility to address the families' needs (Bashoura et al., 2020). Last, CHWs often work with community members that would, otherwise, not receive access to services. Much like the participants in this study, CHWs often work with vulnerable populations, including those experiencing homelessness, food insecurity, high-risk youth, and more (Kangovi et al., 2020; Babando et al., 2022; Zuvekas et al., 1999). This work brings the CHWs into contexts that expose them to face their own traumatic experiences and that can influence potential stress and burnout levels.

In line with previous research, CHWs in San Bernardino County (Southern California) are feeling overworked, have role ambiguity, experience vicarious trauma, and step outside of the boundaries of their role to help families in need (Bashoura et al., 2020). Preliminary findings from a need's assessment that informed this proposal

supports the literature on stress and burnout among CHWS from low- and middle-income countries (LMIC), suggesting CHWs in this region are also experiencing similar levels of stress and burnout (Bashoura et al., 2020). CHWs reported feeling overworked, *"I would just have to keep working, even when I was out of the office,"* issues with role boundaries *"It gets hectic…you get pulled in many different directions,"* and vicarious trauma *"You think about what happened and vicarious trauma is present"* (Bashoura et al., 2020).

Mindfulness Meditation

Mindfulness has origins in Buddhist teachings and is in-the-moment awareness that comes from paying attention in a way that is non-reactive, non-judgmental, and openhearted (Kabat-Zinn, 2015). It is also described as a state of consciousness that prioritizes attending to the current moment (Brown & Ryan, 2003). Buddhist teachings describe mindfulness as the heart of Buddhist meditation and the key to knowing, shaping the mind, and freedom of the mind (Kabat-Zinn, 2015).

While its roots come from Buddhist teachings from east-Asian countries, its use in Western countries has demonstrated a plethora of advantages including consistently reducing general psychopathology (Davis & Hayes, 2011; Heeren & Philippot, 2011; Teasdale et al., 1995), reducing anxiety and depression (Evans et al., 2008; Hofmann et al., 2010), increasing health benefits (Majeed et al., 2018; Márquez et al., 2019), increasing coping (Belton, 2018), increasing emotional regulation (Hülsheger et al., 2013), reducing burnout (Guidetti et al., 2019; Suleiman-Martos et al., 2020), and reducing stress (Greeson et al., 2015; Jayawardene et al., 2017; Neece, 2014; Pascoe et al., 2017). As such, there has been an increase in the use of mindfulness interventions to

address mental health concerns in the West (Creswell, 2017; Khoury et al., 2013; Zoogman et al., 2015). One of the most widely implemented and empirically supported mindfulness interventions is Mindfulness-Based Stress Reduction (MBSR) (Kabat-Zinn et al., 1992).

Mindfulness Based Stress Reduction

Mindfulness Based Stress Reduction interventions (MBSR) (Kabat-Zinn et al., 1992) can reduce stress and burnout among CHWs. MBSR was created by Dr. Jon Kabat-Zinn at the University of Massachusetts Medical Center (Kabat-Zinn et al., 1992). Traditional MBSR consisted of eight weekly two-hour sessions, take-home practices, and a 6 hour mostly silent meditation retreat (Kabat-Zinn et al., 1992). The sessions consist of take-home practices, participants engage in various meditation techniques, where mindfulness awareness meditation is the principle self-regulating activity (Kabat-Zinn, 1982). The eight-week program includes three mindfulness meditation practices: sweeping (body scan), mindful breathing, and yoga postures (Kabat-Zinn, 1982). MBSR has demonstrated consistent and significant improvements in mental health outcomes in various populations including teachers (Gold et al., 2010; Ruijgrok-Lupton et al., 2018), health professionals (Ghawadra et al., 2019; Shapiro et al., 2005), therapists in training (Shapiro et al., 2007), parents with children with developmental delays (Chan & Neece, 2018; Neece, 2014), and working professionals (Chiesa & Serretti, 2009; Janssen et al., 2018). Recently, MBSR has been adapted into a six-session program that has found efficacy in a plethora of research (Choe et al., 2020; Wexler et al., 2023) among various populations. One study reviewing the impact of MBSR among nurses working during the COVID-19 pandemic, which identified that both the 6-week mindfulness intervention

and traditional 8-week interventions were effective in reducing stress, depression, and anxiety among nurses (Wexler et al, 2023).

While previous research has shown promising results from the traditional MBSR model, the applicability of this program may not be feasible for some settings. In their pre-post observational study on primary health care providers, Goodman et al., (2012) found that burnout scores and mental well-being improved significantly after receiving the MBSR 8-week model. However, the primary health care providers paid $400 and the providers in training paid $200 for this class (Goodman & Schorling, 2012). The time commitment and monetary expectations to be a part of this 8-week mindfulness-based stress reduction program may not be feasible for a busy lay workforce working in an under-resourced (and often underfunded) community. As such, we seek to support the implementation of a low-dose mindfulness-based intervention.

Low-Dose Mindfulness-Based Stress Reduction

Compared to the typical MBSR model, the low-dose MBSR intervention has reduced the time spent on mindfulness training but maintains the core elements of the traditional MBSR intervention (Klatt et al., 2009) [see Table 2 for a comparison of the two models]. One study found no significant differences between the effect of the mindfulness intervention and number of in-class hours for clinical (in-patient populations, some cancer and cardiovascular patients) and nonclinical samples (students or community volunteers). This supports the use of mindfulness stress reduction models that have less session time (Carmody & Baer, 2009). We acknowledge other studies that do not contain a mindfulness component have demonstrated effectiveness in reducing stress and burnout, including cognitive behavioral therapy (CBT) and dialectical behavior

therapy (DBT) (Bamber, 2006; Robins et al., 2019; Robinson et al., 2020). However, MBSR was designed specifically to address stress (Kabat-Zinn, 2003) and research supports MBSR as an effective and feasible stress reduction model for adults in work settings (Chin et al., 2019; Klatt et al., 2009). Moreover, the low-dose MBSR model was designed to reduce stress in working adults who have limited availability. Thus, MBSR-ld reduces the time commitment that may impede access for stressed individuals in a busy work environment (Klatt et al., 2009).

The COVID-19 pandemic demonstrated many interventions could be effectively delivered online. Specifically, several studies support the delivery of live online MBSR as an effective alternative to traditional in-person delivery (Johansson et al., 2015; Spadaro & Hunker, 2016). To address the barriers of access to mental health services by a busy lay workforce, this low-dose MBSR intervention will be delivered live (in real time) online (via video conferencing). This project evaluated a more feasible and less time-intensive online mindfulness-based stress reduction model (MBSR-ld) (Klatt et al., 2009) for Community Health Workers.

Current Study

Health disparities in underserved communities affect child and caregiver health outcomes (WHO, 2020). CHWs are a promising workforce in the battle against health disparities (Barnett et al., 2018). However, research and preliminary findings suggest that CHWs are at risk for stress and burnout (Bashoura et al, 2020), which may lead to less effective implementation and dissemination of quality services (Maslach et al., 2001). Mindfulness based interventions may help support the well-being of this important workforce. The Institute for Community Partnership (ICP) is the community program that

hires the CHWs that participated in this study. They hosted a live online low-dose Mindfulness Based Stress Reduction training in 2021 to reduce levels of stress and support the well-being of CHWs. The investigative team took leverage of this opportunity to investigate the mindfulness intervention.

The proposed study sought to evaluate a live online low-dose mindfulness-based stress reduction model (Klatt et al., 2009) for one cohort of CHWs serving in one of California's most under-resourced and high-risk communities (Kaiser Permanente, 2019). Due to community-based limitations and feasibility concerns (e.g., the program providing this training once to all CHWs available) randomization of participants was not possible. Numerous experimental research studies have provided support for the traditional Mindfulness-Based Stress Reduction (MBSR) (Kabat-Zinn, 2003) intervention as an effective model for reducing degrees of stress and burnout in health care providers (Goodman & Schorling, 2012; Shapiro et al., 2005). However, the cost and substantial time commitment from participants may not be practical, sustainable, cost-effective, or feasible for a busy lay workforce working in low-resource communities. As such, the proposed study examined the effects of a six-week live online MBSR low-dose intervention with CHWs to evaluate the (1) feasibility, accessibility, and adaptability of mindfulness in this mental health care setting and (2) its effectiveness in reducing stress and burnout.

Aims and hypotheses.

Aim 1: Determine whether the live online low-dose Mindfulness-Based Stress Reduction (MBSR-ld) intervention is feasible, acceptable, appropriate, and useable for this Community Health Workers population.

Hypothesis 1.1: We hypothesize that the live online MBSR-ld intervention will be feasible for the CHWs workforce, as evidence by high scores on the Feasibility of Intervention Measure (FIM) and reports of feasibility of use during qualitative interviews.

Hypothesis 1.2: We hypothesize that the live online MBSR-ld intervention will be acceptable for the CHWs workforce, as evidence by high scores on the Acceptability of Intervention Measure (AIM) and reports of high acceptability during qualitative interviews, such that there will be high reports of acceptability.

Hypothesis 1.3: We hypothesize that the live online MBSR-ld intervention will be appropriate for the CHWs workforce, as evidence by high scores on the Intervention Appropriateness Measures (IAM) and by reports of high appropriateness on qualitative interviews.

Hypothesis 1.4: We hypothesize that the live online MBSR-ld intervention will be useable for the CHWs workforce, as evidence by high scores on the Systems Usability Scale (SUS) and reports of usefulness during qualitative interviews.

