



Article

Employing Dissonance-Based Interventions to Promote Health Equity Utilizing a Community-Based Participatory Research Approach and Social Network Analysis

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Abstract: The purpose of this paper is to examine and advocate for the consideration of relevant approaches that can be utilized to increase the effectiveness of cognitive dissonance-based interventions (DBIs) designed to promote health equity. Although DBIs informed by different paradigms have been reported to be effective in creating behavior change, particularly among at-risk populations, their long-term impacts on behavior change have apparently been difficult to sustain. We argue that a community-based participatory research (CBPR) approach could considerably improve the effectiveness and long-term impacts of DBIs by harnessing community strengths, increasing stakeholder participation, and facilitating collaborations and partnerships in the planning, implementation, and evaluation of such interventions. Then, we argue that the benefits of employing a CBPR approach in DBIs can be further enhanced when combined with an approach that intentionally utilizes Social Network Analysis (SNA). SNA applies powerful techniques to recognize the type of connections that hold a specific network together and identify that network's key and influential stakeholders. We conclude by providing recommendations for the use of CBPR and SNA in DBIs and demonstrating the benefits of our recommendations, especially in the context of promoting health equity.

Keywords: community engagement; community-based participatory research; dissonance-based interventions; health equity; social network analysis



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1. Introduction

Social justice movements for equitable healthcare and health services have become prominent at the forefront of protests around the world and the center of conversations in research development (Berry-James et al. 2021; Rauhaus and Johnson 2021; Terriquez and Milkman 2021; Starks 2021). Consequently, online search queries on health equity have seen a steady rise over the last 10 years (Google Trends 2021). Growing racial and other sociodemographic inequities have galvanized the crusade for more research supporting at-risk and marginalized groups and social justice efforts (Winberry and Bishop 2021). While these efforts have indicated an increase in research highlighting the needs of at-risk and marginalized populations, it has become incumbent on researchers to explore the gains that can be made by revisiting the approaches utilized by existing psychological interventions for issues related to various health services and programs, and those that seek to address health disparities. Health services and program interventions that are culturally sound and that take on socioecological perspectives have been found to be more successful in serving at-risk and marginalized populations compared to psychological interventions for at-risk and marginalized populations that utilize top-down and individual-centered approaches to creating solutions (Glanz and Bishop 2010). Taking into account the successes of such culturally competent and socioecological approaches, the purpose of our paper is to explore relevant approaches for existing psychological interventions to consider by drawing

from and examining theories related to cognitive dissonance, community psychology, and social networks.

Cognitive dissonance, [Festinger's \(1957\)](#) theory of psychological discomfort driven by individual inconsistencies between human beliefs and actual behavior, has prompted the field of social psychological sciences to explore techniques for adjusting or changing unwanted attitudes and behavior. Notably, interventions informed by experimental paradigms on cognitive dissonance have been explored and utilized in population health interventions. For example, interventions to combat feelings of hypocrisy (i.e., hypocrisy paradigm) have targeted behaviors around tobacco usage, sexual risk, HIV treatment, substance abuse, and weight management ([Aronson et al. 1991](#); [Becker et al. 2005](#); [Stone et al. 1994](#); [Steiker et al. 2011](#); [Simmons et al. 2013](#)).

In a randomized, four-arm experimental design study that was informed and influenced by the hypocrisy paradigm, 331 college student smokers were assigned to either the intervention arm or one of three active control conditions ([Simmons et al. 2013](#)). Participants were made to believe that the purpose of the study was to develop novel and more effective interventions promoting healthy lifestyle behaviors for high school seniors by designing a website with a series of health-related videos. After being told that high school seniors may be more receptive to messages delivered by peers rather than health professionals, the college student smokers who were randomly assigned to the intervention were asked to create a video message to be included on the website. The creation of a video message was an important component of this dissonance-enhancing intervention because the way the participants presented themselves publicly (e.g., on video) could influence their behavior. If the participants reported negative experiences and disapproval of smoking on video, the inconsistencies between their publicly displayed attitudes against tobacco use on video and their smoking behaviors were likely to produce psychological discomfort that could prompt efforts to reduce the dissonance. As the researchers hypothesized, the intervention arm was more effective than the control groups in increasing motivation to quit smoking ([Simmons et al. 2013](#)). At 6-month follow-up, the dissonance-enhancing intervention produced higher rates of smoking cessation than the control groups. Among daily smokers, the intervention produced greater abstinence rates than the control conditions ([Simmons et al. 2013](#)).

Empirical evidence has supported the notion that attitude and behavior change could be achieved through interventions that rely on cognitive dissonance ([Freijy and Kothe 2013](#); [Stice et al. 2019](#); [Stone and Fernandez 2008](#)). As a consequence of their noted success in changing attitudes and behavior, dissonance-based interventions (DBIs) that were introduced in the 1950s continue to be implemented globally today in clinical settings ([Becker 2017](#); [Hudson et al. 2021](#); [Ghaderi et al. 2020](#)). Studies that have utilized DBIs have highlighted the ability of DBIs to obtain successful results in effecting behavior change.

