

Utilizing a Social-Ecological Health Promotion Framework to Engage Diverse Populations for Recruitment in the *All of Us* Research Program

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Abstract

In 2017, the National Institutes of Health (NIH) *All of Us* Research Program announced a funding opportunity for community partners to “educate, motivate, and facilitate enrollment” of volunteers. In response to this opportunity, four institutions from the Research Centers in Minority Institutions (RCMI) Translational Research Network (RTRN) formed the Precision Medicine Research (PreMeR) Diversity Consortium. This multi-institutional collaboration proposed to employ evidence-based best practices to engage, recruit, and retain diverse populations in the *All of Us* program. The PreMeR approach was premised on the notion that engagement, recruitment, and retention strategies in community and biomedical research must be viewed as community-engaged public health interventions and utilize the same theoretical principles and approaches. To that end, social influence theories were key in conceptualizing approaches to engaging diverse populations in research, as they helped PreMeR members better understand how people’s beliefs and opinions could be modified to effect change and lead to action (Stokols, 1996). PreMeR adopted the social-ecological model (SEM) for health promotion (Dahlberg & Krug, 2006) from Stokols (1996) and community-based participatory research (CBPR) models (Israel et al., 1998, 2005; Wallerstein & Duran, 2010) to guide proposed engagement, recruitment, and retention strategies. The processes of contextualizing engagement strategies across the individual, interpersonal, organizational, community, and policy spheres of influence necessitated the incorporation of multiple methods to reach diverse audiences. This article provides a model for applying a theory-driven approach to research engagement, recruitment, and retention.

Certain populations in the United States experience health disparities, which can be defined as differences in health outcomes among different populations (Braveman, 2014; Braveman et al., 2011; Carter-Pokras & Baquet, 2002). Health disparities are promulgated by myriad factors, including low social and economic status, racial- or ethnic-minority status (Barr, 2014), lack of health insurance (Farkas et al., 2012; McWilliams et al., 2004; Sabatino et al., 2008; Shi et al., 2011; Trivers et al., 2008), insufficient access to health care (Brown et al., 2011), inadequate health care information (Substance Abuse and Mental Health Services Administration [SAMSHA], 2017), a shortage of diverse health care providers, and a dearth of culturally and linguistically adept health care (SAMSHA, 2017). The populations that experience health disparities are usually vulnerable, diverse communities, and they are often underrepresented in research studies, limiting the potential for improving the effectiveness of health care practice within these groups. Increasing the diversity of research participants can be fostered through community

engagement approaches and better tailored interventions that can improve health outcomes. The capacity to integrate community engagement into multisite research studies is essential to efficiently testing, disseminating, and scaling up research findings regionally and nationally.

The Precision Medicine Research (PreMeR) Diversity Consortium was formed with the goal of increasing minority representation in research, thereby facilitating better health outcomes and reducing health disparities in minority communities. The PreMeR Consortium brought together four institutions, including two historically Black institutions, Howard University and Meharry Medical College; a Hispanic-serving institution, the University of Texas at El Paso; and an Asian American and Pacific Islander-Serving institution, the University of Hawaii. The PreMeR Consortium proposed engagement, recruitment, and retention strategies for use across diverse geographic, cultural, and racial/ethnic communities, which will be described in this article. Each collaborating institution brought to the Consortium its unique knowledge

of its respective community and best practices to potentially engage, recruit, and retain research participants to meet the proposed grant aims.

The PreMeR universities are members of the Research Centers in Minority Institutions (RCMI) Translational Research Network (RTRN). The RTRN was established in 2007 to promote inter-institutional research collaborations among the RCMI institutions, improve the health of underserved populations, and reduce health inequities (Ofili et al., 2019). The RCMI programs are housed within institutions that serve underrepresented students and underserved populations experiencing health disparities. One of the RTRN's aims is to translate gained knowledge back into the targeted communities in culturally sensitive, linguistically sensitive, and cost-effective ways, thus reflecting the RTRN's demographics (Ofili et al., 2019).

The four RTRN institutions that established the PreMeR Consortium collectively represent diverse populations that experience disproportionate health disparities, guided by scientists with extensive experience in reaching and working within underserved communities. In keeping with the missions of the RCMI program and RTRN, the PreMeR Consortium formed in response to the National Institutes of Health (NIH) *All of Us* Research Program's request for applications. The objective of the *All of Us* Research Program is to build a diverse cohort of one million volunteers from across the United States and U.S. territories that will participate in research studies to help scientists better understand contributing factors to individual health and disease. The PreMeR Consortium sought to meet the objective of the *All of Us* Research Program by building upon a decade of RTRN experience that leveraged expertise and resources from across RCMIs and their work with diverse communities.

The purpose of this paper is to describe the PreMeR Consortium's planning strategies including the development of a framework on how to engage geographically and ethnically diverse communities that can be used by community-academic partnerships and institutions when engaging diverse populations and multiple communities in collaborative research. The operationalization of these planning strategies is based on existing conceptual frameworks for community engagement. We describe these to provide clarity on how community-based research and engagement can ultimately benefit health disparities in communities.

Because adaptations and modifications occur in community settings, and often do so organically in response to context, this planning framework acknowledges that adaptations based on community context and fit should be proactive and deliberate (Stirman et al., 2019). While the activities proposed by the PreMeR Consortium were not ultimately funded, and thus not tested, the theoretically grounded strategies may serve as a replicable operationalized plan for engaging community members from diverse geographical areas in research activities.

Utilizing Theoretical Frameworks as a Foundation for Reaching Diverse Populations

The PreMeR Consortium sought to integrate best practices by combining the social-ecological model (SEM) for health promotion with CBPR. The SEM for health promotion provided context for the approaches developed by the Consortium for reaching diverse populations. CBPR principles guided the structure of the proposed community engagement and recruitment activities.