Aim 2: Determine whether the live online MBSR-ld intervention will reduce perceived stress and burnout for this Community Health Workers population.

Hypothesis 2.1: We hypothesize that CHWs who receive the live online MBSR-ld intervention will report clinically significant lower scores of stress and burnout on stress and burnout outcome measures and on qualitative interviews.

Chapter 2

Methods

Participants

The current study evaluated a stress reduction intervention for Community Health Workers (CHWs) in Southern California. Inclusion criteria were (1) those employed as a Community Health Worker; (2) who received training at the local Promotores Academy (San Manuel Gateway College in San Bernardino, CA) and (3) were hired through local agencies or local school districts. All procedures were IRB approved. Participants were primarily recruited through the Institute for Community Partnerships (ICP), a program founded in 2008 that works closely with Loma Linda University to expand community engagement. Most participants were Female (88.64%), Hispanic/Latino (79.55%), Married (56.82%), bilingual in English and Spanish (70.45%), served in a community setting (61.36%), and were ages 22-56 years (M = 40.70). Demographics data for this sample can be found in Table 1. While we would have wanted to include trainers and data collection in Spanish, due to feasibility constraints, we maintained an English-speaking trainer and questionnaires in English. Of note, five CHWs reported a language barrier due to having English as a second language. These participants reported finding difficulty with mindfulness terminology but were nevertheless able to understand and implement the mindfulness skills and techniques. As such, these participants were not excluded from quantitative and qualitative analyses.

Setting. Participants recruited for this study serve in San Bernardino County (SBC) in Southern California, which is one of the nation's largest and 14th most populous counties in the United States (San Bernardino County, 2023). SBC is highly diverse and

more than 19% of SBC and 22.7% of the population in the city of San Bernardino live below the federal poverty level (Census, 2023), compared to the national average of 13%. Moreover, SBC has 19 mental health provider shortage areas with uninsured rates higher (SBC = 15%, City of San Bernardino = 19%) than the US average (14.5%) (San Bernardino County, 2023). This community benefits greatly from community health workers. As such, it was important to emphasize a community-based approach to delivering this intervention. We hoped to address issues that impact the community and the workforces who work with them by delivering this intervention within the community to a community workforce working in a severely underserved region. As noted in the demographics, 70% of CHW participants worked in the community.

Implementation Framework

This implementation framework was selected by considering the purpose of this study, levels of analysis, delivery orientation, and complexity of the research. Upon researching different frameworks, we found that acceptability, adaptability, and feasibility, are key considerations in the implementation of evidence-based interventions in community-based research. As such, this study is guided by Proctor's framework which proposes a two-pronged approach to studying implementation outcomes (Proctor et al., 2011), including conceptualization and measuring implementation outcomes. Proctor proposes eight implementation outcomes— acceptability, adoption, appropriateness, feasibility, fidelity, implementation cost, penetration, and sustainability. The last two implementation outcomes — penetration and sustainability — are implemented after the initial implementation outcomes have been analyzed (Proctor et al., 2011). As such, these were not measured as part of this study.

Acceptability was measured by the Acceptability of Intervention Measure (AIM) (Proctor et al., 2011; Weiner et al., 2017). Adoption was measured by the percentage of sessions participants attended out of the six sessions (McIntyre et al., 2015). Appropriateness was measured by the Intervention Appropriateness Measures (IAM). Feasibility was measured by the Feasibility of Intervention Measure (FIM). Fidelity was measured at each session using a treatment fidelity checklist that was used in previous projects that utilized the same instructor and similar mindfulness-based interventions (Roberts & Neece, 2015). The fidelity checklist included a list of the components expected to be delivered during each class. The fidelity checker (an assigned study personnel) would check whether the components were addressed and add additional notes about general class functioning. Additional information on who provided the intervention, the fidelity observer, date, and length of contact were also noted. An example of the fidelity checklist is in the appendix. Implementation cost was the cost of the intervention to the Institute for Community Partnerships.

Successful implementation of this intervention was dependent on both the provider (e.g., their expertise) and the recipient (CHWs). The telehealth delivery of this intervention included an instructor who had over 20 years of experience practicing mindfulness and delivering the full MBSR intervention. He completed the Advanced MBSR Teacher Training at the University of Massachusetts Medical Center and had received training by Dr. Kabat-Zinn through the Center for Mindfulness at the University of Massachusetts Medical Center (Neece, 2013).

Procedures

Recruitment. The Institute for Community Partnership (ICP) hosted a live online low-dose Mindfulness-Based Stress Reduction intervention to reduce levels of stress and to support the well-being of Community Health Workers. They hosted this intervention in the summer of 2021 and presented it as a training to the CHWs. The investigative team leveraged this opportunity to evaluate the intervention and inform stakeholders of its effectiveness.

In collaboration with the ICP, the investigative team provided a brief presentation about the study objectives, length, participant expectations, and study compensation. These presentations took place during the CHWs' supervision meetings one week before the first day of the intervention. Most Community Health Workers working with the Institute of Community Partnerships (ICP) met inclusion criteria, except participants who could not understand English. All CHWs still took part of the mindfulness intervention, - those who were not fluent were excluded from the study.

Baseline Data Collection and Consent. A link was shared during the recruitment meeting to complete the pre-intervention questionnaires including informed consent, demographic, linguistic abilities, and contact information, the Maslach Burnout Inventory- General Survey (MBI-GS), the Perceived Stress Scale (PSS), and the Mindful Attention Awareness Scale (MAAS) for participants interested in being part of this study. All participants met language requirements for the group. For participants who speak in Spanish and English, 100% reported they had at least "Basic Knowledge" of speaking/understanding the English language according to responses to "Linguistic Ability" and "English Fluency" items. All participants were de-identified and assigned an ID number.

Intervention. Participants engaged in the live online low-dose Mindfulness Based Stress Reduction intervention provided by their employer and delivered by Mindful-Way. The intervention mirrored the MBSR-ld conducted by Klatt et al., (2009) as this six-week model demonstrated efficacy in working adults. This low-dose MBSR model was adapted from the tradition 8-week mindfulness Based Stress Reduction model (Kabat-Zinn, 2003), which is an empirically-supported intervention that shows promise in reducing degrees of stress and burnout while promoting well-being in diverse populations (Goldin & Gross, 2010; Grossman et al., 2004). The intervention incorporated the main components of MBSR including didactical material on mindfulness, methods of implementing mindfulness in day-to-day life, mindfulness exercises during group sessions, and daily home practices. This included breathing, relaxation, body scans, and gentle yoga (Klatt et al., 2009) [see Table 2 for a comparison of the two models]. Participants partook in one-hour weekly mindfulness-based intervention sessions for six weeks through a live online delivery. The instructor was in-vivo delivering the intervention to participants via zoom. They were instructed to engage in 15 minutes of home practice (daily guided meditation as delivered by the mindfulness instructor).

Participants were asked to arrive ten minutes before the beginning of the weekly intervention session to complete a brief survey on the amount of home practice they engaged in (e.g. How many days did you do the home practices?) and their current stress levels (e.g. During the last week: On a scale from 0 to 10, how stressed do you feel?). Participant attendance was monitored by the primary investigator who noted which participants were present during each session on a master excel spreadsheet. Participants were also asked during the post-intervention questionnaire which of the sessions they

attended. Participant responses were compared to the master excel spreadsheet to ensure accuracy of attendance. The intervention took place during a one-hour slot that fit the schedule of most participants. Participants also completed a brief satisfaction survey after each session.

Cohort Maintenance. Participants were sent reminder emails before interventions by their supervisor. They were also sent reminders for questionnaires every week, before and after sessions. Study personnel were present at every session and welcomed the CHWs as they arrived. The primary investigator was also present at every session. Study personnel remained after the instructor left to allow the space for participants who wanted to debrief amongst themselves— to simulate possible interactions that occur as participants leave session were they to be in person.

Post-Intervention Data Collection. One-week post-intervention, participants completed a survey that included the same measures taken at baseline (MBSR-GS, PSS, MAAS) plus feasibility outcome measures and a brief satisfaction questionnaire. To assess for usability, acceptability, feasibility, and adaptability of the intervention, we asked participants to complete the Service Utility Scale (SUS), Acceptability of Intervention (AIM), Intervention Appropriateness Measure (IAM), and Feasibility of Intervention Measure (FIM) (see Figure 1 for Study Flowchart) post-intervention.

Qualitative Interviews. At the end of the survey, participants were asked if they would like to participate in an individual semi-structured interview. CHWs who were interested were scheduled to meet individually with a researcher to obtain qualitative data regarding CHWs perceptions of the intervention, along with feedback about their levels of stress and burnout. Study personnel conducted the individual semi-structured

interviews and recorded them using a physical audio recorder. All participant recordings were de-identified, and then transcribed using Otter.ai software program. Physical audio recordings were erased.

Follow-up questionnaires. The MBSR-GS, PSS, and MAAS were administered at three-months and six-months post-intervention to determine if changes in stress and burnout levels were maintained over time.