A review of these DBIs has posited that the lasting impact of cognitive dissonance declines over the weeks following their initial implementation ([Draycott and Dabbs 1998](#)). Both anecdotally and in real-world practice, this problem of attaining only short-term impacts after the implementation of an intervention has not been limited solely to DBIs. In efforts to improve upon the waning impacts of both DBIs and non-dissonance-based interventions to address health issues and disparities, champions of the community-based participatory research (CBPR) approach have relied on meaningful community engagement and the active participation of pertinent stakeholders to extend the effectiveness of such interventions ([Kloos et al. 2011](#)). Based on our extensive literature search, while only two case examples of DBIs have been known to successfully implement a CBPR approach that resulted in more lasting desired outcomes, many non-dissonance-based interventions have been documented to successfully utilize a CBPR approach and achieve positive impacts lasting up to one year or longer ([Becker et al. 2009](#); [Steiker et al. 2011](#)). In particular, non-dissonance-based interventions with greater community engagements have generally reported higher positive outcome performance ([Krishnaswami et al. 2012](#); [Freeman et al. 2018](#)).

Although social sciences and public health researchers have used participatory approaches in health prevention research and practice since the 1960s, CBPR as an approach has notably not been incorporated into DBIs development until the last turn of the century (Becker et al. 2009; Kloos et al. 2011). To our knowledge, only two DBIs, *The Body Project* and the *Keepin' it REAL* intervention programs, have been empirically tested for their effectiveness while incorporating a CBPR approach to scale up active participation and knowledge dissemination among community stakeholders (Becker et al. 2017; Becker and Stice 2017; Kulis et al. 2005; Steiker and Powell 2011). Based on the research conducted on these DBIs, the researchers' improved ability to restructure their DBIs in response to the input of key stakeholders resulted in successfully meeting the needs of relevant communities around the world (Becker et al. 2009; Steiker et al. 2011). In order to bridge the gap between research and practice, these DBIs have recognized and adopted in their interventions criticisms and recommendations that CBPR has highlighted, such as the need to challenge the lack of high-level community engagement and voice throughout all phases of their project development and implementation (i.e., definition of problem, study design, data collection, data analysis, and dissemination), and the need to remain mindful of promoting equitable community involvement during their entire research processes (Becker et al. 2009; Gibbs et al. 2020; Shier 2001).

While participatory approaches to DBIs that have been implemented in eating disorder prevention work worldwide have been examined and documented by research studies (Becker and Stice 2017), a gap in academic literature still exists between the larger field of DBIs in social sciences and public health, and the use of community-engaged research. Furthermore, existing literature on DBIs has highlighted the importance of building collaborative processes and developing peer leadership in the establishment of interventions (Becker et al. 2017). To this end, our paper will argue for the critical need for proponents of DBIs to adopt and incorporate a CBPR approach to developing and implementing interventions dedicated to addressing social justice and health equity issues for longer-lasting impacts.

Social network theory has postulated that traditional social sciences have historically overlooked multi-level systems and that these environment systems have purposefully been taken into account by the network perspective (Borgatti and Ofem 2010; Neal and Christens 2014). The network perspective focuses on the relationships embedded within an environment, and the types of ties that hold the network together in order to understand the context of individuals and their environments (Borgatti and Ofem 2010). Utilizing the social network theory (Borgatti and Ofem 2010), our paper will additionally argue for proponents of DBIs to consider applying social network analysis (SNA), in addition to utilizing a CBPR approach, when developing health interventions to synergistically promote social justice and health equity. In summary, the two main arguments of our paper are:

1. A CBPR approach to DBIs is beneficial for meaningful problem definition processes in pertinent communities and fostering durable community-focused, long-term solutions based on the collaborative voices and input of relevant stakeholders, and;
2. DBIs guided by social network theory and analysis can identify a network's key and most influential stakeholders, promote the creation of collaborative spaces, and bolster the extent of an intervention's reach to underserved communities.

2. Dissonance-Based Interventions (DBIs)

Cognitive dissonance theory and research have captivated the field of social psychology since the 1950s with thousands of publications examining how to reduce dissonance (Cooper and Fazio 1984; Cooper 2007; Harmon-Jones 2002). Festinger (1957) challenged previous dominant theories (i.e., learning and reinforcement theories), where social psychologists explored behavior motivated by reward rather than internal discomfort (Aronson 1997). Specifically, according to Aronson's (1997) review and modification of cognitive dissonance theory, an aversive state (i.e., dissonance) occurs when one's cognition, usually beliefs or convictions, and actual behavior about a particular concern are inconsistent. This

classical theory in social psychology galvanized the emergence of multiple paradigms designed to explore how to successfully change attitudes or behaviors. The five major paradigms that have guided the development of DBIs include: belief disconfirmation, effort justification, free choice, hypocrisy, and induced compliance (Harmon-Jones and Mills 2019). We have outlined these five paradigms in Table 1.