The SEM for health promotion (Stokols, 1996) is premised on four key assumptions: (a) a person's physical and social environments interact with their individual attributes to influence their behavior, (b) conceptualization of a person's environment and the complexity of interactions along multiple dimensions (e.g., perceived attributes, social climate, physical characteristics, etc.); (c) people interact with their environments at all levels (individual, interpersonal, organizational, community, and policy); and (d) there is reciprocal influence between the person and their environment (Sallis & Owen, 2015).

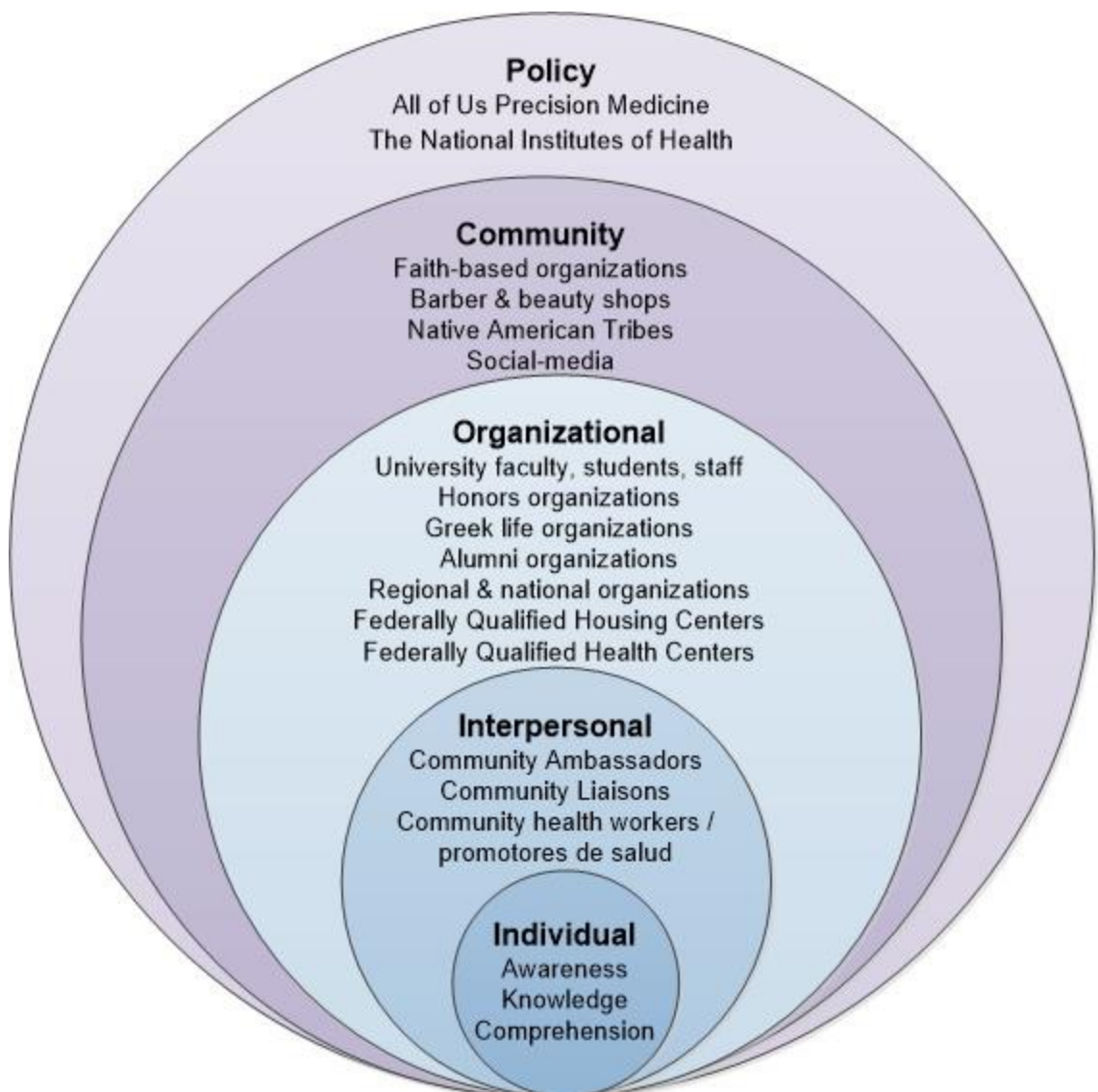
The SEM for health promotion (Stokols, 1996) is widely used by the Centers for Disease Control and Prevention (CDC) and within the field of public health to understand the effects of individual, interpersonal, and environmental factors on health outcomes (CDC, 2017). It was adapted by the CDC's Colorectal Cancer Control Program to include individual, interpersonal, organizational, community, and policy influences. The individual level identifies factors such as age, education, and income as influences on individual behavior (CDC, 2017). Four broader levels—interpersonal, organizational, community, and policy—surround the individual and represent the levels of influence that must be addressed and targeted to comprehensively treat the health and well-being of the individual (Figure 1).

While the PreMeR Consortium started with a focus on strategies for recruiting participants for precision medicine research, these strategies are also applicable to other community engagement efforts. The SEM framework guided our proposed community engagement strategies, encouraging us to take into consideration how an individual's health and behaviors are influenced by multifaceted and complex interactions.

CBPR is an equitable approach to engaging communities and diverse partners that aims to collect multiple perspectives on addressing community-identified health concerns. The CBPR framework is widely used to reach vulnerable and diverse populations in health promotion

and disease prevention interventions. Israel et al. (2013) outlined nine principles of CBPR, recognizing that not all would be applicable to all partnerships. CBPR (a) recognizes community as a unit of identity; (b) builds on strengths and resources within the community; (c) facilitates collaborative, equitable partnership in all phases of research; (d) promotes colearning and capacity building among all partners; (e) integrates and achieves a balance between the generation of knowledge and intervention for the mutual benefit of all partners; (f) emphasizes the relevance of public health problems and ecological perspectives that recognize and incorporate multiple determinants of health and disease; (g)

Figure 1. The SEM for engagement, recruitment, and retention



involves the development of systems through a cyclical and iterative process; (h) disseminates findings and gained knowledge to all partners and involves them in the dissemination process; and (i) involves a long-term process and commitment.