Measures

Maslach Burnout Inventory – General Survey (MBI-GS)

Participants completed the Maslach Burnout Inventory – General Survey (MBI-GS) (Maslach et al., 1986) at baseline, one-week post-intervention, and three-months post-intervention. The MBI-GS is a 16-item measure rated on a 7-point Likert scale (0 = Never to 6 = Every day). The MBI-GS contains three subscales including exhaustion (e.g., "I feel emotional drained by my work; $\alpha = 0.90$), cynicism (e.g., "I have become less interested in my work since I started this job"; $\alpha = 0.76$), and professional efficacy (e.g., "I can effectively solve the problems that arise in my work"; $\alpha = 0.76$). The MBI-GS demonstrates validity across different occupations (Schutte et al., 2000) and ethnicities (Moreno-Jiménez et al., 2001). Scores are obtained for each subscale by adding the responses on each subscales' corresponding items and then dividing by the number of answered items for an average score. Higher scores on exhaustion and cynicism, and lower scores on personal accomplishments indicate burnout.

Perceived Stress Scale (PSS)

Participants completed the Perceived Stress Scale (PSS) (Cohen et al., 1983) measure at baseline, after the intervention, and three-months after the intervention. The PSS is a 10-

item measure rated on a 5-point Likert scale (0 = Never to 4 = Very Often), which evaluates perceived levels of stress (e.g., “In the last month, how often have you felt confident about your ability to handle your personal problems?”). It is one of the most widely used instruments for measuring stress perception (Cohen et al., 1983). Scores are obtained by reverse coding the four items that are worded in a positive way (4, 5, 7, and 8) and then summing across all items (α = 0.85). A higher score indicates higher levels of perceived stress.

Mindful Attention Awareness Scale (MAAS)

Participants completed the Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003) measure at baseline, after the intervention, and three-months after the intervention. The MAAS is a 15-item measure on a 6-point Likert scale (1=Almost Always to 6 = Almost Never), which evaluates the presence or absence of attention to awareness in the present moment (e.g., I rush through activities without being really attentive to them”). An example of one item is, “I find myself doing things without paying attention.” Higher scores are indicative of a more mindful state. The MAAS has demonstrated exemplar test-retest reliability (α = 0.81), acceptable reliability and convergent validity, and is the most cited mindfulness questionnaire (Brown & Ryan, 2003).

System Usability Scale (SUS)

Participants completed an adapted version of the System Usability Scale (SUS) (J Brooke, 1996) immediately after the end of the six-week intervention. The SUS is a 10-item measure rated on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree), that is used to classify the ease of the intervention (α = 0.91). The questions are adapted to fit this specific intervention. An example of one original item is, “I found the

system unnecessarily complex" (John Brooke, 1996). The adapted version will be, "I found the mindfulness intervention unnecessarily complex." The SUS scale has shown validity in interpreting usability of internet-based interventions in medical and mental health care (Ben-Zeev et al., 2014; Mol et al., 2020) and is "highly robust and versatile" to measure usability (Bangor et al., 2008).

Acceptability of Intervention Measure (AIM), Intervention Appropriateness Measures (IAM), Feasibility of Intervention Measure (FIM)

Participants completed the Acceptability of Intervention Measure (AIM), the Intervention Appropriateness Measure (IAM), and Feasibility of Intervention Measure (FIM) (Proctor et al., 2011; Weiner et al., 2017) immediately after the end of the six-week mindfulness intervention. These are 4-item measures rated on a 5-point Likert Scale (1-Completely Disagree to 5-Completely Agree). The AIM measures perceived intervention acceptability ("I like the Mindfulness-Based Stress Reduction Intervention). The IAM measures perceived intervention appropriateness (e.g., "Mindfulness-Based Stress Reduction Intervention seems applicable."; α = .87-.89). The FIM measures perceived intervention feasibility (e.g., "Mindfulness-Based Stress Reduction Intervention seems doable." Test-retest reliability coefficients ranged from α = .73 to α = .88.

Treatment Fidelity

Fidelity was measured at each session using a treatment fidelity checklist used in previous projects that applied MBSR programs and utilized the same instructor (Roberts & Neece, 2015). The fidelity checklist included (1) an overview of the session topics, (2) a list of the specific components that needed to be addressed at each session, (3) a dichotomous (yes/no) rating whether the instructor delivered the component, and (4) a

notes section for the fidelity checker to note any particularities in that session (e.g., participant disruptions). A fidelity checker was present at each session and completed the fidelity checklist through direct observation. This fidelity checker met with the primary investigator to discuss the particularities of each component on the checklist so that they would be able to identify them during sessions.

Statistical Analysis

Quantitative Data. We used a multi-level modeling approach to analyze the data from this study, as this method can be used for within-samples longitudinal data collection. Specifically, we conducted Linear Mixed Methods analyses. This method is also effective in finding meaningful results even if there is missing data. The quantitative data was analyzed using SPSS and Jamovi. A priori power analyses indicated that we needed approximately 24 participants to have a 95% chance of detecting a significant effect (Cohen's effect size $f = .5$) with three data collection timepoints ($\alpha = .05$) [see Figure 2]. After taking into consideration the possibility of participant attrition, we recruited approximately 45 participants for this study.

Qualitative Data. Several coding steps took place based on the guidelines by Palinkas et al., (2014) and Akers et al., (2010). The audio recordings of the individual semi-structured interviews were automatically transcribed by Otter.ai software and then checked line-by-line by graduate student researchers. Two interviews were completed in Spanish and transcribed to English by study personnel. Two coders then independently engaged in open coding by reviewing each transcript to identify key words or phrases related to participants' stress, burnout, and attitudes towards the live online MBSR-ld intervention (Akers et al., 2011).

After the open coding process, the coders met to identify common key themes (parent codes) that were present in the transcripts and organized them in hierarchical categories (Palinkas, 2014). These key themes (parent codes) were then divided into sub-themes (child codes) to further classify the excerpts. The PI then created a codebook based on the categories that were identified. Next, the two coders each used one transcript to test the codebook to confirm its appropriateness to accurately code the excerpts. Once the codebook was finalized, two independent coders were trained to reliably code all transcripts. The two coders each independently code the same transcript. They then met once a week with the first author to resolve discrepancies by consensus and prevent coder drift. All transcripts were double coded. Weekly meetings continued to complete consensus coding. Frequency counts for each code were determined using the Dedoose software program. The final frequency counts of all codes and exemplar key quotes gave study personnel insight to the feasibility of the MBSR-ld intervention and CHWs stress and burnout pre-post intervention.

Chapter 3

Results

We hypothesized that the live online MBSR-ld intervention would be acceptable, appropriate for the CHWs' work, feasible, and useable. Our findings supported these hypotheses. We also hypothesized that participants would report statistically significant lower scores of stress and burnout on outcome measures and report clinically significant lower stress during qualitative interviews. This hypothesis was also supported.

Quantitative Results

Missing data: A number of respondents were omitted from quantitative analyses, including participants who partially completed the survey ($N = 2$) and those who appeared to hit 'strongly agree' to all questions, even when negatively worded questions were present, indicating the participant did not read the question ($N = 1$). There were also 10 participants who only completed baseline questionnaires and were kept in the analysis. See Figure 3 for participant flow. We deleted any surveys that were completed more than once and kept the survey completed first for analyses ($N = 4$).

Aim 1: Implementation Outcomes

Thirty-two participants responded to the implementation outcome measures at Time 2 (post-intervention questionnaire). Descriptive results are provided below.

Acceptability

Participants reported high acceptability ($N = 32$, $M = 4.61$, $SD = 0.45$) on the Acceptability of Intervention (AIM) scale. Specifically, 72% of participants responded 'Completely Agree' and 25% of participants responded 'Agree' to an item asking whether participants liked mindfulness. This finding is in congruence with qualitative

analyses reports. Participants reported high acceptability when asked whether they liked the mindfulness training. One participant responded “Neither agree nor disagree” to the items inquiring regarding liking mindfulness and mindfulness being “appealing” to them.

Adoption

The adoption domain was measured by the percent of sessions attended. Ninety-seven percent ($N = 31$), of participants attended at least five or more sessions out of a total of six session. Overall percentage of sessions attended was 94%. It is important to note that participants were given allotted paid time during their workday to attend these sessions.

Appropriateness

Participants reported high appropriateness ($N = 32$, $M = 4.59$, $SD = 0.48$), on the Intervention Appropriateness Measure (IAM) scale. Specifically, 66% of participants responded, ‘Completely Agree’ and 34% of participants responded ‘Agree’ to an item asking whether participants thought mindfulness seemed like a good match. This finding is in congruence with qualitative analyses reports. Participants reported high appropriateness when asked whether they thought mindfulness was a good match for their position as CHWs. No participant responded “Neither agree or disagree” or below.

Feasibility

Participants reported high feasibility ($N = 32$, $M = 4.51$, $SD = 0.56$), on the Feasibility of Intervention Measure (FIM) Scale. Specifically, 50% of participants responded, ‘Completely Agree’ and 44% of participants responded ‘Agree’ to an item asking whether participants thought mindfulness was easy to use. This finding is in congruence with qualitative analyses reports. Participants reported high feasibility when asked whether they thought mindfulness was easy to use. There were three “Disagree”

responses to the following items: “mindfulness seems possible to use,” “mindfulness seems doable,” “mindfulness seems easy to use.” As these were the only disagree responses, participants may have had difficulty with the feasibility.

Fidelity

Treatment adherence was high, including 90% average fidelity across all six sessions. The items that were missed included items that were optional and were related to the homework. Of note, the lowest fidelity day with 80% fidelity was during Week 6. Participants engaged in increased questions and information gathering on this day.