Table 1. Summary of Paradigms ¹.

Paradigm	Description
Belief Disconfirmation	Dissonance occurs as a result of an inconsistency between presented information and one's own beliefs, which may lead to denial of the information if one chooses not to change their belief. Forms of denial can manifest as misinterpretation of the presented information, refusal/rejection of the presented information, or pursuit of support from others who share similar beliefs that are inconsistent with the presented information. Consistency between cognition and behavior can be increased by seeking support from social groups who share similar beliefs or persuading opposing social groups that the presented information is invalid.
Effort Justification	Dissonance occurs as a result of voluntary participation in an unpleasant activity in order to gain a desirable outcome. Consistency between cognition and behavior can be increased by exaggerating the merits of the desirable outcome.
Free Choice	Dissonance occurs as a result of a selection made between two highly valued options. Consistency between cognition and behavior can be increased by adding positive associations or decreasing negative associations with the selected option.
Hypocrisy	Dissonance occurs as a result of behaviors being inconsistent with public statements. Consistency between cognition and behavior can be increased by an evaluation of or explanation for the original public statement, and/or alteration of the inconsistent behavior to support the statement.
Induced Compliance	Dissonance occurs as a result of forced participation in an unpleasant activity. Consistency between cognition and behavior can be increased by forms of persuasion (i.e., provision of rewards or withdrawal of threats) that are contingent upon participation.

¹ Adapted from text and content in Cognitive Dissonance: Reexamining a Pivotal Theory in Psychology, Harmon-Jones and Mills (2019), American Psychological Association.

These paradigms have influenced techniques that have been utilized in DBIs to address health concerns such as smoking, substance use, safe sex practices, and low levels of exercise and physical activity (Chatzisarantis et al. 2008; Natvig and Edvard Aarø 2014; Simmons et al. 2013; Stone et al. 1994). To illustrate, successful attitude change among high school students has been reported following an experimental study guided by the free choice paradigm (Chatzisarantis et al. 2008). Researchers developed a specific intervention that aimed to increase physical activity among participants by providing them a choice of whether or not to exercise as a technique specifically to stimulate dissonance. The researchers found that participants who chose to exercise, possibly because of their belief in the value of exercise and despite their reluctance to exercise based on their personal barriers to doing so, reported higher levels of frustration (i.e., dissonance) towards the physical task and were most likely the ones to fulfill the physical task in order to achieve consistency between their personal cognition and behavior. Similarly, experiments guided by the hypocrisy paradigm have found that participants who shared public statements over video or in-person speeches as a means to create a promise to a behavior were more likely to remain committed to their public statement knowing they would have follow-up interviews (Stone et al. 1994; Stone and Fernandez 2008).

Despite the successes of certain DBIs, a recent review of interventions based on the effects of cognitive dissonance has called for the field to consider a more socioecological perspective in order to advance knowledge for reducing dissonance (McGrath 2017). McGrath (2017) has noted the disconnect between the theoretical effectiveness of cognitive dissonance and the real-world applications that are sensitive to unique characteristics and modes of dissonance reduction. In this paper, we integrate classic social psychology theory and modern research approaches to address this disconnect. Due to the prominence of cognitive dissonance theory in evidence-based interventions, our paper will focus on DBIs and how they can be revisited to incorporate community engagement and CBPR, as well as challenge limitations that previous literature has reported.

3. Community-Based Participatory Research (CBPR) and DBIs

Health interventions have been designed using community-based approaches to capitalize on local community strengths when addressing global health challenges of at-risk and underserved populations, and simultaneously, bridge the gap between research and practice. To illustrate, interventions incorporating CBPR principles and methods (i.e., collaborative and equitable community partnerships, diversity, inclusion, systems development using cyclical and iterative processes, and stakeholder capacity-building) have been established to provide mental health services for people living with HIV, encourage family-centered health practices for non-nuclear families, address racism and its impacts on physical health, scale up access to primary care in marginalized communities, and create sustainable health management resources for low-income households (Carty et al. 2011; Coffman et al. 2017; Coughlin 2016; Davison et al. 2013; De la Torre et al. 2013; Heisler et al. 2014; Hergenrather et al. 2013; Liboro et al. 2021; McCuistian et al. 2021).

Interventions have been developed by researchers in collaboration with community leaders to combat the unique challenges racial and ethnic minority groups have faced while accessing HIV health services, such as language barriers and cultural differences (Flores et al. 1998; Liboro et al. 2020, 2021). For instance, Rhodes and colleagues (2012) have sought solutions to provide HIV prevention tools for Latiné communities using a collaborative approach. In their study, their community partners helped them establish a multi-step intervention program that involved both increasing stakeholder participation and capturing qualitative data to explore the lived experiences of Latiné communities in order to refine intervention priorities and provide sustainable tools to prevent the spread of sexually transmitted infections (Rhodes et al. 2012).