Equitable collaborations between researchers and communities provide a conduit for fluid interactions and afford the opportunity to leverage the interconnectedness among groups to bring community-based research and programs to fruition. Participatory processes remove barriers and reveal shared values between the researcher and community members, norms, interests, senses of identity, emotional connections, and sense of belonging that form the foundation for participants' trust in the research process (Israel et al., 1998; Israel et al., 2005; Steuart, 1993). CBPR principles both acknowledge the equitable nature of the partnership and provide valuable knowledge about optimal approaches to participant engagement, recruitment, and retention (Israel et al., 2005). The participatory process provides valuable knowledge about optimal approaches to participant engagement, recruitment, and retention. CBPR principles were also included in PreMeR's proposed recruitment approaches at all SEM levels.

Two primary CBPR models were incorporated into the PreMeR Consortium design. The Wallerstein and Duran (2010) model addresses CBPR outcomes in accordance with four consecutive phases: (a) contexts, (b) partnership processes, (c) intervention and research (processes and outputs), and (d) outcomes (intermediate and long-term; Oetzel et al., 2018; Wallerstein & Duran, 2010). Only the first two phases, contexts and partnership processes, are germane to the current discussion (see details in Figure 2). The Israel model was used to guide the structure of group dynamics embodied in CBPR partnerships (Schulz et al., 2003). Israel's model and the validated Wallerstein (evaluation outcomes) model frameworks were used to develop our culturally tailored strategic approaches (Belone et al., 2016; Lucero et al., 2018; Oetzel et al., 2018).

Engaging Diverse Populations Through Culturally Diverse Best Practices

Wallerstein's conceptual framework guided how we proposed to refine, integrate, and plan culturally tailored approaches to inform and engage diverse populations using a variety of information channels and formats. This framework (Wallerstein, & Duran, 2010). was designed

to interlink informational and educational activities and seamlessly connect individuals with opportunities to enroll in research studies. Our proposed approaches sought to substantively and meaningfully engage community participants by identifying and emphasizing personal reasons why they should participate in the *All of Us* Research Program, thereby encouraging high retention rates in longitudinal research.

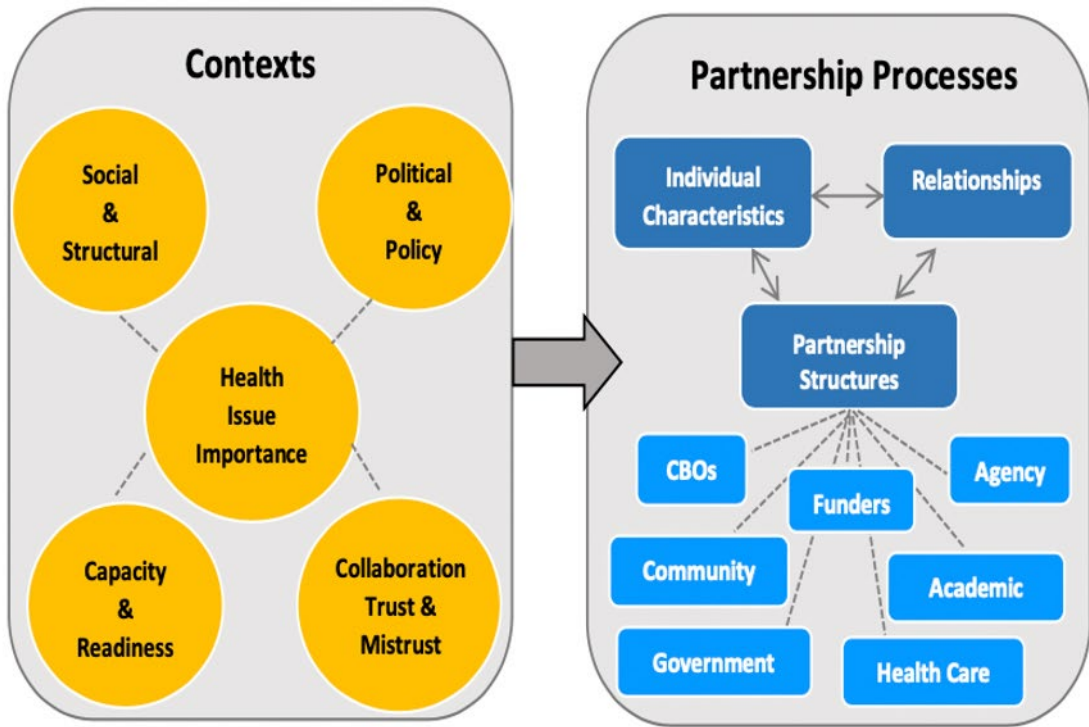
The engagement approaches listed in Table 1 exemplify "what works" based upon each institution's working knowledge of, familiarity with, and previous work with the communities they serve. For example, predominantly immigrant communities prefer to interact via social media because this channel of communication allows them to interface with family and friends both domestically and abroad, while certain PreMeR communities make more use of unique social hubs such as barber and beauty shops in their communications.

Context: Description of PreMeR Institutions and Integration of the Program

Context as described in the first phase of Wallerstein's model (Oetzel et al., 2018; Wallerstein & Duran, 2010) was operationalized through the PreMeR Consortium institutions' diverse geographical and racial/ethnic communities. The PreMeR Consortium's approach to recruiting underserved and diverse populations for participation in research has two critical characteristics. First, the participating institutions are strategically located in different geographic regions of the country. Thus, the products of the Consortium would represent the approaches that worked across multiple regions as well as those that were tailored to specific localities. The PreMeR institutions also had previous experience in reaching and engaging the populations that the *All of Us* program aimed to reach. Thus, the PreMeR Consortium was positioned to work toward the goals of eliminating health disparities and improving health outcomes prior to planning the proposed research program.