Implementation Cost

The Institute for Community Partnership reported paying an amount that fell within their training budget. They felt that this amount was feasible and sustainable enough for them to provide this training on a regular basis. The total cost was $4,500.

Useability

Participants reported high useability ($N = 32$, $M = 69.77$, $SD = 13.68$) on the Systems Usability Scale (SUS). Specifically, 58% of participants responded, ‘Strongly Agree’ and 36% of participants responded ‘Agree’ to an item asking whether participants thought that they would like to use mindfulness frequently. The SUS benchmark score of mean range of 65-71 is considered average across studies (Lewis & Sauro 2018). Participants indicated “neither agree nor disagree” or “disagree” to items regarding the ease of use of mindfulness and whether most people would learn to use mindfulness quickly.

Training Satisfaction

Participants reported high satisfaction ($N = 32$, $M = 4.62$, $SD = 0.46$) on a brief satisfaction scale. Specifically, 72% of participants responded 'Very Satisfied' and 28% of participants responded 'Satisfied' to an item asking how satisfied they were with the six-week program overall. That is, 100% of participants were either satisfied or very satisfied with the program.

Aim 2: Perceived Stress and Burnout

Our two measures, Perceived Stress Scale (PSS) and Maslach Burnout Inventory (MBI), composed our outcome variables of interest. The Mindfulness Attention Awareness Scale (MAAS) measured the participant's mindful state and was used as a continuous control variable. A higher score on both the PSS and MBI indicated greater stress and burnout respectively.

Analyses Results

We ran a linear mixed model (LMM) analysis in Jamovi version 2.6.44. Possible covariates were evaluated and controlled for during this analysis. The first analysis included the PSS as the dependent variable and added fixed effects of time, marital status, number of sessions attended, and ethnicity. The second analysis included the, with the MBI-Exhaustion scores as the dependent variable and added fixed effects of lingual abilities, marital status, ethnicity, and age. The third analysis included the MBI-Cynicism scores as the dependent variable and no fixed effects. The fourth analysis included the MBI-Professional Efficacy scores as the dependent variable and added fixed effects of education and population worked with. We included each participant as a random effect.

LMM with PSS as dependent variable: There was a statistically significant main effect of Time ($F = 4.03$, $p = .01$). Specifically, there were statistically significant

differences when compared between the time points, including baseline stress levels to post-intervention (β = -1.57, $p < .05$), from baseline to 3-month follow-up (β = -2.81, $p < .01$), and from baseline to 6-month follow-up (β = -2.68, $p < .01$). There was also a statistically significant main effect of the MAAS scores ($F = 4.82$, $p < .05$), such that the more that participants were in a mindful state (higher scores on the MAAS), the less perceived stress was reported (lower scores on the PSS). See Table 3 for fixed parameter estimates with PSS as dependent variable. See Figure 4 for effects plot visual with PSS scores plotted across time.

LMM with MBI-Exhaustion as dependent variable: There was also a statistically significant main effect of the MAAS scores ($F = 8.03$, $p < .01$), such that the more that participants were in a mindful state (higher scores on the MAAS), the less exhaustion was reported (lower scores on the MBI-Exhaustion). There was no significant main effect of Time. See Table 4 for fixed parameter estimates with PSS as dependent variable.

LMM with MBI-Cynicism as dependent variable: There was also a statistically significant main effect of the MAAS scores ($F = 9.07$, $p < .01$), such that the more that participants were in a mindful state (higher scores on the MAAS), the less cynicism was reported (lower scores on the MBI- Cynicism). There was no significant main effect of Time. See Table 5 for fixed parameter estimates with PSS as dependent variable.

LMM with MBI-Professional Efficacy as dependent variable: There was also a statistically significant main effect of the MAAS scores ($F = 4.87$, $p < .01$), such the more that participants were in a mindful state (higher scores on the MAAS), the more professional efficacy was reported (higher scores on the MBI- Professional Efficacy).

There was no significant main effect of Time. See Table 6 for fixed parameter estimates with PSS as dependent variable.

Qualitative Data

Thematic Overview.

A total of 12 transcripts ($N = 12$) were coded, representing 12 semi-structured interviews conducted with 12 participants. We coded 519 excerpts across the 12 transcripts with a range of 35 to 61 excerpts per transcript ($M = 43.25$, $SD = 6.38$). The term "excerpt" refers to the direct quotes from participant interviews. Quantifiably, excerpts are a segment that is extracted from the transcript that represents a single unit of analysis. Each excerpt could represent more than one code. As such, codes were used as the reference for data analysis. A total of 717 codes were applied to the 12 transcripts.

After common theme analysis, six themes were identified as parent codes: (1) stress, (2) burnout, (3) MBSR Training Experience, (4) Mindfulness Implementation, (5) Mindfulness Intervention Outcome/Impact, (6) Recommendations. These themes (parent codes) were then divided into sub-themes (child codes) to further classify the excerpts. The results of the qualitative analyses will focus on two parent codes: *MBSR training experience* and *mindfulness intervention outcome/impact.* These two parent codes consisted of 366 total codes or 51% of the total codes applied to excerpts. The parent codes and corresponding child codes that were most frequently cited by participants are depicted below alongside relevant participant quotes. See Table 7 for the two parent codes, their corresponding child codes, and a description.

Mindfulness Intervention Implementation Outcomes/Impact ($N = 204$ codes, 28% of total codes)

Qualitative data analysis revealed that this parent code had the highest prevalence among the six parent codes, with a range of 11 to 21 codes per transcript (M = 17, SD = 3.38) and containing 28% of all codes. Participants identified various implementation outcomes and ways that the mindfulness intervention both impacted or benefited them, including (1) *acceptability* or likeability of the intervention, (2) *appropriateness* or whether this intervention was a good match for their position, (3) *feasibility* or whether this intervention was easy to use, (4) *usability,* and (5) *impact on CHWs.* The child codes below are the most frequently applied codes throughout the transcripts. The percentage represents the child code appearance within the parent code.

Child code 1.1: Impact on CHWs. (N = 136 codes, 67%)

Qualitative data analysis revealed the *impact on CHWs* child code as the most frequently coded sub-theme within the *mindfulness intervention implementation outcomes/impact* parent code, consisting of 67% of the total parent codes. These included reports of benefits due to the mindfulness intervention, including having a new coping tool (57 codes, 42%), reports of increased cognitive flexibility (33 codes, 24%), of being more present (22 codes, 16%), gaining a new perspective of mindfulness or of life experiences (18 codes, 13%), and impact on stress (27 codes, 20%) and sleep (14 codes, 10%).

Within the stress code, 10 of the 12 participants reported a reduction in stress levels due to the mindfulness intervention:

> *"Oh, yes. It helped all of us and helped myself… normally my stress level is an eight. But I feel that mindfulness trainings, they put me down to a four."*

These findings are consistent with the quantitative data analyses completed in this study that supported a reduction in stress among CHWs after the mindfulness intervention (see quantitative data results).

CHWs reported enjoying having mindfulness techniques as new coping tools:

> *"Now that we took this class, the relaxation exercises like deep breathing, concentration, meditation, have been fantastic for me…"*
>
> *"…The actual tool, I would say, it's hard to pinpoint but I would say, just stopping us in our tracks, and taking our focus off the big mountain of life, and focusing in on what's tangible, and what's in front of us….I think, has brought me to a place to allow things to surface so that I can be better…"*

CHWs also reported symptoms of increased cognitive flexibility:

> *"And like I said, even if it's not affecting our families directly, the fact that we're there, I mean, those families go through that. We get that, and we bring it home, sometimes… so I think having this type of training kind of gives us a mindfulness of 'hey, what do I want? Why is this affecting me? How can I cope with that? What can I do for myself to help myself get through this?"*

Child code 1.2: Acceptability. (*N* = 22 codes, 11%)

The second most endorsed code was acceptability — whether the CHWs reported liking the mindfulness intervention. All 12 CHWs interviewed reported liking the mindfulness intervention:

> *"I like mindfulness. I would like to learn more about it and if it can be combined with other teachings. I would also like that…"*

This is consistent with quantitative data analyses that revealed high acceptability (N = 32, M = 4.61, SD = 0.45) of the mindfulness intervention.

Child code 1.3: Appropriateness. (N = 22 codes, 11%)

The second most endorsed code was appropriateness — whether the CHWs reported mindfulness was a good match for their position. All 12 CHWs interviewed reported mindfulness was a good match:

"Yeah, I think it's a great tool. It's a great match. And I think we should learn more of those tools or maybe more in depth…"

"I think because there's such a large stigma in the community we work with involving relaxation an mediation and mental health, that I think just having that on our tool belt, even if we don't practice it with the family, but actively just start teaching them and destigmatizing what meditation and mental health is, I think you can have a large impact in the community just knowing that like, oh, like it's not a bad thing. Like this is the science behind it…having mindfulness as a tool, being able to teach others— I think that's awesome."

This is consistent with quantitative data analyses that revealed high appropriateness (N = 32, M = 4.59, SD = 0.48) of the mindfulness intervention.

Child code 1.4: Usability. (N = 18 codes, 8%)

The next code endorsed was usability. CHWs reported on its usefulness in both personal and community settings:

"In moments when one notices that emotions are escalating, that is a moment to apply the exercises we have learned like deep breathing, etc. in those moments, it is very great tool to apply in those moments."