While various interventions utilizing a CBPR approach have focused on health inequities, most health interventions have not fully adopted a genuine CBPR approach to incorporate community involvement in all elements of intervention development (Kwon et al. 2018; McCuistian et al. 2021; Shier 2001). Considering the various challenges to adopting CBPR as an approach to developing health interventions that have been identified by many community-engaged scholars from the time CBPR began gaining momentum as a collaborative approach (Israel et al. 1998; O'Toole et al. 2003) up to the time that ethical challenges related to utilizing CBPR (Minkler 2004; Wilson et al. 2018) and sustaining it as a viable option began to arise (Israel et al. 2006; Shultz et al. 2006; Wallerstein and Duran 2006), it stands to reason that many researchers have been reluctant to fully adopt CBPR as an approach to implementing their interventions. Since its utility gained increasing recognition, early challenges such as how to determine who belongs to specific communities, define meaningful impacts, balance methodological rigor with desired outcomes, and resolve differences in the assumptions, perspectives, values, and priorities of various stakeholders have emerged (Israel et al. 1998; O'Toole et al. 2003). Later, ethical and other challenges related to the use of CBPR in health interventions have surfaced including issues concerning trust/mistrust, insider-outsider tensions, power and privilege, community consent, ownership of data and culturally bound knowledge, levels of participation, lack of funding and resources, and time constraints (Israel et al. 2006; Minkler 2004; Shultz et al. 2006; Wallerstein and Duran 2006; Wilson et al. 2018). With numerous challenges to

consider, researchers and community partners have had a lot to contemplate and discuss before diving into strategies to incorporate CBPR as an approach to DBIs.

Many DBIs that have not been guided by CBPR have been widely used to address health issues affecting at-risk populations. For example, DBIs informed by the hypocrisy paradigm that have not involved any community engagement or CBPR principles and methods have been implemented to facilitate weight management, change obstinate smoking behaviors, and promote HIV prevention and treatment (Aronson et al. 1991; Peterson et al. 2008; Simmons et al. 2013). Interestingly, some DBIs aimed at reducing problematic substance use among youth have argued that despite having utilized materials for their programs that have been written solely by researchers and clinicians (i.e., without input from community stakeholders), their programs have also incorporated certain components of the CBPR approach in their work (i.e., selecting music for pre-written informative videos that were relevant to substance using and at-risk youth) (Steiker and Powell 2011). These examples underscore the limited use of CBPR as an approach to influencing or implementing DBIs for supporting at-risk populations and addressing health disparities. Consequently, a systematic review of community-engaged work in DBIs has implored researchers to more actively and consistently engage community members in all phases of research, in order to achieve the CBPR “gold standard” and more sustainable impacts (Krishnaswami et al. 2012, p. 89).

CBPR has been effectively used as an approach to health interventions designed to promote health equity, especially because it has been utilized to consciously identify and purposefully address the differences in privilege and power that have historically existed among academic researchers, their community partners, and the participants they purport to help and support with their interventions (Israel et al. 2006; Minkler 2004; Shultz et al. 2006; Wallerstein and Duran 2006; Wilson et al. 2018). In the past twenty years, proponents of CBPR have strived to promote the agency, autonomy, and capacity of community stakeholders and the participants who have become involved in the studies and interventions that they have conducted and implemented. CBPR proponents have also worked harder to uphold the sharing of power, responsibility, and ownership of knowledge that has been generated from their intended collaborative research (Israel et al. 2006; Minkler 2004; Wallerstein and Duran 2006; Wilson et al. 2018). Using CBPR as an approach, DBIs scholars potentially stood a greater chance of promoting health equity in their work.

There are specific strategies that can be used to incorporate CBPR into DBIs from the start of their implementation. A practice in CBPR that has been typically utilized by researchers involves the provision of opportunities for participants and key stakeholders to lead intervention sessions (Jacquez et al. 2013; Ozer et al. 2008; Ozer and Douglas 2015; Valdez et al. 2020). Through this practice, community members have been able to not only deliver information pertinent to the health issue being addressed but also gain opportunities to create culturally appropriate content for the interventions that are unique to the needs of their communities and environment. Previous interventions in social sciences and public health have incorporated the practice of training participants and key stakeholders to serve as intervention specialists (i.e., task shifting), in order to better reach underserved and low-income communities (Joshi et al. 2014; World Health Organization 2007). Researchers have harnessed the willingness of community stakeholders to act as specialists in order to recruit more participants and disseminate evidence-based knowledge (Iwelunmor et al. 2017; Joshi et al. 2014). Similar works have applied this strategy of task shifting and have conspicuously had positive impacts. However, criticisms of interventions utilizing CBPR have questioned the authenticity of supposed collaborative interventions that have not genuinely incorporated community voices in the initial stages of their project development (Jacquez et al. 2013). Notably, a review of research on task shifting and sharing in clinical settings has advanced an appeal for future studies to authentically utilize more CBPR principles and methods from the beginning stages of their interventions in order to understand early on community contexts and develop relevant interventions for

communities (Iwelunmor et al. 2017). In this paper, we echo the calls of prior researchers for the promulgation of peer-led DBIs implementing the strengths-based approach of utilizing members of the community as agents of change, and the relinquishing of previous practices of procuring traditional agents from outside resources (Pallaveshi et al. 2014; Williford et al. 2022).