Howard University represents the Washington, D.C., metropolitan area. Howard is a historically Black university located in a region where non-Hispanic White people make up about 46% of the total population, followed by Black (25%), Hispanic (15%), and Asian (10%) residents. Within the city of Washington, D.C., 46% of residents are Black, followed by non-Hispanic White (36%), Hispanic (11%), and

Figure 2. Contexts and Partnership Processes in the CBPR Conceptual Model



Contexts	Partnership Process	
<p>Social-Structural: Social-Economic Status, Place, History, Environment, Community Safety, Institutional Racism, Culture, Role of Education and Research Institutions</p> <p>Political & Policy: National / Local Governance / Stewardship Approvals of Research; Policy & Funding Trends</p> <p>Health Issue: Perceived Severity by Partners</p> <p>Collaboration: Historic Trust/Mistrust between Partners</p> <p>Capacity: Community History of Organizing / Academic Capacity / Partnership Capacity</p>	<p>Partnership Structures:</p> <ul style="list-style-type: none"> • Diversity: Who is involved • Complexity • Formal Agreements • Control Resources • % Dollars to Community • CBPR Principles • Partnership Values • Bridging Social Capital • Time in Partnership <p>Individual Characteristics:</p> <ul style="list-style-type: none"> • Motivation to Participate • Cultural Identities/Humility • Personal Beliefs/Values • Spirituality • Reputation of PI 	<p>Relationships:</p> <ul style="list-style-type: none"> • Safety / Respect / Trust • Influence / Voice • Flexibility • Dialogue and Listening • Mutual Learning • Conflict Management • Leadership • Self & Collective Reflection / Reflexivity • Resource Management • Participatory Decision-Making • Task Roles Recognized • Commitment to Collective Empowerment

Note. Adapted from Wallerstein et al. (2008) and Wallerstein and Duran (2010).

Table 1. Social Ecological Model (SEM) Strategies for Participant Recruitment

	Howard University	Meharry	UTEP	University of Hawaii
Individual level				
Culturally competent materials	X	X	X	X
Interpersonal level				
Family event tools	X			
Brand ambassadors	X	X		X
Community liaisons	X	X	X	X
Promotores de salud/ Community health workers			X	
Organizational level				
Academic research centers and consortia				
University faculty and staff	X	X	X	X
Greek life organizations	X	X	X	X
Alumni organizations		X		
Federally Qualified Health Centers		X	X	
Federally qualified housing Communities		X	X	
Local, regional, and national organizations	X			
Community level				
Faith-based organizations	X	X	X	
Barber and beauty shops	X	X		
Community advisory board	X	X		
Social media		X	X	X
Native American tribe			X	
Nonprofits			X	
Policy level				
<i>All of Us</i> Research Program operational protocols and trust principles	X	X	X	X

Asian (4%) residents. Some communities in the region experience substantial health disparities; for instance, infant mortality rates are five times higher among Black people as compared to White people, and adult life expectancy is 15 fewer years for Black men, and nine fewer years for Black women, as compared with the life expectancies of White men and women.

Meharry Medical College is a historically Black college with a mission to serve the underserved. Many of Meharry's outreach programs aim to improve the quality of life for uninsured and underinsured communities. Meharry has national reach through its graduates practicing in urban and rural areas of the country, its structured alumni association (with 38 chapters), and the national and international readership of its *Journal of Health Care for the Poor and Underserved*. Meharry Medical College works with urban communities through community health centers (CHCs) in Nashville, Memphis, and Chattanooga, Tennessee, to extend its reach to underserved individuals in these urban centers. The CHCs provide services to the most underserved. Combined, the estimated population of these three cities is 1,466,163. Black or African Americans make up 28% of the population in Nashville, 64% in Memphis, and 34% in Chattanooga, while Hispanics compose 10% of the population in Nashville, 7% in Memphis, and 5% in Chattanooga (U.S. Census Bureau, 2017b).