This is consistent with quantitative data analyses that revealed high usefulness (N = 32, M = 69.77, SD = 13.68) of the mindfulness intervention.

Child code 1.5: Feasibility. (N = 16 codes, 8%)

The least endorsed code was feasibility — whether the CHWs reported mindfulness was easy to use. CHWs interviewed reported mindfulness was easy to use:

> *"Yeah, and it's super easy to use, and will continue to use these. I think it's been great, and I feel like everyone in the training should use them, especially with the work we do…"*

This is consistent with quantitative data analyses that revealed high feasibility (N = 32, M = 4.51, SD = 0.56) of the mindfulness intervention.

MBSR Training Experience (N = 162 codes, 23% of total codes)

Qualitative data analysis revealed that the *MBSR training experience* code had the second highest prevalence among the six parent codes, with a range of 9 to 23 codes per transcript (M = 13.5, SD = 4.08). Participants were asked about their general experience with the mindfulness training. They identified various experiences, including (1) *barriers to engagement,* (2) *comments about the facilitator,* (3) *dislikes,* (4) *participant satisfaction* with the training, and (5) *recommend ability* of the intervention. This study also included a (6) *main takeaway* code that asked about their main takeaway of the training and an (7) *other* code that was used to encompass any codes that were not captured in the previous sub-codes. The child codes below are the most frequently applied codes throughout the transcripts. The percentage represents the child code appearance within the parent code.

Child code 1.1: Facilitator comments. (N = 50 codes, 31%)

Qualitative data analysis revealed the *facilitator comments* child code as the most frequently coded sub-theme within the *MBSR training experience* parent code, consisting of 31% of the total parent codes. These included both positive ($N = 46$, 92%) and negative ($N = 4$, 8%) comments about the facilitator. All CHWs made positive comments about the facilitator including comments on his expertise, teaching techniques, and demeaner:

> *"Yeah, I think he made it extremely easy. Because he was getting up himself and doing it and practicing it. And he wasn't like, all right before the video and practice the tone, you know, like he was actually getting up doing it, you know, it was just very engaging in my opinion."*
>
> *"What did I like? Again, I think his knowledge base, I appreciated that. I have been in trainings where the facilitator does not have 100%, you know, grasp on what they're teaching and that's always unfortunate because you can tell. And with him, you knew he had the experience, he had the knowledge. It was there and I appreciated that."*

Of note, the four negative comments included comments on participants wanting 1) more information on the facilitator's ability to reach his level of expertise, 2) him to cue for questions more directly, and 3) more time spent on homework assignments:

> *"What I didn't like? I guess there was sometimes where like, there was questions about the homework and he didn't necessarily go over them. You know, I mean I know it's not necessarily an assignment like it's a class we're getting graded or anything, but like, some of the things we had questions on, it'd be nice for him to provide that information."*

Child code 1.2: Satisfaction. (*N* = 44 codes, 27%)

Participant satisfaction was the second most endorsed child code within the *MBSR training experience* parent code, consisting of 27% of the total parent codes. All 12 CHWs interviewed reported being satisfied with the mindfulness training:

"It was fantastic. I wish there was one that was more advanced."

"It was a beautiful experience. First, personally and second for what one does to help the families also, and I have shared some of the techniques. Although, let me tell you, I did not understand everything 100% but I still could take some tools."

"Yeah, it was a very good training. Very useful, very helpful, very everything."

"9 or 10, I'm very, very satisfied. It's helped me a lot."

This is consistent with quantitative data analyses that revealed high satisfaction (*N* = 32, *M* = 4.62, *SD* = 0.46) of the mindfulness training.

Child code 1.3: Recommendability. (*N* = 21 codes, 13%)

The third most endorsed child code within the *MBSR training experience* parent code, consisting of 13% of the total parent codes, was on whether the CHWs would recommend this training. All 12 CHWs reported that they would recommend this training to others:

"Yeah, yes because it teaches you to take care of yourself, your well-being you can't take care of your community if you don't take care of yourself…"

"Yes, I already have told them. In fact, when we were in the classes I would tell my daughters, 'come and hear this.' Even my grandchildren, I would tell them 'Nana is in class, let's do some exercises."

Child code 1.4: Barriers to Engagement. (*N* = 20 codes, 12%)

Barriers to engagement was the fourth most endorsed child code within the *MBSR training experience* parent code, consisting of 12% of the total parent codes. This child code captured the reasons why participants were not fully present in the training. Nine CHWs reported various reasons, including having to be in their car due to location limitations, distractions, and nervousness to ask clarifying questions:

> *"Um, I think it was more on my part that I had a hard time because right now our office is kind of in a conference room. So, we would have to go to our cars, you know, we just, I personally did not have a place to be able to really take the fulness of each session."*
>
> *"If I was to do it again, I think that I would probably set myself up for taking this time and giving myself a little cushion before and a little cushion after, you know, in my workday just to be able to say 'okay, this time is completely set apart.' That's what I would do differently, just so that I wouldn't have in my mind, like what's next?'..."*

Child code 1.5: Dislikes. (N = 15 codes, 9%)

Dislikes were the fifth most endorsed code within the *MBSR training experience* parent code, consisting of 9% of the total parent codes. CHWs reported various dislikes of the training including wanting more interaction or participation from other CHWs, focusing too much on one technique, wanting more emphasis on the workbook, and that the training ended.

> *"I would have appreciated more interaction and I understand that it was voluntary. I did feel that some sessions who I heard a lot of responses from was our team and I wish that we would have had a little more interaction. We had*

interaction from our team, but not really getting to know anyone else that was there."

"The only thing that I didn't like too much of the training was maybe we spent too much time on the body scan… sometimes I notice that, you know, 30 minutes and doing the body scan… but maybe we can do other stuff like stretching, more breathing exercises… to me personally, I felt like the body scan was good. But to me, what worked really good for me was the breathing."

All CHWs reported implementing mindfulness after the training. All 12 CHWs reported implementing it themselves, nine reported implementing it in the community with the families they serve, and seven CHWs reported teaching their family members. CHW's provided general recommendations for improving the mindfulness training including wanting this training in Spanish, having mindfulness class boosters, wanting the course to be a few weeks longer, adding more time for the class to address the workbook, and changing the time to be more convenient for the CHWs' work schedule.

Chapter 4

Discussion

This study is the first to explore a live online mindfulness intervention among this population of Community Health Workers serving in one of the most under resourced communities in the United States. The aim of this study was to explore the feasibility and effectiveness of a live online mindfulness-based stress reduction intervention for CHWs serving a critically under resourced region in Southern California, USA. Our first aim was based on the Proctor Framework of implementation science aimed at testing feasibility in a formulated and methodological way. Our second aim tested the effectiveness of the mindfulness intervention in reducing stress and burnout among participants.

Implementation Outcomes

Of the framework models measured (acceptability, adoption, appropriateness, feasibility, fidelity, implementation cost), we will highlight those of most interest: *acceptability, appropriateness, feasibility,* and *usability.* We expected positive implementation outcomes such that the intervention would be highly *acceptable, appropriate, feasible, and useable.* Findings indicate that CHWs reported positive implementation outcomes both in the semi-structured interviews and quantitative data. First, CHWs perceived the mindfulness intervention was highly *acceptable*, as evidenced by CHWs reporting that they liked mindfulness as a new tool to cope with stress. Specifically, CHWs reported enjoying the mindfulness skills they learned, including deep breathing, body scan, and increasing their attention in the present moment. Next, CHWs reported that mindfulness was highly *appropriate* for their work. Specifically, CHWs

reported that mindfulness was a good match for the type of work they conduct with the vulnerable populations they serve. That is, they found it useful in both their personal lives and in sharing what they had learned with the community members. CHWs highlighted inviting their family members to listen in on the class and reported teaching their clients how to engage in mindfulness skills.

Furthermore, CHWs reported high feasibility, commenting that they perceived mindfulness was easy to use. Of note, some participants reported hesitation with mindfulness at the beginning of the intervention. They noted that they had a hard time engaging in the mindfulness skills, specifically, they had a hard time with extended breathing and being present in the moment. Regardless, CHWs reported that after a few sessions and after engaging in increased mindfulness practice, they found mindfulness easy to apply themselves, with their family, and community members.

Last, CHWs reported that mindfulness was a useable tool for them. That is, CHWs did not experience mindfulness as too complex, that the skills were simple to learn, and that mindfulness was easy to learn. In the SUS measure, most CHWs highlighted that they would use mindfulness frequently. This was further supported by the semi-structured interviews, such that CHWs reported high frequency of implementation for personal use as well as teaching their families and community members. This is an unexpected highlight of this study — the CHWs took the mindfulness skills they knew were working for them and applied them to the community. They disseminated useful tools to the community members that would, otherwise, not have access to these skills.

Mindfulness Training

CHWs reported high satisfaction with the overall training experience. CHWs highlighted wanting mindfulness skills training to be part of their regular training or for it to be implemented in some way in their work. They commented on the training being useful and helpful. So much so, that all the CHWs that were interviewed reported that they would recommend the training to others. Of note, CHWs were impressed with the facilitator's expertise and demeaner. They commented on his vast knowledge in mindfulness and their appreciation for his in-vivo practice with participants. The negative comments about the training alluded to the time limitations. The program was designed to attempt to fit one-hour from the CHW week as this may be most sustainable both for the program cost (training and paying the CHWs for their one hour of time) and the attempt to not add a great commitment to the CHWs already busy work week.