As far as we could determine, there have only been two case examples of DBIs with aims of providing peer-led services that had been transformed to meet CBPR guidelines for community-sensitive interventions with a peer-led focus (Stice and Presnell 2007; Becker et al. 2009). One of these DBIs, *The Body Project*, utilized a hypocrisy paradigm to develop interventions that target community-defined problems through community-led solutions (Becker and Stice 2017). In this project, researchers collaborated with university organizations that reached out for solutions towards building positive body image practices (i.e., reducing dietary restrictions, decreasing eating pathology behaviors, and increasing body satisfaction) among young women. Participants of the intervention program had maximal involvement as leaders who defined the research problem, designed the interventions to fit the values of their organizations, and facilitated interventions and follow-up focus group interviews. Significant reductions in aversive body image behaviors had been reported at the 8-month follow-up.

The second of the two DBIs that had been transformed to meet CBPR guidelines for community-sensitive interventions, the *Keepin' it REAL* program, had a focus on youth problematic substance use prevention (Steiker and Powell 2011). Youth who had already been using drugs at the start of the intervention had been consulted as experts during the development of intervention material for a substance use prevention curriculum adaptation activity, which was meant to utilize motivational methods for the purpose of reducing substance use. As youth had developed informational videos in collaboration with researchers and clinicians in order to capture and share lived experiences on substance use, the dissonance between the youths' roles as experts/preventionists and their own problematic substance use also apparently led to shifts in their own behaviors. Similar to *The Body Project*, an intervention evaluation of the *Keepin' it REAL* intervention program revealed significant decreases in youth problematic substance use (e.g., alcohol and marijuana) among participants over a 14-month period (Kulis et al. 2005).

It is evident from these two case examples that DBIs could successfully adopt a CBPR approach to develop community-driven solutions. In both case examples, participants had been meaningfully involved in their respective intervention programs as either program leaders or experts/preventionists in true CBPR fashion (Kulis et al. 2005; Steiker and Powell 2011). However, the incorporation of CBPR in DBIs has not been carried out without challenges, particularly in the development of committed and core team leadership in the organization and implementation of the interventions (Becker et al. 2009). In light of these challenges, we recommend the concomitant use of an approach that would intentionally utilize SNA for researchers to consider as they develop collaborative projects that aim to scale up stakeholder participation and identify key and influential leadership potential in networks and communities.

4. Social Network Theory, Social Network Analysis (SNA), CBPR, and DBIs

Relationships and the patterns of relationships have a large and varied influence on both individual and group action and are of paramount importance in explaining behaviors. SNA offers many exciting tools and techniques for research and practice in a wide variety of medical and public health situations, which include coordinating coalitions, developing organizational improvements, understanding risk behaviors, delivering healthcare and services, and promoting behavior change in population health contexts (Valente 2010). In the last two decades, the increasing use of SNA across a number of disciplines has led to the spread and adoption of social network concepts, and subsequently, the introduction of various opportunities for future research using SNA (Borgatti et al. 2014; Kadushin 2012). In particular, the growing recognition of the use of social network theory and concepts has

drawn attention to the appropriate use of social network data in network interventions to improve organizational performance and accelerate behavior change (Valente 2012). Network interventions have been used to assess the effectiveness of local opinion leaders in improving professional practice and patient outcomes (Flodgren et al. 2011), as well as utilize the characteristics of social networks to generate, accelerate, or maintain desired health behaviors (Hunter et al. 2019), which could be useful to develop the design, manage the conduct, and evaluate the outcomes of DBIs.

Successful interventions utilizing a CBPR approach have been designed using SNA to identify key stakeholders or relevant community members for the purposes of scaling up participation, gaining community trust through a greater understanding of the social environment, and influencing intervention design through strategic leadership (Kornbluh et al. 2016; Gilfoyle et al. 2020; Neal and Christens 2014). It is at this stage of designing interventions that researchers should be intentionally mindful of interpersonal relationship building. For instance, Langhout and colleagues (2014) have developed a participatory approach to empower underserved youth, and have employed SNA to both examine resources in the networks involved as well as aid in bridging gaps in the networks. Moreover, they have underscored the importance of identifying highly central actors to bridge social divisions and build important interpersonal relationships, as well as have appealed for future work to consider SNA to capture and describe appropriate contexts within networks (Langhout et al. 2014).

Social network theory has highlighted the importance of gaining an understanding of the socioecological context of intervention efforts through quantitative assessments of relationships. Uniquely, relationships within a network can be defined as locations (e.g., industries, departments), attributes (e.g., gender, age), social relationships (e.g., friends, coworkers), mental relations (e.g., likes, dislikes, awareness), or social interactions (e.g., conversations, assists) (Borgatti and Ofem 2010). Currently, as far as we could determine, there are no reports in the academic literature of DBIs that have included approaches to critically identify the relationships held within a group of participants or network of relevant stakeholders. Assessing the types of relationships between participants or stakeholders prior to intervention development could prospectively produce research designs that are more effective and locally relevant. Additionally, the use of SNA has provided scientists with a quantitative perspective on research design and has allowed for data triangulation, a higher saturation of findings, and more innovative intervention development (Kornbluh and Neal 2015).

As we have previously discussed, health interventions have not always been comprehensively influenced by a CBPR approach. Despite a slight propensity to procure a more limited participation from the larger community, the use of SNA to identify highly central community members who could deliver expert-developed interventions has led to successful outcomes (Shelton et al. 2019). During the stage of conducting SNA in DBIs utilizing CBPR as an approach, researchers have been able to continue to rely on and promote interpersonal relationship building. For instance, Pickering et al. (2018) have relied on friendship nominations to identify peer leaders who would be most successful in disseminating suicide prevention intervention messages, subsequently revealing that closeness to peer leaders played the most important role in intervention exposure.

Frequently used measurements in SNA for health interventions have included degree centrality (i.e., the quantity of relationships a community member holds) and eigenvector centrality (i.e., the quantity of the relationships held by neighbors of a community member). In line with evaluating the success of interventions using SNA, a recent review of health interventions that have utilized SNA found that degree centrality was a commonly used measure to inform intervention designs across 52 publications (Shelton et al. 2019). Likewise, the eigenvector centrality of community members has been assessed in the investigation of sexual contact networks to explore best practices for health management (Juher et al. 2017). Juher and colleagues (2017) have found that measuring for eigenvector centrality allowed for information to accurately reach the sexual partners of those who have recently

been infected with a sexually transmitted infection, thus reducing the burden and cost of notifying those who have not been part of the transmitted network.

While the effective use of SNA in non-DBIs in social sciences and public health has been evaluated and documented, its utilization in DBIs dedicated to promoting health equity and addressing health issues impacting at-risk and marginalized populations remains to be considered by proponents of DBIs. Related to this, researchers have noted the need to expand the perspectives of dissonance, and have encouraged the field supporting DBIs to utilize more novel approaches (Cooper 2019; McGrath 2017). Specifically, Cooper's (2019) review of cognitive dissonance has highlighted the progress of the field from the 1950s to modern practice and has lauded experimental designs that have ultimately contributed to alleviating dissonance in people's lives. Echoing McGrath's (2017) assertion on the lack of contextual understanding in DBIs, Cooper (2019) has implored researchers to generate new knowledge from empirical studies that can be translated to practical use for health interventions, as well as seek undiscovered and new perspectives when conducting research using DBIs.

In this paper, we have argued for the new perspective and considerable benefits of utilizing a CBPR approach in DBIs to provide researchers with more opportunities to explore useful and relevant findings based on greater participant input, increased stakeholder participation, and enhanced meaningful community involvement. We expand on this argument by advocating for future efforts in research to also revisit existing DBIs through a social network theory perspective. Specifically, we argue for the importance of including SNA in the development, establishment, and dissemination of DBIs that utilize a CBPR approach because it has not been purposefully considered and explored in empirical studies and academic literature despite its apparent potential to improve DBIs.

According to Cooper (2019), the field of DBIs is in need of new approaches to examine how dissonance operates in groups. There are gaps in the DBIs field that need to be filled by new perspectives on dissonance and new combinations of dissonance with other processes, including new and valuable approaches that would help people in their daily lives, particularly those who are underserved and in the margins (Cooper 2019). These gaps need to be addressed in order to accelerate the translation of dissonance from a well-respected laboratory tradition into principles and practices that are important in people's lives in the 21st century. To close these gaps, the use of SNA in community-driven or peer-led DBIs could potentially provide researchers with increased opportunities to critically examine the contexts of the people in diverse communities that are targeted for interventions (Neal and Christens 2014). A full implementation of our recommendation to use SNA as an approach concomitant with the utilization of CBPR would start with gaining a quantitative perspective of the social ties and relationships within a community through SNA. Then, by considering a sequential methods design (Kornbluh and Neal 2015), SNA findings could assist researchers and community members in identifying gaps and strengths in the community, as well as enhance the development of culturally appropriate network interventions. To illustrate, after performing a quantitative SNA on their study's relevant community, researchers conducted interviews among teachers in order to determine who among them was optimally positioned within a network to deliver information (Kornbluh and Neal 2015). In this research, structured interview questions were utilized to identify the number of relationships each teacher held and whom they sought advice from for different education-related issues. Interestingly, the overall network analysis results revealed that teachers who were originally not predicted to be optimally positioned in the network turned out to be better positioned in the network to disseminate information on school interventions based on their frequently reported connectedness to other teachers.