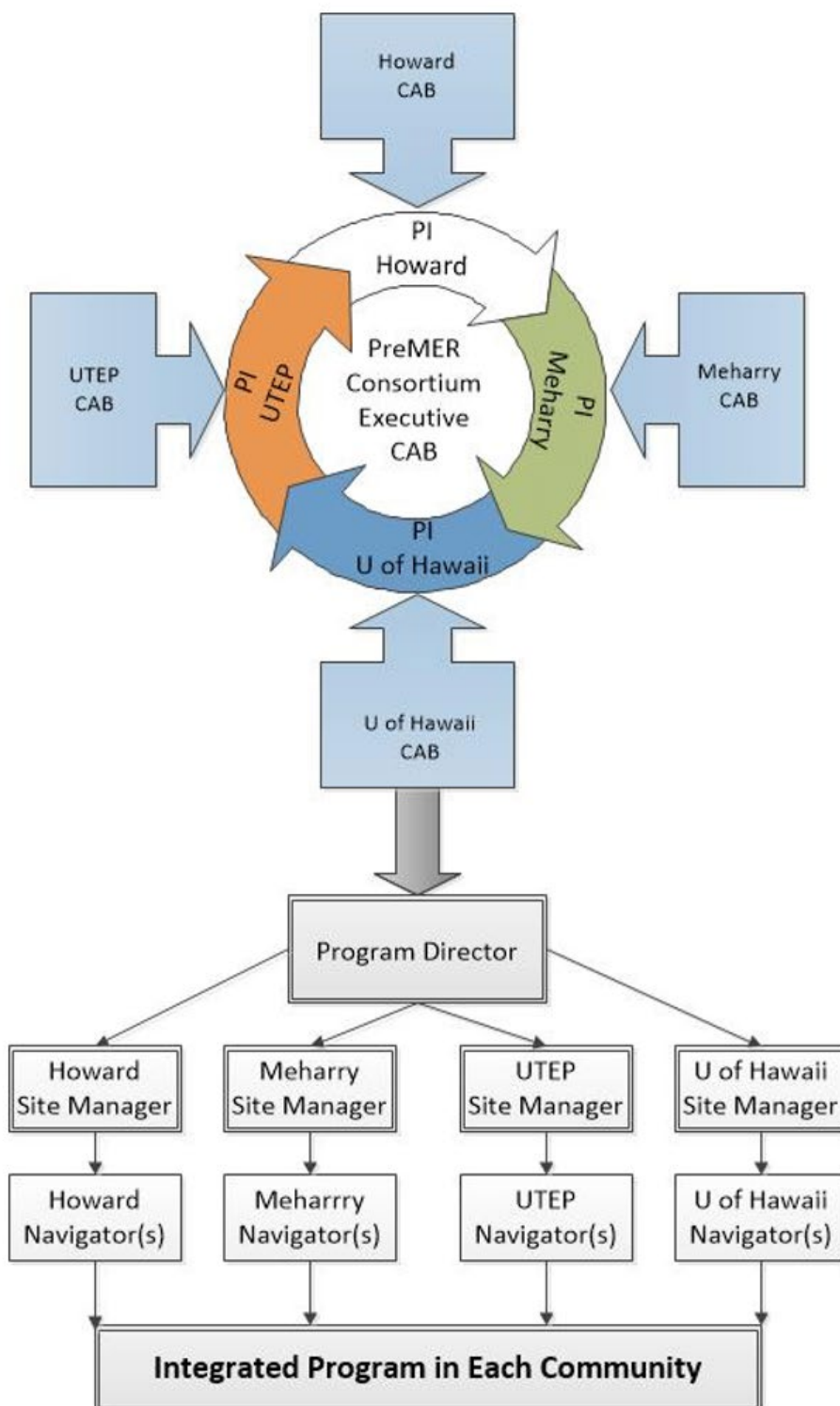
The University of Texas at El Paso (UTEP) represents the Southwest region and is located in El Paso, Texas, directly across the U.S.-Mexico border from Ciudad Juárez, Mexico. Together with Las Cruces, New Mexico, El Paso and Ciudad Juárez form the second-largest binational metroplex in the United States, with a population of over 2.5 million people (*World Population Review*, 2021). El Paso has a majority-minority population that is 83% Hispanic (U.S. Census Bureau, 2017a), and many individuals traverse the U.S.-Mexico border regularly for work, family, and health care. The median household income in El Paso between 2011 and 2015 was \$41,637, with 20.3% of the population living below the federal poverty line (U.S. Census Bureau, 2017a). El Paso has long been a minor-continuous gateway for labor migrants from Latin America, primarily Mexico, and it is one of seven metro areas in the United States with large immigrant populations (25.7%) (Singer, 2015). Immigration status is a

barrier that frequently impedes El Paso residents from seeking health care and participating in research studies.

The University of Hawaii (UH) represents the Pacific Island region and is an Asian American and Pacific Islander-Serving institution supporting higher education in the state of Hawaii and the U.S. Pacific territories. The state's population of 1.4 million people is 36.4% Asian, 23.0% non-Hispanic White, 18.8% two or more races (non-Hispanic), and 9.3% Native Hawaiian and other Pacific Island ethnicities (though the majority of Native Hawaiians and other Pacific Islanders also self-identify in the two or more races category). The U.S. territories of American Samoa, Guam, and the Northern Mariana Islands are composed of Pacific Islander and Asian (API) populations totaling 55,641, 164,229, and 55,144, respectively (World Bank, 2019). The API communities in Hawaii and the U.S. Pacific territories live in unique, geographically isolated social and structural contexts (Wallerstein & Duran, 2010). Social determinants of health are associated with API communities experiencing persistent health disparities, especially when subgroups such as Filipinos, Native Hawaiians, and Samoans are disaggregated.

The PreMeR approach demonstrates a model for integrating community perspectives across diverse geographic, cultural, ethnic, and linguistic groups. Since the collaborating partners are geographically dispersed, how the PreMeR Consortium would collectively recruit community members to participate in research while keeping congruent with CBPR principals had to be considered carefully. Figure 3 illustrates the PreMeR Consortium's central governing body: the Executive Community Advisory Board (CAB), which would also include the project directors from each collaborating institution. The local institutional CABs would provide input to the Executive CAB, which would in turn influence the guidance and management of the directors. The directors would then oversee the respective site managers, who would in turn supervise staff navigators working within each community setting. The entire process would lead to the integration of the program at each collaborating site. As this structure and process was only proposed and not put into effect, no institutional review board approval was sought.

Figure 3. PreMeR Consortium Infrastructure



Context: Alignment with CBPR Model

The proposed PreMeR Consortium's key contexts were further delineated according to Wallerstein's model (Figure 2).

- **Social and structural:** Each institution is designated as minority-serving, reflecting the institutions' respective communities: Meharry Medical College and Howard University serve African American communities, the University of Texas at El Paso serves a predominately Hispanic community, and the University of Hawaii serves Pacific Islander communities. These institutions also represent communities experiencing health-related challenges due to their geographies: urban, rural, border, geographically dispersed, and isolated/island. Furthermore, each of the four regions includes areas where residents experience low socioeconomic status (SES) and neighborhood-level disadvantages.
- **Politics and policy:** This context is indicative of the historically inequitable distribution of resources that has affected the communities served by the four institutions. For example, low-SES minority residents have historically not benefited from political advocacy, which, coupled with local, state, and federal policies that affect research funding trends, has limited their ability to acquire needed resources.
- **Health issue importance:** This context encompasses health disparities in the four communities, where non-White ethnic/racial groups have a higher burden of morbidity and mortality (e.g. diabetes and sexually transmitted infections). The top two causes of death, heart disease and cancer, persist in the four states of interest (CDC, 2015).
- **Capacity and readiness:** This context represents the research infrastructure and fiscal support, such as federal research grants, that foster research capacity within each institution. Each institution is supported by the National Institute on Minority Health and Health Disparities RCMI grant. Several of the institutions are also supported by Centers of Excellence in Clinical and Translational Sciences Center grants, which also fund Community Engagement Cores at each institution. Finally, each institution has existing collaborations and networks with community organizations such as community health centers, coalitions, and community advisory boards (CABs).

- **Collaboration trust and mistrust:** This context is similar across the institutions, as each is engaged in trust-building networks. Each location has historically collaborated with community health centers, CABs, and other mechanisms of positive research collaborations.

Partnership Processes: Approaches to Promoting Engagement, Recruitment, and Retention to Overcome Barriers

When trying to engage, recruit, and retain participants from diverse communities in research, it is important to consider factors that may influence participation, especially if the population is considered vulnerable due to race or ethnicity, poverty, creed or religion, sexual orientation, and/or immigration status (Anderson et al., 1999; Flaskerud & Winslow, 1998). Though efforts have increased to intentionally recruit underserved communities in research, the communities the PreMeR institutions serve have historically been underrepresented in scientific research, largely due to a lack of cultural and linguistic understanding between ethnically diverse communities and researchers that result in unsuccessful communication during recruitment, enrollment, and retention (George et al., 2014). These communities also face language barriers in terms of recruitment materials (Larkey et al., 2009; Skaff et al., 2002). Vulnerable populations may not trust the scientific community, resulting in (a) misgivings about data collection, (b) uneasiness with authority, (c) fear of exploitation or mistreatment, and (d) no perceived benefit (Bonevski et al., 2014; Corbie-Smith et al., 1999). Additionally, potential participants' low education levels and health literacy, unfamiliarity with research processes, personal beliefs, culture, inadequate technology (e.g., a lack of internet access, computers, and/or telephones), age, gender, fear, transportation burdens, and lack of interest in research can further complicate engagement, recruitment, and retention (Bonevski et al., 2014).

The proposed community engagement strategies outlined in Table 1 are vital considerations for recruitment and retention plans. Researchers who are new to an institution or community should look for opportunities to collaborate with community stakeholders and identify a community liaison. This person should be someone established within the community of interest, of the same ethnicity as community members if possible, or someone who understands

the community's language and culture and can provide a cultural perspective (Jones & Thomas, 2009). Most importantly, a liaison should be someone whom community members respect and trust. An introduction into the community by a liaison provides an endorsement for an investigator and facilitates trust and respect, which can lead to action, including participation in research studies (Jones & Thomas, 2009). Similar and unique strategies that may be used by multi-institutional, community-based partnerships are delineated in Table 1. Incorporating all of these strategies may not be feasible in many instances.

Recruitment plans and approaches proposed for the diverse communities were represented by each institution (listed in Table 1). The table also illustrates similarities and differences across the geographic sites. Additionally, Table 1 illustrates the proposed recruitment techniques in terms of the four SEM levels and how individuals from ethnically diverse communities are engaged.

Partnership Processes: Alignment with SEM

The SEM spheres (Figure 1) represent the types of approaches that must be employed to facilitate successful engagement, recruitment, and retention, while also considering the contexts described above. At the individual level, the goal of these efforts is to ensure that all activities address personal awareness, knowledge, and comprehension. Included at this level are the recruitment materials that communicate the *All of Us* Research Program's expressed values of diversity, inclusivity, and cultural and linguistic sensitivity. Recruitment materials should be created in all of a community's dominant languages in order to reach as many individuals as possible. Input from community members should also be sought to ensure that local dialects and/or "slang terms" used in recruitment materials convey the desired message, are acceptable, and respect the cultures of the diverse populations that the materials are meant to target. For example, Spanish terms used by Mexican Americans can have different connotations for other Hispanic subgroups such as Puerto Ricans, Cubans, Colombians, and so on, and vice versa.

The interpersonal level is considered the primary level of engagement and recruitment activities because it includes personalized interactions with participants. Strategies that can facilitate interactions at this level include brand ambassadors, who assist with recruitment; community liaisons, who serve as links to the community; and community health workers,

who are trusted community members and can engage the community of interest. Establishing trust is critical to community engagement and to the success of recruitment and retention. Furthermore, this level of engagement would lead to increased knowledge regarding the *All of Us* Research Program, which promotes potential volunteers' informed decisions about the benefits of participating in the program.

The PreMeR Consortium is considered part of the organizational level because of the member institutions' concerted efforts and dedicated infrastructure to serve underserved health disparity populations and underrepresented students. Recognizing the diverse student populations within the institutions, one of the Consortium's planned approaches was to address the influence of campus social interactions within established organizations. This plan also included recruitment efforts through local, regional, and national organizations; alumni organizations; and Federally Qualified Health Centers and federally qualified housing communities. These sectors are highly populous and have well-established networks and infrastructure that encourage participant recruitment.

Recruitment strategies at the community level would have the capacity to sustain engagement, recruitment, and retention because of the social interactions that occur naturally within these groups. At this level, the influence of the organizations and interactions must reflect the community's culture—that is, Wallerstein's "context"—such as the role of faith-based organizations, barber shops, and beauty shops (Wallerstein & Duran, 2010).

The *All of Us* Research Program represents the policy level. Through its leadership structure, the program determines the policies that govern the engagement, recruitment, and retention activities. Moreover, it establishes priorities for resource allocation and, most importantly, drives the research that ultimately affects treatments and prevention aimed at improving the health of society.

Table 2 details the similar and unique strategies the institutions proposed to engage, recruit, and retain community members in research.

Research Processes and Outputs

To facilitate the goal of large-scale engagement, recruitment, and retention, we recommended three types of activities (according to CBPR phases) that should occur at each partnering site: assessment, action planning, and implementation

of multi-interventions. These three steps are based on the work of Schulz, Israel, and their collaborators on the integration of CBPR processes (Schulz et al., 2011).

Assessment

This activity would be critical to understanding the multifaceted contexts at each site, as proposed in Wallerstein's model. Epidemiological and other analytical reports would be used to describe the entire site or each community. Using SEM and CBPR, community and academic researchers would identify and describe the characteristics of each site to understand how a proposed program could be developed to impact outcomes. More detailed information could be obtained from community focus groups to understand the factors likely to impede or facilitate community engagement in the proposed program. Focus group results would then be shared and discussed with key stakeholders, CABs, and other leaders to identify and establish action priorities at each institutional site. Following these activities and agreements, the community manager and navigators would be hired to pursue community engagement and outreach activities, guided by the knowledge and insight gained from this procedural phase.

Action Planning

The three theoretical models may guide community-academic partners in developing and implementing the engagement, recruitment, and retention interventions as well as other relevant messages and activities. Staff and project leadership along with CABs and communities would recommend and develop messages, presentation formats and content, intervention activities, evaluation forms, and so on. Pilot testing would then occur to assess the proposed engagement, recruitment, and retention strategies/interventions (both a pilot and a pilot with experimental designs). Fidelity to implementation would be achieved through continuous record keeping and monitoring of activities. Lastly, education and program-tracking tools would be chosen and/or developed at this stage of operations.

Implement Multi-Interventions

The plans established in the action planning phase would be implemented and supervised, as required by CBPR, to determine if modifications are needed to improve the processes. All changes would be implemented at the site and consortium

levels with judicious activities tracking and data management at each site. Table 3 describes the processes.

Outcomes

Outcomes would align with the proposed CBPR activities in accordance with the Wallerstein and Duran (2010) model (Figure 2) and would be achieved in the first two phases: (a) contexts and (b) partnership processes, which were relevant to the proposed project's aims. Respective community contexts—social and structural, political and policy, and history of collaboration—would be carefully identified. Although we were not able to implement the proposed strategies, we achieved partnership outcomes according to Wallerstein's model. This multi-institutional collaboration allowed us to develop a proposed strategic plan to increase our capacity to engage, recruit, and retain culturally and geographically diverse populations in research. Our proposed project illustrates how the Wallerstein model may be operationalized and provides examples of outcomes that were achieved.

Discussion

The PreMeR Consortium was formed in response to a funding opportunity announcement. This collaboration resulted in an opportunity to share resources and expertise and to examine best practices and planning processes for community engagement and participant recruitment in research using evidence-based SEM and CBPR theories across four diverse communities in the United States. Strategies for engagement, recruitment, and retention are key elements of CBPR, and these strategies were operationalized through collaborative efforts between our institutions and respective communities. The proposed activities and processes align and integrate essential theoretical principles of engagement (SEM and CBPR) to address the “partnership process” outcomes (Figure 2; Wallerstein & Duran, 2010). Accordingly, our academic collaboration established a foundation and concrete plan for mobilizing future community, culture-centered interventions; addressing our diverse communities; and generating partnership synergy among the academic collaborators.

The social-ecological model (SEM) for the Colorectal Cancer Control Program (CDC, 2017) delineates factors affecting health outcomes across the five levels. Applying the SEM for health promotion alongside CBPR frameworks in community engagement and

Table 2. PreMeR Diversity Consortium Context

Context	Howard University	Meharry	UTEP	University of Hawaii
Social and structural	<ul style="list-style-type: none"> • African American–Serving • Urban location • Low SES 	<ul style="list-style-type: none"> • African American–Serving • Urban location • Active alumni association 	<ul style="list-style-type: none"> • Hispanic-Serving • U.S.-Mexico Border • Majority-minority (82% Hispanic) • Rural • Low SES • Language barriers • Bicultural • Native American population 	<ul style="list-style-type: none"> • Asian and Pacific Islander–Serving • Language barriers • Geographically isolated U.S. territories: American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, and the State of Hawaii
Political and policy	<ul style="list-style-type: none"> • Inequitable resource distribution 	<ul style="list-style-type: none"> • Civil War history • Inequitable resource distribution 	<ul style="list-style-type: none"> • Immigration • Inequitable resource distribution 	<ul style="list-style-type: none"> • Immigrant-serving • Inequitable resource distribution
Health issue importance	<ul style="list-style-type: none"> • Health disparities: cardiovascular disease (CVD), cancer, diabetes, sexually transmitted infections (STIs), substance abuse • Infant mortality • Maternal mortality • Limited health care access 	<ul style="list-style-type: none"> • Health disparities: CVD, cancer, diabetes, STIs • Opioid abuse • Infant mortality • Maternal mortality • Limited health care access 	<ul style="list-style-type: none"> • Health disparities: cancer, CVD, diabetes, STIs • Alcohol, tobacco, other drug abuse • Limited health care access 	<ul style="list-style-type: none"> • Health disparities: CVD, cancer, diabetes, STIs • Alcohol, tobacco, other drug abuse • Limited health care access

Capacity and readiness	<ul style="list-style-type: none"> • NIH-funded research centers: Howard RCMI, CTSA • GHUCCTS CAB, etc. • Community Engagement Core • Health professions schools: medical, nursing, pharmacy • Teaching hospital 	<ul style="list-style-type: none"> • NIH-funded research centers: Meharry RCMI, Center of Excellence • Community Engagement Cores • Academic-community-clinical partnerships: HIV/Aids, Cancer Consortium, RWJ Policy Center • Federally Qualified Health Centers (CHCs) • Medical and dental schools • Teaching hospital • Data research institute • International journal 	<ul style="list-style-type: none"> • NIH-funded research centers: RCMI Border Biomedical Research Center • Community-based collaborations (CABs) • Federally Qualified Health Centers (CHCs) • Health professions schools: nursing, pharmacy, health Sciences • Community health workers/ Promotores de salud 	<ul style="list-style-type: none"> • NIH-funded research centers: RTRN Research Coordinating Center, UH RMATRIX • Community Engagement Core Community Advisory Boards (CABs) • Research sharing • Federally Qualified Health Centers (CHCs) • Health professions schools: medical, nursing, pharmacy • Native Hawaiian academic units
Collaboration trust and mistrust	<ul style="list-style-type: none"> • Historical trust of Howard CHC • Communication barriers • Research inclusion/exclusion bias 	<ul style="list-style-type: none"> • History of collaboration with Matthew Walker Comprehensive Health Center • https://mwchc.org/about/ • Research inclusion/exclusion bias (Tuskegee study) 	<ul style="list-style-type: none"> • Trust of MDs and PhDs 	<ul style="list-style-type: none"> • Historical misrepresentation • Research sharing

Note Adapted from Wallerstein et al.'s, 2008; Wallerstein & Duran, 2010

Table 3. PreMeR Consortium Protocol Adapted From Schulz et al., 2011

Schulz Phase 1: Assessment by Site

CBPR contexts: Gather relevant existing epidemiological/analytical reports.

SEM communities: Conduct focus group(s) on factors that may impede or facilitate progress toward the three specific aims: engage, recruit, and retain.

Calculate assessment results; write, issue, circulate, and discuss reports by all sites.

Establish action priorities for each site.

Develop and test assessment/evaluation tools.

Select CABs and hire group leaders by site: community manager/ community navigator(s)

Schulz Phase 2: Action Planning by Group

Engage in CBPR partnership processes by SEM group as needed.

Implement “Train the Trainer” curricula and other trainings for all group leaders by site.

Develop action strategies and interventions by group/site: messages/ activities for aims 1–3.

Test interventions by site, including pilot and experimental designs.

Set up messages, presentation formats, intervention activities, evaluation forms, and so on.

Set up for and support continuous record keeping (who, where).

Schulz Phase 3: Implement Multi-Interventions

Implement multi-interventions by SEM group at each site for aims 1–3

Engage in continuous record keeping and submit to analysts.

recruitment techniques for research can compatibly and comprehensively engage diverse and underserved populations. CBPR and health promotion models and theories were developed to guide community-engaged health initiatives. Participant engagement for research recruitment and retention must incorporate multiple SEM levels for highly diverse and complex communities.

Based upon the principles of CBPR, community engagement, recruitment, and retention strategies in biomedical research require deliberate attention to address context and form the partnership processes necessary to achieve desirable community engaged outcomes—that is,

culture-centered interventions and partnership synergy. Paramount to the success of any community-based project involving community partners are respect and trust, which can be earned through shared resources, commitment, and time (Israel et al., 1998; Treleaven, 1994).

Research recruitment and retention activities are community-engaged interventions in and of themselves, particularly in the development and implementation of precision medicine and other biomedical research. Institutions of higher education typically strive to serve their local and regional communities and are fairly successful at establishing partnerships and/or collaborations. Researchers should build upon established

collaborations and partnerships; however, if none exist, it is essential to develop these relationships utilizing CBPR methods.

Conclusions

This manuscript contributes to two priority areas in health research: establishing diverse multi-institutional collaborations and engaging underrepresented groups in research. This manuscript applies a relevant conceptual framework used in CBPR to contextualize the community engagement process and to identify relevant outcomes for PreMeR, which can be used by practitioners, institutions of higher learning, and the community to successfully engage with diverse populations.

A one size fits all approach is not compatible when attempting to engage diverse, underserved populations to participate in scientific research and interventions. The proposed approach can serve as a planning model for reaching vulnerable and underserved populations. The partnership established between the four collaborating institutions, the proposed partnership processes, and the insights gained by the researchers from the PreMeR Consortium have initiated future collaborations and projects. Accordingly, we can demonstrate relevant differences and similarities within our diverse populations within the contexts of CBPR.

The process of engaging diverse populations for research recruitment and retention must be viewed as intervention development and implementation. By actively engaging community stakeholders through the principles of CBPR, such as contexts and partnership processes, successful collaborations can be obtained. These partnerships are critical for recruiting and retaining volunteers for precision medicine and other biomedical research, and approaches and theoretical frameworks such as the SEM can aid these efforts to mitigate barrier and risk factors and utilize facilitators at the individual, interpersonal, organizational, community, and policy levels.

Lessons for Practitioners, Institutions of Higher Learning, and Community Partners

The factors that impede and facilitate engaging, recruiting, and retaining diverse populations for research studies are underscored by the inherent challenges that hinder the participation of individuals from these communities. However, as practitioners and researchers, we can deploy multiple strategies to mitigate these challenges,

such as utilizing relevant ecological frameworks and methodologies grounded in CBPR to guide collaborations. CBPR and ecological frameworks and models provide critical partnership-building approaches and methodologies for practitioners and researchers as they engage with diverse, underrepresented communities in research. The knowledge gained from engaging diverse populations in research has numerous positive implications for health care and policy. Although the PreMeR Consortium was not selected as a grantee of the *All of Us* Research Program, our collaboration has not ended. On the contrary, we continue to work together on other research ideas and funding mechanisms. In addition, we now have a theoretical framework that we can test within our respective communities. We have also developed a network of colleagues across the country whom we can draw upon for other research projects. Moreover, the writing process itself has facilitated extensive scholarly reflection about how to integrate theoretical frameworks and best practices to successfully engage diverse communities in research, which is critically needed to address health disparities.

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