Notably, participants experienced numerous barriers to engagement. Most prominent was their distraction with other obligations and not having a location to sit and engage with the intervention. Future studies should take into consideration having a "buffer" before and after sessions for CHWs to fully engage in the program without feeling distracted by their busy schedules. Recommendations to improve this study would be to incorporate mindfulness skills training in their work week or adding mindfulness class boosters. We also encourage programs to hold this training at a time that works best for the CHW schedule, perhaps the last hour of the day on their last day of their work week to decrease distractions and work obligations. Further, finding an MBSR facilitator to lead this in Spanish may be beneficial as there were many CHWs who were primarily monolingual Spanish-speaking (although not included in this study). At the time of this study, there was no facilitator that was MBSR certified available to lead this program in

Spanish. An alternative would have been to hire two facilitators, one who is the MBSR certified facilitator and a second facilitator who is Spanish-speaking and can help lead the mindfulness intervention. This meant for higher cost and a barrier for sustainability. We hope that, based on these results, there could be further funding available for this type of delivery or that there are trained MBSR professionals available.

Stress and Burnout

We expected that stress and burnout would decrease after the mindfulness intervention. Supporting our hypothesis, we found that stress was clinically and statistically significantly decreased post-intervention, three months, and six months after the intervention. During the interviews, CHWs reported increased cognitive flexibility, being more present, gaining a new perspective of life experiences, and benefits to their sleep. These may be the reasons that stress significantly decreased after the intervention. Of note, the interview did not include direct questions regarding cognitive flexibility, rather, CHWs provided examples of their ability to adapt more appropriately to new or unexpected events, face situations with increased reflection, and change their behavioral responses to situations (Dennis & Vander Wal, 2010). This is consistent with previous research reporting on the relationship between mindfulness and cognitive flexibility, indicating MBSR improves cognitive flexibility (Moore & Malinowski, 2009; Lee & Orsillo, 2014; Harp et al., 2022).

Regarding burnout, we found no statistically significant difference in burnout over time. Consistent with previous findings on the needs assessment conducted prior to this study (Bashoura, 2020), CHWs did not report being "burnt out." However, burnout is measured in this study based on the Maslach Burnout Inventory and categorized to

Cynicism, Emotional Exhaustion, and Professional Efficacy. While CHWs did not report that they were burnt out, some did report symptoms of burnout including emotional exhaustion from their work. This may be why quantitative analyses revealed a significant relationship between burnout and MAAS scores (mindful states), such that increased mindful states were indicative of less cynicism, less exhaustion, and higher professional efficacy. This is also consistent with previous research indicating that increased implementation of mindfulness skills, helps alleviate burnout symptoms (Guidetti et al., 2019; Suleiman-Martos et al., 2020).

It is important to highlight the substantial benefit that is highlighted from the results of this intervention, which demonstrate statistically significant reduction in stress among CHWs at six-month follow-up. According to our findings, delivering a mindfulness-based intervention demonstrates long-term benefits through the sustainment of stress reduction half-a-year post-intervention. The literature consistently reports the challenges and risks that come with chronic stress and, delivering an intervention that supports long-term stress reduction, may combat these risks. Reducing stress among this workforce would build resiliency and benefit those they serve. This would increase distress tolerance, reduce the risk of burnout, and prepare this workforce to better support vulnerable populations without feeling overburdened.

Future Directions

One post-delivery goal of this study was to deliver feedback to stakeholders and community programs who work with CHWs on the implementation outcomes and effectiveness of this intervention in reducing stress among this important workforce. This study supports both the feasibility and effectiveness of mindfulness interventions as a tool

to reduce stress among CHWs. Of note, sustainability is of major importance in community-based research. Future studies might focus on the sustainability of this type of project. Arguably, the significant reduction in stress among participants validates efforts for programs to apply such programs in their curriculum. That is, this project took advantage of a community program that already sought to implement a stress-reduction intervention, and findings indicate high benefits for the intervention cost to the program.

Next, many of the CHWs who participated in the mindfulness intervention were not eligible to take part in the research component because they did not have enough knowledge or understanding of the English language, with Spanish being their primary language. As such, we hope future research will engage Spanish-speaking CHWs and investigate the effectiveness of mindfulness interventions in other languages. Recommendations for programs working with CHWs are to provide greater mental health support, one of which can be mindfulness-based interventions in other languages or as a part of the CHW work experience.

Conclusion

Our findings are consistent with previous literature demonstrating that a brief mindfulness-based intervention may significantly decrease stress. Together, our quantitative and qualitative analyses demonstrate positive perceptions of this live online mindfulness-based stress intervention among Community Health Workers. CHWs are a highly capable workforce for dissemination of mental health skills to communities that do not have the resources to easily access mental health support. Stakeholders and community programs working with CHWs should consider providing opportunities for their staff to lean mindfulness to reduce stress and support mental well-being.

Limitations

There are several limitations that should be considered when interpreting results. First, participants could not be randomly assigned into a control group, due to the limitations of the community implementation of this study. That is, the ICP, rightfully, made the mindfulness intervention program available to all CHWs at once. As such, randomization was not possible. Second, the small sample size was due to the limitations of the delivery of the intervention. That is, the time constraints made it so the instructor limited the number of participants allowed at the same time. Third, there were several participants who noted being "Spanish-Speaking Only." While they met inclusion criteria and noted they had basic knowledge of English, the participant level of understanding of the English language is a limitation in this study. Last, the sample was from a specific county in Southern California in the United States. While generalizability may be limited, these findings add to the literature of mindfulness in improving stress through community application among a stressed workforce.

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Appendix A

Tables

Table 1

Characteristics of Sample (N = 43)

	N (%)
Gender	
Male	4 (9.09)
Female	39 (88.64)
Ethnicity	
Hispanic/Latin	35 (79.55)
Black/African American	5 (12.27)
White	3 (6.82)
Education	
Less than High School Degree	4 (9.09)
High School Graduate	10 (22.73)
Some College	11 (25)
2-year Degree	5 (12.27)
4-year Degree	10 (22.73)
Vocational / Trade School	2 (4.55)
Masters	1 (2.27)
Population Served	
Children	5 (12.27)
Adolescents	6 (13.64)
Parents	16 (36.36)
Adults	14 (31.82)
Other	2 (4.55)
Languages Spoken	
Only Spanish Speaking	5 (12.27)
Spanish and English Speaking	31 (70.45)
Only English Speaking	5 (12.27)
Other	2 (4.55)
Work Population	
School	4 (9.09)
Healthcare with Adults	5 (12.27)
Healthcare with youth	3 (6.82)
Community-Based Services	27 (61.36)
Behavioral Health	1 (2.27)
Other	3 (6.82)
Marital Status	
Married	25 (56.82)
Divorced	7 (15.91)
Separated	2 (4.55)
Single	9 (20.45)
Age *M (SD)*	40.70 (9.99)

Table 2

Comparison of Traditional MBSR versus Live Online MBSR-ld

Traditional Mindfulness Based Stress Reduction (MBSR)	Live Online Low-Dose Mindfulness Based Stress Reduction (MBSR)
• 2.0-2.5-hour sessions	• 1-hour sessions
• Weekly sessions for 8-weeks	• Weekly sessions for 6-weeks
• Home practices that are approximately 30 minutes long	• Home practices that are 15 minutes long
• One full-day mindfulness retreat	• No Full-day retreat

Table 3.

Fixed effects Parameter Estimates of Stress

			95% Confidence Interval				
Effect	**Estimate**	**SE**	**Lower**	**Upper**	**df**	**t**	**p**
Intercept	12.92	1.76	9.42	16.44	27.30	7.33	<.001
Time 1 (6 Weeks) – Baseline	-1.57	0.76	-3.09	-0.06	58.50	-2.06	0.043*
Time 2 (3 Months) – Baseline	-2.81	0.94	-4.68	-0.95	60.60	-3.00	0.004**
Time 3 (6 Months) – Baseline	-2.68	0.97	-4.61	-0.75	60.70	-2.76	0.008**
MAAS Score	-1.06	0.48	-2.02	-0.10	72.20	-2.19	0.031*

Note. PSS scores as dependent variable (stress) * = statistical significance at $p < 0.5$, ** = statistical significance at $p < .01$.

Table 4.

Fixed effects Parameter Estimates of Burnout: Emotional Exhaustion

			95% Confidence Interval				
Effect	**Estimate**	**SE**	**Lower**	**Upper**	**df**	**t**	**p**
Intercept	1.48	0.35	0.78	2.18	26.90	4.22	<.001
Time 1 (6 Weeks) – Baseline	0.03	0.20	-0.44	0.37	60.30	0.17	0.864
Time 2 (3 Months) – Baseline	0.30	0.25	-.80	0.20	63.40	1.21	0.232
Time 3 (6 Months) – Baseline	0.06	0.26	-0.45	0.57	63.70	0.25	0.806
MAAS Score	0.35	0.13	-0.60	-0.11	81.30	2.83	0.006**

Note. MBI-Exhaustion scores as dependent variable (emotional exhaustion) ** = statistical significance at $p < .01$.

Table 5.