Future long-term successes of DBIs could potentially result from both the incorporation of a CBPR approach and the utilization of SNA to gain a more accurate contextual understanding of the communities involved in the interventions. Research has examined the context of community-based organizations through the lens of stakeholder collabora-

tions and SNA in order to successfully map out and better understand the relationships and patterns of communications between community-based organizations (Evans et al. 2014). Evans and colleagues (2014) surveyed organizations on how often they communicated with other organizations in their local area to create a network in order to display the strength of relationships between the surveyed organizations. Based on their observations, they had been able to successfully identify community hubs (i.e., central organizations in the network) that could be utilized in the development and establishment of a coalition that could successfully unite the local community-based organizations. Furthermore, sequential mixed methods projects using SNA have provided researchers the ability to first capture the structure of the social system prior to developing additional methods of data collection (Froehlich et al. 2020; Yousefi Nooraie et al. 2020). In their recent study, Prevo and colleagues (2018) have demonstrated the use of network data to identify highly central individuals employed in social support services for low-income communities. Highly central individuals were selected to be interviewed to further investigate the facilitators and barriers to connecting a variety of social support sectors (i.e., recreational, healthcare, and educational). This complementary distribution in data collection and methodology has allowed researchers to build upon the strengths of each stage and produce meaningful study outcomes (Ivankova et al. 2006).

In the past two decades, research studies examining implemented DBIs have increasingly focused on health disparities and structural inequalities impacting racial and ethnic minorities, sexual and gender minorities, and other underserved populations. For example, many of these studies have looked into interventions that have sought to address different problematic health behaviors related to eating and body image issues, and how adverse factors (i.e., minority stress, racism, ethnocentrism) have impacted the feasibility, acceptability, and efficacy of the DBIs that have been designed to address them (Calzo et al. 2017; Kant et al. 2019; Rodriguez et al. 2008; Stice et al. 2014). Even more recently, proponents of DBIs for promoting health equity have become more deliberate with planning their research agendas, carefully designing and implementing their methodologies, and the conduct of their studies with principles and tenets such as diversity, inclusion, and social justice foremost in their minds (Castor and Borrell 2022; Ciao et al. 2021, 2022). Future research should consider rigorous methods for examining the formation of organizations and the existence of relationships among individuals within an organization. In line with today's current social movements toward providing equitable healthcare and health services to historically at-risk and marginalized populations, the use of the CBPR approach to conduct population research, and the values of diversity, equity, inclusion, social justice, and collaboration that are the foundation of this approach, have been successful in serving and addressing the needs of at-risk and marginalized communities (Berry-James et al. 2021; Kloos et al. 2011). In the pursuit and support of similar goals, researchers have also utilized SNA to organize and scale up social justice efforts among youth in online settings (Kornbluh et al. 2016). By analyzing the context and pattern of relationships within a network, researchers have identified barriers and facilitators that scale up participation in social justice-centered projects and interventions dedicated to promoting health equity.

While considering our arguments and recommendations in this article, we caution DBIs researchers to be mindful not only of the inherent challenges that accompany the decision to use CBPR as an approach to designing, conducting, and evaluating their health interventions but also of the applicability of SNA in their research process. In the various stages of preparing for and implementing DBIs to promote health equity, researchers would need to remain attentive to the community-driven research questions and the methodological decisions that were agreed upon during stakeholder deliberations. It would be important to remember that community partners may believe or feel that SNA is not an appropriate option to consider and incorporate in their collaborative projects. Hence, not only is it imperative for academic researchers to examine with their community partners the feasibility, applicability, and potential usefulness of CBPR as an approach to utilize in

their projects, but also examine the feasibility, applicability, and potential usefulness of SNA in the conduct of their research process [see Figure 1].

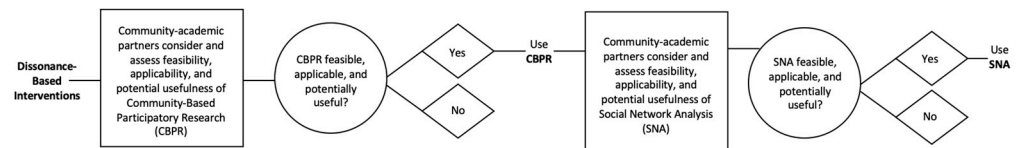


Figure 1. DBIs CBPR SNA Algorithm.

Future DBIs incorporating both a CBPR approach and an approach that intentionally maximizes the benefits of utilizing SNA could potentially address health issues and disparities impacting immigrants and newcomers, older adults, ethnoracial minorities, sexual and gender minorities, folks with lower socioeconomic status, people living with HIV or other hidden or episodic disabilities, and other at-risk and marginalized populations who have been historically underserved and disadvantaged in terms of accessing health services and programs. By increasing stakeholder input and participation during all phases of the intervention, understanding crucial network connections and dynamics, identifying key leaders and gatekeepers, providing critical opportunities for meaningful representation and participant involvement during program implementation, and building capacity in their respective communities, DBIs utilizing CBPR and SNA could prospectively overcome specific challenges at-risk and marginalized populations encounter and experience such as language and cultural barriers, ageism, racism, homophobia and transphobia, financial constraints, HIV stigma, ableism, and community disengagement. The research studies implementing and evaluating these DBIs utilizing CBPR and SNA could also potentially generate significant findings and lessons learned that may inform and influence health policies, programs, and services specifically dedicated to improving the lives and health statuses of at-risk and marginalized populations in society.

5. Limitations of Recommendations

In addition to the various challenges we have previously discussed associated with utilizing a CBPR approach (e.g., ethical and methodological issues, issues related to power and privilege, concerns about ownership of data and culturally bound knowledge) (Israel et al. 1998, 2006; Minkler 2004; O'Toole et al. 2003; Shultz et al. 2006; Wallerstein and Duran 2006; Wilson et al. 2018) that could prospectively pose as barriers and limitations in the use of CBPR in DBIs, a distinct limitation in conducting CBPR in DBIs that utilize technical statistical analyses such as SNA is the possibility that community partners may not readily understand the meaning and relevance of the projects' quantitative results. Provan and colleagues (2005) have discussed the benefits of exploring the structure of quantitative relationships in specific networks, and how it should be considered an important tool for communities to improve the structure and function of organizations. In order to address this limitation (i.e., the lack of understanding of statistical analytic techniques and results among collaborators in CBPR DBIs), Provan et al. (2005) have provided accessible resources for researchers and community partners to use so that they may more readily understand network data, as well as interpret results that would assist them in addressing community capacity and collaboration concerns and issues. Previous research has also discussed the need for disseminating data and findings in readily accessible formats as a means to encourage participation and collaboration within communities (Garnett et al. 2015). Therefore, we encourage future DBIs utilizing CBPR and SNA as approaches to consider the provision and use of readily understandable and accessible material for community partnerships that have not included training in technical statistical analytic techniques.

SNA is typically applied as a quantitative method, which has important limitations on its own. First, quantitative methods are capable of capturing the form of relationships (e.g., strength and frequency), but they are less suitable for capturing the content of relationships

(e.g., interests and motivations). Second, while complex social systems involving at-risk and marginalized populations are highly dynamic, the representations that SNA creates of such systems are often static (Schipper and Spekkink 2015). These limitations can potentially be overcome by balancing a quantitative approach to SNA with a qualitative approach, or utilizing the qualitative aspects of the SNA to fill the gaps left behind by its quantitative aspects with the use of a sequential methods design (Evans et al. 2014; Froehlich et al. 2020; Kornbluh and Neal 2015; Prevo et al. 2018; Yousefi Nooraie et al. 2020), as we have described and discussed with examples in this paper.

6. Conclusions

Our paper presents an argument for the incorporation of two approaches in the development and conduct of DBIs. One approach that utilizes CBPR, and another, the use of SNA. We reviewed the noted successes of two case examples of DBIs in extant academic literature that have utilized a CBPR approach, and these examples have highlighted the potential impact of utilizing CBPR elements (i.e., engaging community participation and heightening community voice) on the reduction of dissonance (Becker and Stice 2017; Steiker and Powell 2011), particularly for future studies. Additionally, our paper has voiced support for researchers to incorporate SNA in DBIs utilizing a CBPR approach in order to gain a more comprehensive understanding of the contexts and networks involved during the development of health interventions (Neal and Neal 2017). The arguments we have put forward in this paper indicate that research and practice that aim to reduce cognitive dissonance could substantially benefit from adopting approaches that utilize CBPR, analyze specific contexts through a social network theory perspective, and use SNA.

Overall, our paper provides an important contribution to the current literature regarding novel approaches for revisiting and improving DBIs so as to develop relevant practices that serve at-risk and underserved communities. By providing a new vision for DBIs, our paper offers future research efforts valuable insights towards adapting evidence-based health interventions that have greater potential to augment community engagement, address real-world problems through community-developed solutions, and sustain longer-lasting health impacts on behavior change, especially among at-risk and underserved populations experiencing health disparities. From this new vision for DBIs, our paper also highlights the perspective that SNA offers to gain a greater understanding of the complex relationships that develop within communities and the impacts of such relationships on the success of interventions dedicated to reducing dissonance and promoting social justice and health equity.

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