Fixed effects Parameter Estimates of Burnout: Cynicism

			95% Confidence Interval				
Effect	**Estimate**	**SE**	**Lower**	**Upper**	**df**	**t**	**p**
Intercept	1.0	0.11	0.77	1.21	33.40	9.01	<001
Time 1 (6 Weeks) – Baseline	0.06	0.21	-0.48	0.36	68.00	0.23	0.77
Time 2 (3 Months) – Baseline	0.21	0.25	-0.71	0.28	79.0	0.85	0.401
Time 3 (6 Months) – Baseline	0.16	0.25	-0.67	0.34	80.70	0.64	0.523
MAAS Score	0.32	0.11	-0.52	-0.11	92.80	3.01	0.003**

Note. MBI-Cynicism scores as dependent variable (cynicism) ** = statistical significance at $p < .01$.

Table 6.

Fixed effects Parameter Estimates of Burnout: Professional Efficacy

			95% Confidence Interval				
Effect	**Estimate**	**SE**	**Lower**	**Upper**	**df**	**t**	**p**
Intercept	4.17	0.43	3.31	5.04	25.90	9.64	<0.001
Time 1 (6 Weeks) – Baseline	0.39	0.25	-0.12	0.89	61.50	1.53	0.132
Time 2 (3 Months) – Baseline	-0.08	0.31	-0.70	0.54	63.50	-0.28	0.790
Time 3 (6 Months) – Baseline	0.42	0.32	-0.22	1.06	63.60	1.30	0.200
MAAS Score	0.34	0.16	0.03	0.65	78.30	2.21	0.030*

Note. MBI-Cynicism scores as dependent variable (cynicism) ** = statistical significance at $p < .01$.

Table 7.

Qualitative Codes with Description and Exemplar Quotes

Code	*Description*	*Example*
MBSR Training Experience		
Barriers to engagement	Comments regarding barriers to fully engaging in the training.	**<u>Barriers to Engagement:</u>** "Yeah, the timing was when I had to travel so I couldn't be as focused as I wanted to be because I had to drive and listen."
Facilitator	Comments in response to questions about the facilitator	**<u>Facilitator:</u>** **Positive Comments:** "He was great!" **Negative Comments:** "I didn't really enjoy the facilitator."
Dislikes	Comments regarding their dislikes about the Mindfulness intervention.	**<u>Dislikes:</u>** "I didn't really like that we didn't go over the booklet."
Main Takeaway	Comments in response to the question asking what their main takeaway from the training is.	**<u>Main Takeaway:</u>** **"**My main takeaway are the relaxation skills."
Recommendability	Comments in response to the question asking whether they would recommend the training to someone else.	**<u>Recommendability:</u>** "Oh yes, I would definitely recommend this to my colleagues."
Satisfaction	Comments regarding their satisfaction with the Mindfulness training.	**<u>Satisfaction with MBSR training (1-5):</u>** **Satisfaction (5):** "I was super satisfied with the training!" **Satisfaction (3):** "I feel okay about it." **Satisfaction (1):** "I was not satisfied with it."

Other	Other comments regarding the MBSR training overall not captured by any of the above codes.	
Mindfulness Intervention Outcome / Impact		
Acceptability	Comments regarding the acceptability or likeability of the Mindfulness training.	**<u>Acceptability (1-5):</u>** **Acceptability (5):** "I really liked it! I was really interested in the mindfulness activities." **Acceptability (3):** "I mean I thought it was okay." **Acceptability (1):** "I didn't really like it."
Appropriateness	Comments regarding the appropriateness of the Mindfulness training.	**<u>Appropriateness (1-5):</u>** **Appropriateness (5):** "The mindfulness was appropriate for my work. I think my families will super benefit from this." **Appropriateness (3):** "Maybe It would be a good match with the families. I'm not too sure." **Appropriateness (1):** "I don't really think that it would be applicable or relevant with the families I work with."
Feasibility	Comments regarding the feasibility of the Mindfulness training.	**<u>Feasibility (1-5):</u>** **Feasibility (5):** "The mindfulness seems easy to use. I think I could easily apply it in my life and also share it with the families I work with." **Feasibility (3):** "Maybe I could use this with my families. I'm not too sure now easy it would be to do so." **Feasibility (1):** "I don't really think that it would be possible to apply mindfulness in my everyday life."
Usability	Comments regarding the usability of the Mindfulness intervention.	**<u>Usability:</u>** "I think I will use mindfulness frequently."
Impact on CHWs	Comments regarding impact of mindfulness on CHWs regarding being present, cognitive flexibility,	**<u>Impact on CHWs:</u>** Being Present:

	new coping tool, new perspective, sleep and stress.	"Yes, now I'm more aware of what I'm doing. I like take the time to enjoy my surrounding and pay attention to the place I'm at." Cognitive Flexibility: "Where before I would just react, now I take time to think about what I'm going to do. I ask myself, how can I best respond to this situation?" New Coping Tool: "I loved mindfulness! It is a new way to help me cope with stress." New perspective: "I have a new perspective on mindfulness and how it can help." Sleep: "Yeah, I've noticed that I sleep better." Stress: "I feel like it has helped me cope better with my stress. I think before I was maybe an 8 and now I'm more like a 5."
Other	Participant comments regarding any impact of the mindfulness intervention that is not covered by a previous code.	**Other:** "Yeah I have never had a training in mindfulness before."

Appendix B

Figures

Figure 1.

Methodology Flow Chart

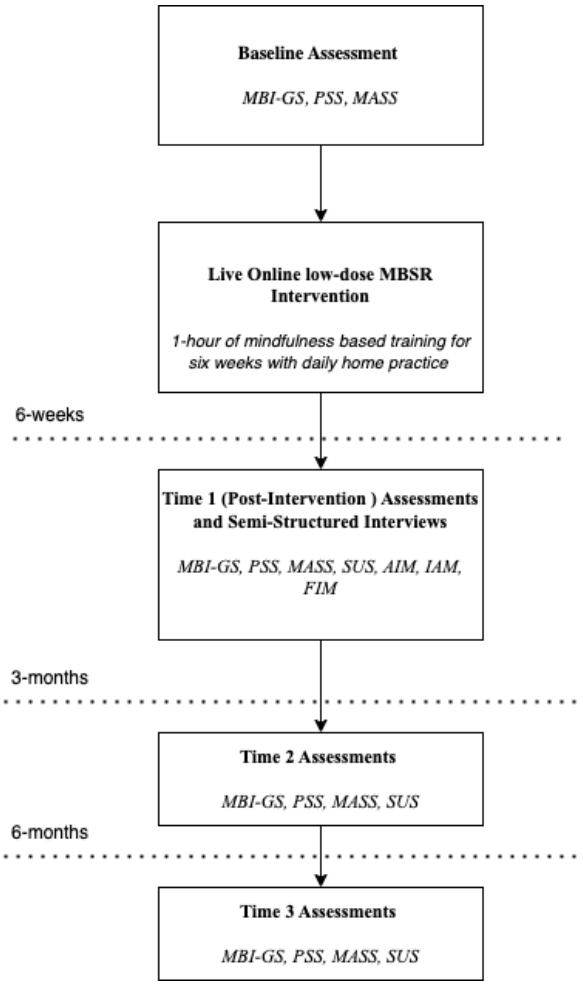


Figure 2

*G*Power Plot for Multi-level Modeling with Three Timepoints*

Figure 3

Participant Retention

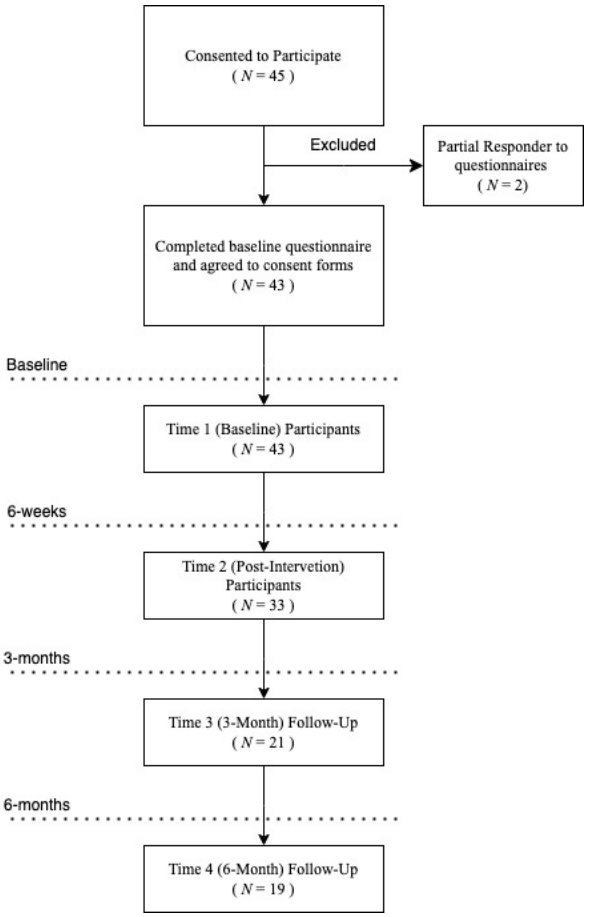
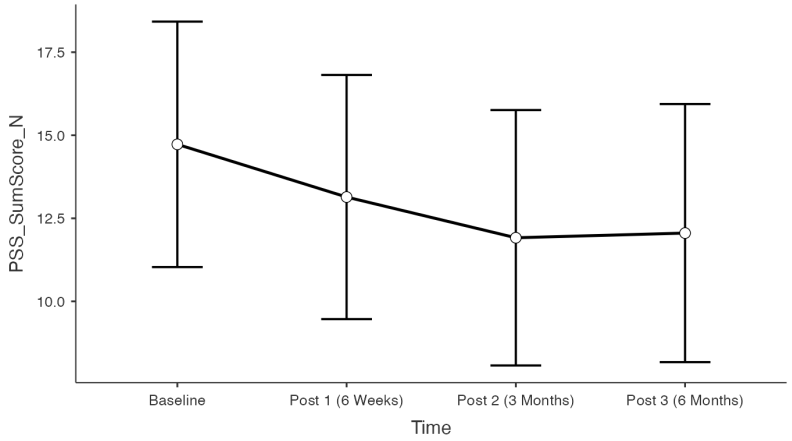


Figure 4

Effects Plot with Perceived Stress plotted across Time Points



Appendix C

Measures

Measure 1

Mindful Attention Awareness Scale (MAAS), System Usability Scale (SUS)

Day-to-Day Experiences

Instructions: Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

1	2	3	4	5	6
Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never

I could be experiencing some emotion and not be conscious of it until some time later.	1	2	3	4	5	6
I break or spill things because of carelessness, not paying attention, or thinking of something else.	1	2	3	4	5	6
I find it difficult to stay focused on what's happening in the present.	1	2	3	4	5	6
I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	1	2	3	4	5	6
I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	1	2	3	4	5	6
I forget a person's name almost as soon as I've been told it for the first time.	1	2	3	4	5	6
It seems I am "running on automatic," without much awareness of what I'm doing.	1	2	3	4	5	6
I rush through activities without being really attentive to them.	1	2	3	4	5	6

I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.	1	2	3	4	5	6
I do jobs or tasks automatically, without being aware of what I'm doing.	1	2	3	4	5	6
I find myself listening to someone with one ear, doing something else at the same time.	1	2	3	4	5	6

1	2	3	4	5	6
Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never

I drive places on 'automatic pilot' and then wonder why I went there.	1	2	3	4	5	6
I find myself preoccupied with the future or the past.	1	2	3	4	5	6
I find myself doing things without paying attention.	1	2	3	4	5	6
I snack without being aware that I'm eating.	1	2	3	4	5	6

Measure 2

Perceived Stress Scale (PSS)

PERCEIVED STRESS SCALE

The questions in this scale ask you about your feelings and thoughts during the last month**. In each case, you will be asked to indicate by circling *how often* you felt or thought a certain way.**

Name _____ Date _____

Age _____ Gender (*Circle*): **M F** Other _____

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2. In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3. In the last month, how often have you felt nervous and "stressed"?	0	1	2	3	4
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5. In the last month, how often have you felt that things were going					

your way?	0	1	2	3	4
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
7. In the last month, how often have you been able to control irritations in your life?	0	1	2	3	4
8. In the last month, how often have you felt that you were on top of things?	0	1	2	3	4
9. In the last month, how often have you been angered because of things that were outside of your control?	0	1	2	3	4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

Measure 3

System Usability Scale (SUS)

Participant ID: _____ Site: _____ Date: ___/___/___

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the website *today*.

		Strongly Disagree				Strongly Agree
1.	I think that I would like to use this website frequently.	☐	☐	☐	☐	☐
2.	I found this website unnecessarily complex.	☐	☐	☐	☐	☐
3.	I thought this website was easy to use.	☐	☐	☐	☐	☐
4.	I think that I would need assistance to be able to use this website.	☐	☐	☐	☐	☐
5.	I found the various functions in this website were well integrated.	☐	☐	☐	☐	☐
6.	I thought there was too much inconsistency in this website.	☐	☐	☐	☐	☐
7.	I would imagine that most people would learn to use this website very quickly.	☐	☐	☐	☐	☐
8.	I found this website very cumbersome/awkward to use.	☐	☐	☐	☐	☐
9.	I felt very confident using this website.	☐	☐	☐	☐	☐
10.	I needed to learn a lot of things before I could get going with this website.	☐	☐	☐	☐	☐

Please provide any comments about this website:

Measure 4

Acceptability of Intervention Measure (AIM), Intervention Appropriateness Measures (IAM), Feasibility of Intervention Measure (FIM)

Acceptability of Intervention Measure (AIM), Intervention Appropriateness Measure (IAM), & Feasibility of Intervention Measure

The Acceptability of Intervention Measure (AIM), Intervention Appropriateness Measure (IAM), and Feasibility of Intervention Measure (FIM; Weiner et al., 2017) are four-item measures of implementation outcomes that are often considered "leading indicators" of implementation success (Proctor et al., 2011). These measures can be administered to a wide range of stakeholders (e.g., parents, direct service providers, administrators) to determine the extent to which they believe an intervention (e.g., Triple P) or an implementation strategy (e.g., training, coaching, data collection, technical assistance) is acceptable, appropriate, and feasible. The measures can be used independently or together. The IAM items could be modified to specify a referent organization, situation, or population (e.g., my clients). The measures were designed to be as pragmatic as possible. Readability is at the 5th grade level. No specialized training is needed to administer, score, or interpret the measures. Cut-off scores for interpretation are not yet available; however, higher scores indicate greater acceptability, appropriateness, and feasibility.

The AIM, IAM, and FIM demonstrated strong psychometric properties in a series of three studies conducted by Weiner et al. (2017). Specifically, the measures demonstrated content validity, discriminant content validity, reliability, structural validity, structural invariance, known-groups validity, and responsiveness to change. The predictive validity of the measures is currently being evaluated.

Response Scale:
1 = Completely disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Completely agree

Scoring Instructions: Scales can be created for each measure by averaging responses. Scale values range from 1 to 5. No items need to be reverse coded.

Acceptability of Intervention Measure (AIM)

1) [Triple P/Implementation Strategy] meets my approval.
2) [Triple P/Implementation Strategy] is appealing to me.
3) I like [Triple P/Implementation Strategy].
4) I welcome [Triple P/Implementation Strategy].

Intervention Appropriateness Measure (IAM)

1) [Triple P/Implementation Strategy] seems fitting.
2) [Triple P/Implementation Strategy] seems suitable.
3) [Triple P/Implementation Strategy] seems applicable.
4) [Triple P/Implementation Strategy] seems like a good match.

Feasibility of Intervention Measure (FIM)

1) [Triple P/Implementation Strategy] seems implementable.
2) [Triple P/Implementation Strategy] seems possible.
3) [Triple P/Implementation Strategy] seems doable.
4) [Triple P/Implementation Strategy] seems easy to use.

Appendix D

IRB Approval Notice

LOMA LINDA UNIVERSITY
HEALTH

INSTITUTIONAL REVIEW BOARD
HUMAN RESEARCH & COMPLIANCE
24887 Taylor Street • Suite 201 • Loma Linda, CA92350
(909) 558-4531 (voice) • (909) 558-0131 (fax)

Initial Approval Notice - Expedited ***IRB# 5210213***

To: **Boustani, Maya M**
Department: **SBH: Psychology**
Protocol: **Stress and Burnout Among Community Health Workers: Feasibility and Effectiveness of a Live Online Mindfulness-Based Stress Reduction Intervention**

This study was reviewed and approved administratively on behalf of the IRB. This decision includes the following determinations:

Risk to research subjects: **Minimal**
Approval begins: **28-Jun-2021**

Stipulations of approval:
See attached list of items (if applicable).
See Appendix A for Conditions of Approval.

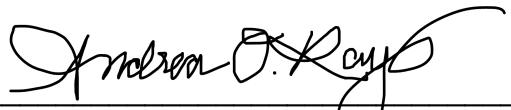
Adverse events and unanticipated problems must be reported in accord with the attached Adverse Event Reporting Matrix **A.**

All investigators are responsible for assuring that studies are conducted according to the approved protocol. Principal investigators are responsible for the actions of sub-investigators and staff with regard to this approval.

Please note the PI's name and the assigned IRB number, as indicated above, on any future communications with the IRB.

Direct all communications to the IRB c/o Human Research and Compliance.

Thank you for your cooperation in LLUH's shared responsibility for the ethical use of human subject in research.



IRB Chair/Designee 06/29/2021

Date

Loma Linda University Health holds Federalwide Assurance (FWA) No. 00006447 with the U.S. Office for Human Research Protections and the IRB registration no. is IORG0000226. This Assurance applies to the following: Loma Linda University, Loma Linda University Medical Center (including Loma Linda University Children's Hospital, LLUMC East Campus Hospital), Loma Linda University Behavioral Medicine, and affiliated medical practicegroups.

IRB Chair:
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Appendix E

Fidelity Checklist Example

CHW Mindfulness Fidelity Checklist

Session I

Observed Intervention provider: Observer: Date:

Class	Components	Addressed? (circle)
Overview of intervention and establishment of learning contract.	1. Welcome and brief introduction of program	Yes No
Theoretical underpinnings of Mind-Body medicine, self-regulatory skills. Experiential introduction to mindful eating, breathing, and body scan.	2. Opening meditation	Yes No
	3. Class responses to opening meditation	Yes No
	4. Review of guidelines for participation	Yes No
	5. Guided individual internal reflection	Yes No
	6. Group go around	Yes No
	7. Raisin-eating exercise	Yes No
	8. Abdominal breathing	Yes No
	9. Guided body scan	Yes No
Length of contact:	10. Discussion	Yes No
	11. Home practice instructions	Yes No

Notes: