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Psychological Sense of Community Among Older Adults in Puerto Rico Two Years After Hurricane María

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

by

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June 2021

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Acknowledgements

I want to thank the chair of my dissertation, Denise Burnette, Ph.D., for her guidance and support during the dissertation process and during my four years in the PhD program. I also want to thank Humberto Fabelo, Ph.D., Kyeongmo Kim, Ph.D., and Tracey Gendron, Ph.D. who served as committee members on my dissertation and provided valuable support and feedback throughout.

I also want to acknowledge and thank research team members who were instrumental to study design and implementation of our data collection effort in Puerto Rico: Yamile M. Marti, Ph.D.; Ellen Lukens, Ph.D.; Mauricio Yabar, LCSW; Kiara Carrasquillo, MSW; Theresa Taylor, MSW; and Megan Taylor, MSW. Additionally, I thank PECES, Inc. for their support as a community partner. I am very thankful for the older adults who participated in this study and community leaders who assisted during data collection trips.

I am extremely grateful to my family and friends who supported me along this journey. Specifically, I thank my brothers- Teddy, Matthew, and Will; my sister-in-law Maddie; Avin, Joann, and Charlotta. I could not have done this without you all! I also want to acknowledge my friends all over the country and local neighbors, who helped provide me a “sense of community” (both locally and virtually during the COVID-19 pandemic) while I worked on my dissertation.

Last, I want to acknowledge family members who are deceased but remain big influences in my life, including my Aunt Nancy, my grandfathers, and my grandmother. I also need to recognize the role of my parents- Mary and Matt Buckley- who are also deceased. My mom was a social worker, and my father ran a non-profit for brain injury survivors. They were instrumental in instilling the values and work ethic that aided me in pursuing a career as a social worker, and in finishing this dissertation!

Funding

I disclosed receipt of the following financial support for the research, authorship, and/or publication of this dissertation: This work was supported by a grant from the Samuel S. Wurtzel endowment to Dr. Denise Burnette, Samuel S. Wurtzel Professor of Social Work at Virginia Commonwealth University.

Declaration of Conflicting Interests

I declared that there is no conflict of interest.

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Abstract

Psychological Sense of Community Among Older Adults in Puerto Rico Two Years After Hurricane María

By Thomas D. Buckley, MSW, Ph.D. Candidate

June 2021

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

Dissertation Chair: Denise Burnette, PhD

Dissertation Committee: Humberto Fabelo, PhD, Kyeongmo Kim, PhD, Tracey Gendron, PhD

Hurricane María devastated Puerto Rico in 2017 and resulted in adverse long-term outcomes. Psychological sense of community (PSOC) may serve as a protective factor against the effects of Hurricane María for older adults in Puerto Rico. Using a three-paper format, this dissertation draws on a resilience framework and theories of PSOC and the Ecological Theory of Aging to examine the role of PSOC among older adults in Puerto Rico two years after Hurricane María.

Paper one is a scoping review of the concept of PSOC in research with community dwelling older adults. I begin by presenting findings on study characteristics and conceptualization and operationalization of PSOC in the final sample of 33 articles. I then use

deductive thematic analysis to explore topical research areas. These themes were (1) built environment and neighborhoods; (2) social participation and connection; (3) civic participation; (4) PSOC as a protective factor; (5) health and well-being; (6) relocation; and (7) scale development. PSOC was a consistent predictor of health and well-being for older adults and served as a mechanism to link neighborhood or environmental characteristics with health and well-being. I present relevance to theory, policy and practice, and suggestions for future directions of research.

Papers two and three used data from a cross-sectional study of 154 older adults in Puerto Rico two years after Hurricane María. Paper two presents psychometric testing of the Brief Sense of Community Scale (BSCS), which is a popular measure of PSOC but has yet to be tested with older adults. The BSCS showed good internal consistency reliability ($\alpha = .85$) and was correlated in expected directions with measures of social network size ($r = .34$, $p < .001$) and loneliness ($r = -.27$, $p < .001$). Confirmatory factor analysis results showed a higher-order four-factor model was the best fit ($\chi^2 (16) = 20.78$, $p = .187$; CFI = .997, TLI = .995, SRMR = .026, RMSEA= .044, 90% CI [< .001, .092]). Paper three used two hierarchical linear regression models to examine the association of PSOC with self-rated health (SRH) and quality of life (QOL), while accounting for relevant risk factors and covariates. Higher levels of PSOC was associated with better SRH ($B = 0.03$, $p = .04$) and higher QOL ($B = 0.26$, $p < .001$).

This dissertation provides evidence of the importance of PSOC for health and well-being for older adults in general, and in Puerto Rico following María. The BSCS is a valid and reliable measure of PSOC for this population and should be used in research and clinical practice settings. I present strategies for building and maintaining PSOC in a culturally relevant

framework for older adults in Puerto Rico. Findings may also be relevant to other areas that experience natural disasters and population aging.

Chapter 1. Introduction

Hurricane María made landfall in Puerto Rico in September of 2017 and had a profound impact on the island with proximal and distal adverse outcomes for the whole population. Within six months of Hurricane María, an estimated 2,975 people, the majority of them older adults, had died (Santos-Burgoa et al., 2018). Environmental threats to human communities tend to trigger or worsen well-being of vulnerable groups (Benevolenza & DeRigne, 2019), especially when widespread destruction is met with limited resources and slow recovery, as with Hurricane María. An already troubled health care and social service system was overburdened by increased need and emigration, which included many health professionals (Downer et al., 2019; Ramphal, 2018). Hurricane María led to high levels of mental distress and unmet psychosocial needs, including a sharp rise in suicides (Perez, 2018; Ramphal, 2018). The overall population declined about 8% within six months of the hurricane (Santos-Burgoa et al., 2018). Furthermore, from 2017 to 2020, Puerto Rico's population declined by about 10%, from 3.16 million to 2.86 million and the median age of the population rose from 39.2 to 44.5 years (Worldometer, 2020). These multiple sources of strain, coupled with unprecedented U.S. government restrictions on aid to Puerto Rico following María (U.S. Government Accounting Office, 2020) made for a painfully slow recovery and compounded existing risks for older adults.

Aside from acute effects of Hurricane María, Puerto Rico was already experiencing a combination of population decline and population aging. From 2010-2019, the island's population decreased by about 14.3%, from 3.7 million to 3.2 million (U.S. Census Bureau, 2020a). As of 2019, about 22% of the population was age 65 and older, compared to 16.5% of the whole United States (U.S. Census Bureau, 2020b). These trends can be attributed in part to factors experienced globally, such as lower birth rates, increased life expectancy and decreased

mortality, but there are also some factors more specific to Puerto Rico, such as economic downturn and natural disasters (Benach et al., 2019; Downer et al., 2019).

Designation as a territory of the United States allows for easy migration, as Puerto Ricans are classified as U.S. citizens. Another driver of population decline was the repeal of Internal Revenue Service Code Section 936 in 2006, which for years gave tax breaks to corporations that housed operations there. This policy change contributed to worsening economic conditions on the island and fueled outmigration, especially working age people (Abel & Deitz, 2014). Throughout the decade preceding Hurricane María, Puerto Rico's economy was in near-continuous recession and the island was forced into bankruptcy in early 2017 (Brown, 2017). Increases in frequency and severity of climate-related natural disasters, such as hurricanes, and earthquakes further contributed to population decline through death and migration (Benach et al., 2019). The convergence of these forces has negatively affected the well-being of older adults (Downer et al., 2019). I explore several key elements in this process, with a focus on the impact of community disruption, in this dissertation.

Community and neighborhoods in social life are essential characteristics of allocentric societies and typify Hispanic cultures. In Puerto Rico, older adults rely heavily on family and community supports, which fill substantial gaps in health care and social services (Downer et al., 2019) and are associated with better health outcomes (Perez & Ailshire, 2017). Even before María, older adults were experiencing high levels of hypertension, diabetes, ADL impairments, and obesity (Downer et al., 2017; Payne, 2018; Pérez & Ailshire, 2017). Disaster-related disruptions to informal support systems are known to increase health, mental health, and social vulnerabilities of older adults. Additionally, outmigration of large numbers of younger and working age individuals diminishes older adults' support systems (Thiede et al., 2017).

Psychological sense of community (PSOC) is an essential construct for health and well-being of older adults. PSOC is defined as the feelings about and perceptions of one's community, such as belonging, connection with others, and the ability of the community to meet one's needs (McMillan & Chavis, 1986). PSOC can be an important protective factor for older adults following disasters (Li et al., 2011) and has been shown to promote better health and mental health (Tang et al., 2018) and well-being (Zhang et al., 2017).

In Puerto Rico, PSOC may help older adults better adapt to environmental stressors of natural disasters, given the vital role of communal support in such situations (Hargrove et al., 2021; Kaniasty et al., 2020). They also may be more likely to turn to their own communities and neighborhoods for support before engaging with or waiting for formal support systems (Cagney et al., 2016). Hayward et al. (2019) described the crucial role of local communities in the wake of Hurricane María, for example, particularly in light of high levels of uncertainty and low confidence in governmental support. This dissertation focuses on Puerto Rican older adults' PSOC two years after Hurricane María.

Theoretical Framework

This dissertation draws on theoretical and empirical literature on PSOC, recent advances in the ecological theory of aging (ETA), and a risk and resilience framework to examine the association of disruption in social relationships and communal support with the health and well-being of older adults in Puerto Rico two years after Hurricane María.

Psychological Sense of Community

In 1974, Seymour Sarason introduced the concept of PSOC, also referred to as 'sense of community', to describe the feeling that an individual is part of a structure that is supportive, present, and dependable and is characterized by interdependence, mutual responsibility, and a

collective consciousness. PSOC was originally intended to help explain individual psychological well-being and to understand the role of PSOC with different populations and outcomes (Bess et al., 2002). Furthermore, Sarason (1986) noted that the goals of his original work were to explore the prevalence of low PSOC, highlight the negative effects of low SOC, and understand how to prevent low PSOC.

The term 'community' traditionally refers to a geographic or physical community, but it may also include relational communities that transcend physical and spatial location (Bess et al., 2002). These and other variations in definition has compromised progress in the field. To address this issue, McMillan and Chavis (1986) integrated existing definitions of the term and proposed mechanisms for a PSOC theoretical framework. They defined PSOC as a "feeling that members have of belonging, a feeling that members matter to each other, and a shared faith that member's needs will be met through their commitment together" (p. 9).

McMillan and Chavis (1986) identify four key domains and processes of PSOC: (1) Membership- a feeling of belonging or shared personal relations, (2) Influence- a sense of mattering and making a difference in one's community, and the bidirectional relationships between members and their communities, (3) Fulfillment of Needs- the idea that a member's needs will be met by the resources provided through being in the community, and (4) a Shared Emotional Connection- a commitment and belief that members have shared and will continue to share a history, common places, time with each other, and events or experiences. They advanced Sarason's theory by specifying the mechanisms through which PSOC operates as opposed to linking it to different outcomes. PSOC may thus be best understood through these mechanisms as they relate to areas of interest identified by Sarason, e.g., the prevalence of low PSOC, psychological well-being outcomes, and serving as a point of intervention.

Ecological Theory of Aging

Lawton and Nahemow's (1973) ecological theory of aging (ETA) seeks to understand interactions and assess quality of fit between older adults' needs and their physical and social environments. Good person and environment fit (P-E fit) leads to positive outcomes, whereas poor P-E fit leads to negative outcomes. Goodness of fit is best understood by evaluating the combination and interaction of personal characteristics and environmental influences. In this dissertation, I will draw on ETA as an overarching framework for understanding the impact of Hurricane María in affecting P-E fit for older adults in Puerto Rico.

Person-related characteristics include factors such as sociodemographic characteristics, health, functioning, and social resources. ETA refers to the combination of these as 'personal competence'. As noted, environments can be physical or social (Greenfield, 2012). The former includes physical location, type of community or residence, and features of their living space. Social environments consist of formal and informal relationships and social and supportive service systems; they occur at different levels, such as the immediate personal environments, small group environments, social networks, and larger sociocultural factors (Lawton, 1989).

ETA assumes the environment around an individual creates demands or strains, also referred to as 'environmental press.' Older adults with higher levels of personal competence are better able to respond to and meet the needs or stress imposed on them by their environments (Lawton & Nahemow, 1973). Conversely, older adults with lower levels of competence function best in environments with lower demands. Poor outcomes result when there is a mismatch between level of competence and environmental press. Researchers have used ETA as a framework for interventions and to examine ability to "age-in-place", satisfaction with living arrangements, level of functioning or other health and wellbeing outcomes (Greenfield, 2012).

Wahl et al. (2012) added the concepts of agency and belonging to ETA. They define *belonging* as positive connections with other people and their environment, involving processes of attachment to specific places, and *agency* as intentional and proactive behaviors that involve being a change agent in one's own life. Good P-E fit occurs when older adults have agency and feelings of belonging. Wahl et al. (2009) found that older adults who feel they have more control and responsibility for their environment and higher feelings of belonging to their environment were less depressed, more functionally independent, and had higher sense of well-being.

Natural Disasters: Risk and Resilience Framework for Older Adults

Natural disasters (such as hurricanes, earthquakes, floods, and tsunamis) are associated with negative health outcomes (Bourque et al., 2006) and increased mental health problems (Fergusson et al., 2014; Makwana, 2019), which may persist (Kessler et al., 2008). While disasters affect all demographic groups and geographic regions, some research suggests older adults may be especially vulnerable to negative outcomes due to disruptions to longstanding routines and patterns of daily living, losses of social relationships and support systems, effects on their physical space, and reluctance to evacuate (Jia et al., 2010; Parker et al., 2016). The effects of natural disasters on mental health of older adults have been well researched in numerous contexts, such as with hurricanes (Sirey et al., 2017), floods (Bei et al., 2013), and earthquakes (Jia et al., 2010; Li et al., 2011). Furthermore, older adults with chronic health conditions represent an especially vulnerable group after natural disasters (Bell et al., 2020; Prohaska & Peters, 2019).

Early research to date shows that María had detrimental effects on health and well-being of people in Puerto Rico, especially older adults (Perez, 2018; Ramphal, 2018), but little is known about longer lasting effects (Downer et al., 2019). Community and interpersonal social

support are important buffers against negative outcomes of natural disasters (Bonanno et al., 2010; Kaniasty et al., 2020). In the wake of natural disasters, there is usually a temporary boom in outside support and mutual aid among community and family members; however, natural disasters can also be extremely disruptive to communal, familial, and social support systems (Bonanno et al., 2010; Kaniasty, 2020). Further, support from neighborhoods and communities often augment or replace gaps left by government or other formal assistance programs (Hargrove et al., 2021). In Puerto Rico, Hurricane María resulted in adverse short-term and long-term consequences to formal and informal support systems (Downer et al., 2019; Ramphal, 2018). Thus, the role of social support is shown to be a strong protective factor; however, there are variations in how María impacted the duration and availability of support. This dissertation aims to respond to the need to examine the combination of both risk and protective factors following natural disasters (Bonanno et al., 2010) and use established measures of social and community support in research in post-disaster contexts (Kaniasty et al., 2020).

Using a risk and resilience framework, I will explore the association between risk and protective factors with health and quality of life (QOL) for older adults in Puerto Rico two years after Hurricane María. The risk and resilience framework seeks to understand how *resiliency* (or protective factors) can mitigate the effects of *risk* factors (e.g., adversity or trauma) (Ong et al., 2009). Resiliency focuses on three key areas of protective factors: individual attributes, relationships, and external support (Garmezy, 1985). This framework is helpful in natural disaster research, especially in examining the combination and additive effects of individual risk and protective factors in explaining outcomes (Bonanno et al., 2010). In this dissertation, I will conceptualize PSOC as a source of resiliency for older adults in Puerto Rico following María.

PSOC fits well in the risk and resilience framework by serving as a protective factor against adverse outcomes. Research on older adults shows that PSOC is associated with higher QOL (Zhang et al., 2017), better health and mental health (Tang et al., 2018), can be a protective factor against traumatic events (Li et al., 2011), and reduces the impact of socioeconomic inequalities (Lai et al., 2021). PSOC is also a useful framework for explaining the relationship between the environment or neighborhood and well-being outcomes (Au et al., 2020; Zhang & Zhang, 2017).

Montero (2008, 2018) discusses, in-depth, the relevance of community psychology in Latin America and identified the need for further research in community psychology and PSOC among Latin American communities and regions. With respect to Latin American and Hispanic populations, PSOC can be a protective factor against substance use (Lardier et al., 2018) and is associated with higher life satisfaction among Hispanic immigrants (Ramos et al., 2017). Hombrados-Mendieta et al. (2013) found that PSOC was associated with better life satisfaction among adults in Spain. While there is robust evidence showing the positive effects of PSOC among older adults and in Latin American or other Hispanic populations, to my knowledge, no research to date has examined PSOC among older adults in Latin American, Hispanic, or Caribbean populations including Puerto Ricans in this region.

Research Questions

I utilized a use a three-paper dissertation format to address the following research questions. Each primary research questions (RQ) represents an individual paper.

RQ1: “How has the construct of PSOC been used in research with community dwelling older adults from 1986 through March, 2021?”

RQ2: “Is the Brief Sense of Community Scale (BSCS) a valid and reliable measure for PSOC among older adults in Puerto Rico?”

I hypothesized that the BSCS will: (a) demonstrate good internal consistency reliability, (b) display convergent validity with measures of social isolation and loneliness, and (c) exhibit favorable psychometric properties in this sample, with a higher-order four factor model providing the best factor structure.

RQ3: Research question 3 explores the relationship of PSOC with self-rated health (SRH) and QOL and addresses the following questions: (a) “Does PSOC contribute to SRH in this population, after accounting for important covariates such as sociodemographic characteristics and social and mental health?” (b) “Does PSOC contribute to QOL, after accounting for the same covariates and SRH?”

I hypothesized that: (1) after controlling for sociodemographic covariates and relevant risk and protective factors, stronger PSOC will be associated with better SRH; and (2) controlling for the effects of these same covariates and SRH, stronger PSOC will be associated with better QOL.

Data Source and Methodology

Each paper contains more detail on study methodology.

Paper 1: Scoping Review of PSOC and Older Adults

In paper 1, I present a scoping literature review on PSOC research with community dwelling older adults. A scoping review is defined as, “a form of knowledge synthesis that addresses an exploratory research question aimed at mapping key concepts, types of evidence, and gaps in research related to a defined area or field by systematically searching, selecting, and synthesizing existing knowledge” (Colquhoun et al., 2014, pp. 1292-1294). Scoping reviews

seek to “examine the extent, range, and nature of research activity in a topic area” (Pham et al., 2014, p. 371), and findings can be used to inform practice, policy, and aid in future research (Daudt et al., 2013).

I followed the guidelines for scoping reviews of Arksey and O’Malley (2005) and updated by Levac et al. (2010), which comprise five stages: (1) identify the research question; (2) identify relevant articles; (3) select studies; (4) chart data; and (5) collate, summarize, and report the results. I also used the PRISMA extension for scoping reviews (PRISMA-ScR) to aid in developing the review and organizing the final paper. The PRISMA-ScR is a checklist of 20 items to include in a scoping review as well as guidelines for reporting each item in the checklist (see Appendix 1-A; Tricco et al., 2018).

Papers 2 and 3: Methods and Data Collection

For the second paper, I conducted psychometric testing of the factor structure, validity, and reliability of the Brief Sense of Community Scale (BSCS; Peterson et al., 2008) as a measure of PSOC for older adults in Puerto Rico. I tested the necessary assumptions for confirmatory factors analysis (CFA) following the recommendations of Tabachnick and Fidell (2019) and Kline (2016).

The third paper presents two hierarchical linear regression models. The first model tested the association between PSOC and SRH, and the second model examined the association between PSOC and QOL in this population. Both regression models met the necessary assumptions and controlled for relevant covariates.

Data for papers 2 and 3 come from a cross-sectional study on the mental health of 154 older adults in Puerto Rico two years after Hurricane María. All participants provided written informed consent and received $15.00 compensation for participation in the interview. The study

was approved by the IRB at Virginia Commonwealth University (IRB # HM20016772, PI: Denise Burnette, PhD). Relevant sample characteristics are reported in papers two and three.

The research team for this data collection effort included two faculty members in the Virginia Commonwealth University School of Social Work, two faculty members in the Columbia University School of Social Work, three graduate students (including me) from the Virginia Commonwealth University School of Social Work, two graduate students from the Universidad Interamericana de Puerto Rico in the School of Social Work, and me. I helped develop and implement training materials and sessions for the students who conducted interviews, and I supervised their work in the field. We also partnered with local community organizations, non-profits, senior centers, and community leaders for project implementation and data collection.

We used translations for standardized scales and instruments when available, while also verifying these with bilingual, bicultural members of the research team for accuracy and cultural relevance and through piloting. This process resulted in only minor changes to phrasing of one scale item (see "Loneliness" section in Paper 3). Non-standardized data items (e.g., demographics) were translated using standard protocols for English-Spanish forward and back translation by bilingual team members (WHO, n.d.). The English version of the scale items used in data collection is included in Appendix A and the Spanish version of these in Appendix B, at the end of the dissertation. Details on scales used in the dissertation are provided in each paper as applicable.

Data collection took place in three separate periods from September 2019 to January 2020. In total, we spent a month in Puerto Rico collecting data. Figure 1 shows a map of the municipalities in which we collected data. This included Manatí (n = 10, 6.5%), Quebradillas

(*n*= 13, 8.5%), Humacao (*n* = 17, 11.0%), Juncos (*n* =34, 22.1%), Maunabo (*n* = 29, 18.8%), San Juan (*n* = 25, 16.2%; this included neighborhoods of Condado, Cupey, Rio Piedras, and Santurce), Carolina (*n* = 2, 1.3%), Utuado (*n* = 12, 7.8%), Jayuya (*n* = 6, 3.9%), and Vieques (*n* = 6, 3.9%). These municipalities represented important sources of diversity within Puerto Rico, such as urban, rural, and suburban communities, as well as coastal and mountainous areas. These municipalities fell within five of Puerto Rico's six geographic regions. We could not access the South due to earthquakes that occurred during a data collection in January 2020 (U.S. Geological Survey, 2020).

Figure 1

Data Collection Locations by Municipalities in Puerto Rico

We used a nonprobability sampling approach, which primarily relied on convenience sampling, with snowball sampling used to a lesser extent for additional recruitment. Participants were interviewed in their homes, senior centers, and public plazas by members of the research team. We partnered with senior centers in several municipalities to aid in recruitment. They assisted us in setting up private interviewing areas and helped recruit older adults to participate. We also partnered with local non-profits and community leaders, who helped in recruiting individuals in the community. We then interviewed these older adults in their homes after explaining the study and determining eligibility criteria. Other home interviews resulted from us going door to door, where we would canvas a neighborhood to inquire if individuals were interested and eligible to participate. Public plazas are common gathering spaces for individuals in Puerto Rico, especially older adults. In public plazas, we approached individuals who appeared to meet the age criteria and inquired if they were eligible to participate. If interested and eligible, we further explained the study and started the inform consent process. We interviewed them in locations in the plaza that were secluded. For interviews in homes and plazas, we ended interviews by asking the older adult if they knew anyone else who may be interested in participating in the interview.

All interviews were conducted face-to-face and lasted between 45 minutes to an hour. Inclusion criteria were: aged 60 and over, lived in Puerto Rico during Hurricane María, and ability to give informed consent.

Following data collection, I entered all data into SPSS version 26 for data management, data cleaning, and preparation for analysis. I also created a user guide to match survey items with variables in the dataset. Data documents are available upon request.

I maintained a detailed journal during and after the trips to Puerto Rico. This contained field notes, observations, photographs taken during data collection trips, and reflections. I used these additional sources of data throughout the dissertation process to frame and conceptualize the study, interpret results, and present implications, and to check for personal bias and positionality as a researcher.

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Appendix 1-A.

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

Table. PRISMA-ScR Checklist

Section	Item	PRISMA-ScR Checklist Item
Title	1	Identify the report as a scoping review.
Abstract		
Structured summary	2	Provide a structured summary that includes (as applicable) background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.
Introduction		
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.
Methods		
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).
Summary measures	13	Not applicable for scoping reviews.
Synthesis of results	14	Describe the methods of handling and summarizing the data that were charted.
Risk of bias across studies	15	Not applicable for scoping reviews.
Additional analyses	16	Not applicable for scoping reviews.
Results		
Selection of sources of evidence	17	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.
Characteristics of sources of evidence	18	For each source of evidence, present characteristics for which data were charted and provide the citations.
Critical appraisal within sources of evidence	19	If done, present data on critical appraisal of included sources of evidence (see item 12).
Results of individual sources of evidence	20	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.
Synthesis of results	21	Summarize and/or present the charting results as they relate to the review questions and objectives.
Risk of bias across studies	22	Not applicable for scoping reviews.
Additional analyses	23	Not applicable for scoping reviews.
Discussion		
Summary of evidence	24	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.
Limitations	25	Discuss the limitations of the scoping review process.
Conclusions	26	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.
Funding	27	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy documents).

Chapter 2.

A Scoping Review of Psychological Sense of Community among Community Dwelling Older Adults

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Dissertation Paper #1

Abstract

Background: Psychological sense of community (PSOC) is an important construct for health and well-being outcomes for older adults. Drawing on the ecological theory of aging and the age-friendly cities (AFC) framework, this scoping review explores how PSOC has been used in research with community dwelling older adults.

Methods: Database searches resulted in 582 unique articles. I first grouped articles based on study populations and conceptualization and operationalization of PSOC. I then used thematic analysis to explore topic areas and main findings related to PSOC. I used the AFC framework to develop themes and others emerged during analysis.

Results: After applying eligibility criteria, I included 33 articles in the final sample. Most studies took place in East Asia or used samples of Chinese immigrants. PSOC was used in a variety of ways in analyses, including as an independent variable, dependent variable, moderator, mediator, and measure of concurrent validity. The Brief Sense of Community Scale appeared to be the best measure of PSOC. Topical research areas in the thematic analysis were (1) built environment and neighborhoods; (2) social participation and connection; (3) civic participation; (4) PSOC as a protective factor; (5) health and well-being; (6) relocation; and (7) scale development. PSOC was a consistent predictor of health and well-being for older adults and served as a mechanism to link neighborhood or environmental characteristics with health and well-being.

Discussion: Results of this scoping review suggest that future research needs to examine PSOC in more diverse geographic regions and cultural groups and conduct further psychometric testing of PSOC scales with older adults. PSOC is conceptually related to the AFC framework and serves as a mechanism that links AFC features and well-being outcomes.

A Scoping Review of Psychological Sense of Community and Community Dwelling Older Adults

Psychological sense of community (PSOC) describes an individual's feeling that they are part of a social structure that is supportive, present, and dependable and is characterized by interdependence, mutual responsibility, and a collective consciousness (Sarason, 1974). McMillan and Chavis (1986) further defined PSOC as a "feeling that members have of belonging, a feeling that members matter to each other, and a shared faith that member's needs will be met through their commitment together" (p. 9). They identified four key domains and processes of PSOC: (1) *Membership*- a feeling of belonging or shared personal relations, (2) *Influence*- a sense of mattering and making a difference in one's community, and the bidirectional relationships between members and their communities, (3) *Fulfillment of needs*- the idea that a member's needs will be met by the resources provided through being in the community, and (4) *Shared emotional connection*- a commitment and belief that members have shared and will continue to share a history, common places, time with each other, and events or experiences. These four domains work together to create and sustain PSOC.

Ecological Theory of Aging

The relationship between an older adult and their community is essential to environmental gerontology. The Ecological Theory of Aging (ETA) seeks to understand interactions and assess quality of fit between older adults and their physical and social environment (Lawton & Nahemow, 1973). Good person and environment fit (P-E fit) leads to positive outcomes, whereas poor P-E fit leads to negative outcomes. Goodness of fit is best understood by evaluating the combination and interaction of personal characteristics and environmental influences.

Person-related characteristics, referred to as *personal competence,* include sociodemographic characteristics, health, functioning, and social resources. ETA assumes the environment around an individual creates demands or strains, also referred to as *environmental press*. Older adults with higher levels of personal competence are better able to respond to and meet the needs or stress imposed on them by their environment (Lawton & Nahemow, 1973). Conversely, older adults with lower levels of competence function best in environments with lower demands. Poor outcomes result when an older adult's level of competence is insufficient to meet the demands of environmental press.

ETA often examines objective aspects of the environment such as living spaces and the physical features of the community. However, more recent research has shifted to understanding subjective appraisals of the environment, in addition to objective aspects. For example, Wahl et al. (2012) added the concepts of agency and belonging to ETA. They define *belonging* as positive connections with other people and their environment, involving processes of attachment to specific places, and *agency* as intentional and proactive behaviors that involve being a change agent in one's own life. Good P-E fit occurs when older adults have agency and feelings of belonging. Wahl et al. (2009) found that older adults who feel they have more control and responsibility for their environment and higher feelings of belonging to their environment were less depressed, more functionally independent, and had higher sense of well-being.

The four aforementioned domains from PSOC have parallels with the concepts of agency and belonging. *Membership* and *emotional connection* are akin to *belonging,* whereas *needs fulfillment* and *influence* match well with *agency*. Belonging involves processes of connection with the environment and other individuals in one's environment. Agency, on the other hand,

involves the ability to influence the environment in order to meet needs or demands, such as responding to environmental press.

To summarize, PSOC serves as an important concept for understanding the interaction between an older adult and their environment. It is related to aspects of the environment or neighborhood (see Guo et al., 2021; Zhang et al., 2018; or Zhang & Zhang, 2017) and health or well-being outcomes (see Tang et al., 2018; or Zang et al., 2017), and it serves as a protective factor for older adults after traumatic events (Li et al., 2011).

Age-Friendly Cities Framework

Policy initiatives emphasize the importance of P-E fit and the role of community factors in promoting the well-being of older adults. In 2005, the World Health Organization (WHO) conceived the Age-Friendly Cities (AFC) framework to respond to global population aging trends and promote living environments that enhance health and well-being of older adults (WHO, 2007). This framework can be used by local governments and policy makers to aid in designing the environment to be more conducive to needs and opportunities for older adults. AFC consists of eight general domains: housing, social participation, respect and social inclusion, civic participation and employment, communication and information, community support and health services, outdoor spaces and buildings, and transportation (see WHO, 2007 for more detail on each domain).

As Greenfield et al. (2015) point out, the emergence of AFC demonstrates a shift in research and practice from focusing on the individual level to the community level. Older adults' perceptions of their communities and PSOC then become an essential focus for research. While PSOC is not part of the AFC framework, it is an important construct for understanding how environmental influences and community levels factors affect health and well-being outcomes.

In fact, multiple studies examine PSOC as a mediator to link age-friendly environment features with various well-being outcomes (Au et al., 2020; Yu et al., 2019).

With the emergence of AFC and continued relevance of ETA, PSOC has garnered more attention in research with older adults. However, there are currently no literature reviews on the topic of PSOC and older adults. Therefore, the aim of this study was to conduct a scoping review to explore how PSOC has been studied with community dwelling older adults. Scoping reviews use a strong methodological framework to map and synthesize evidence around a specific topic to inform practice, policy, and future research (Arksey & O'Malley, 2005; Levac et al., 2010). The research question guiding this scoping review is, "How has the construct of PSOC been used in research with community dwelling older adults?" I also identified a set of secondary questions to help guide the scoping review:

(1) With what populations and in what geographic regions has PSOC been studied?

(2) How has PSOC been conceptualized, operationalized, and used in data analyses?

(3) What topics related to PSOC have been researched and what were the key findings?

Methods

I followed the framework for scoping reviews presented by Arksey and O'Malley (2005) and refined by Levac et al. (2010). The process consists of five stages: (1) identify the research question; (2) identify relevant articles; (3) select studies; (4) chart data; and (5) collate, summarize, and report the results. I also used the PRISMA extension for scoping reviews (PRISMA-ScR), a 20-item checklist of what to include and guidelines for reporting (Tricco et al., 2018), to aid in developing the review and organizing the final paper.

Identifying and Selecting Articles

I searched three databases to identify articles: EBSCO, Web of Science and ProQuest. I specified date range of 1986 – March 2021 and “peer-reviewed”. I selected 1986 because this is the year of McMillan and Chavis’ seminal work on PSOC. I specified searches to include only peer-reviewed journals and English full-text when possible. I used the following search terms (or very close iterations) in each database: (“older adult*" or elder* or geriatric* or senior* or "older people" or "aged 60" or 60+ or "aged 65" or 65+) AND (“sense of community”). The search term “sense of community” identified articles that used either the phrase “sense of community” or “psychological sense of community,” as both phrases are used in the PSOC literature. I also identified other articles through chain citation searching. I used the Mendeley software package to manage articles.

I established eligibility criteria (i.e., inclusion and exclusion criteria) prior to searching and added criteria *post hoc* as my familiarity with the literature increased (Arksey & O’Malley, 2005). I excluded articles that did not have full-text available in English or were non-empirical publications (e.g., book reviews, letter to the editor, etc.). I excluded articles if the sample was not older adults (defined as age 50+) or if there was a mixed-age sample. Since the focus was on community dwelling older adults, I excluded articles where samples were from nursing homes, assisted living facilities, retirement homes, cohousing, or other older adult specific housing. PSOC may manifest differently in a more structured, building specific environment such as these, and the focus of this review was concerned with understanding how PSOC is studied with older adults in the community.

I included articles that focused on the specific construct of PSOC. I excluded articles that used the phrase “sense of community” in ways not related to PSOC. While literature on PSOC uses the “sense of community” or “psychological sense of community” interchangeably to refer

to the construct PSOC, some literature outside of PSOC uses the general phrase “sense of community” to refer to other constructs (not PSOC). I also excluded articles where PSOC was a minor focus of the article, such as only making minor references to PSOC in the introduction or conclusion, or only using it as a minor variable in analyses as opposed to a key construct in the hypothesis or model (e.g., as an independent variable, dependent variable, moderator, or mediator).

Data Charting

Charting involves synthesizing and interpreting data based on key items of information from the studies reviewed (Arksey & O’Malley, 2005). I first extracted data from selected articles based on general study characteristics: author(s), year of publication, and journal; aim/goal/purpose; theoretical framework; research design; sample characteristics; statistical or analytical approach. I then extracted information on how PSOC was used. This included definitions, conceptualizations, and operationalization of PSOC. I also charted specific PSOC topics such as the hypothesis (as related to PSOC), type of variable PSOC was in analysis (e.g., independent variable, dependent variable, mediator, moderator), constructs or variables tested with PSOC, and main results. I used Microsoft Excel to chart the data.

Collating, Summarizing, and Reporting the Results

This stage provides an overview of all material reviewed and presents key themes using a narrative account (Arksey & O’Malley, 2005). I first present information on the article selection process and general study characteristics. Following Levac et al. (2010), I then group articles and use thematic analysis to answer the research questions. I grouped articles based on study location and population (secondary research question 1). Articles we also grouped around definitions, conceptualization, and operationalization of PSOC, as well as the measures used for PSOC

(secondary research question 2). This included phrasing used to describe PSOC, whether the studies cited seminal articles by Sarason (1974) or McMillan and Chavis (1986), how articles conceptualized "community," and measures used for PSOC.

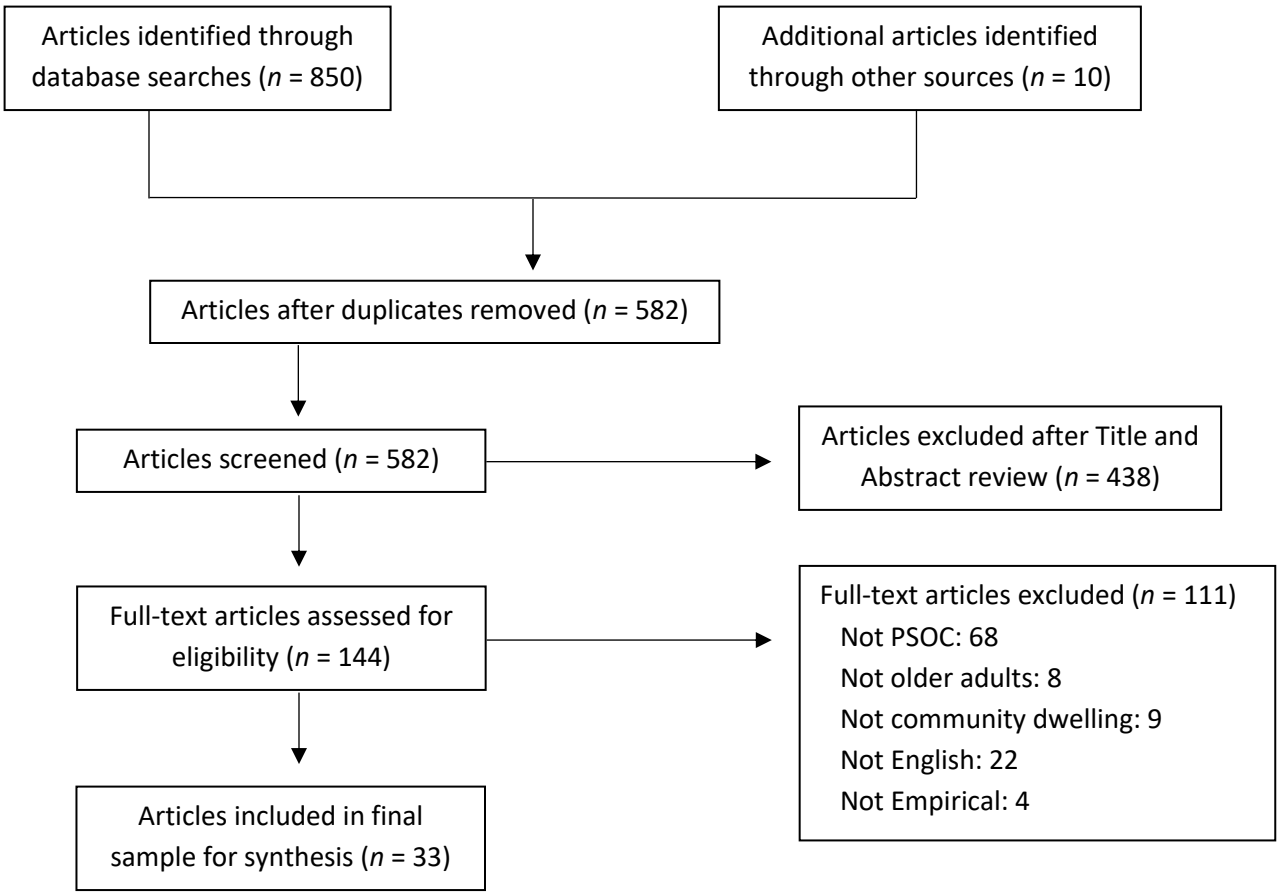
I then used Braun and Clarke's (2006) guidelines for deductive thematic analysis to examine how PSOC has been used in research (secondary research question 3). Prior to analysis, I derived themes based on the eight domains of the WHO AFC framework and grouped articles on into these domains. Some of the eight domains were collapsed into a larger theme to better present findings. Not all of the WHO AFC domains were used, and some articles did not fit naturally into any of the domains. I identified other themes during thematic analysis outside of the WHO AFC framework. I then grouped the remaining articles in these themes while also re-assessing other articles that were previously grouped. Several articles were grouped in multiple themes. After grouping articles into themes, I then present main findings related to PSOC. I maintained detailed notes of decisions I made during thematic analysis to aid in consistency.

Results

Figure 1 shows the scoping review PRISMA diagram. Initial searches yielded 398 articles in EBSCO, 283 in Web of Science, and 161 in ProQuest. I subsequently identified 10 other articles through chain citation searching. In total, these searches yielded 860 articles, and after removing duplicates within and between databases, there were 582 unique articles to review. I first screened titles and abstracts based on the eligibility criteria and removed 438 articles. I then reviewed the full text of 144 articles and removed 111 upon further evaluation of eligibility criteria (see Figure 1 for list of exclusion reasons of full-text review). The final sample included 33 full-text, English language articles that reported empirical findings on PSOC in samples of community dwelling older adults.

Figure 1

PRISMA Diagram for Search and Selection Process



Note: PRISMA (Preferred Reporting Items for Systematic Reviews), PSOC (Psychological Sense of Community.
Databases searched and *n* for each: EBSC0 (*n* = 398), Web of Science (*n* = 283), ProQuest (*n* = 161).

Study Characteristics

Table 1 presents information on the final sample of 33 articles, including general study characteristics and information on PSOC as it pertains to each article, which were published between 2003 and 2021. Nine were in gerontology journals, four in community psychology, 15 in medical, psychology, or social science, two in leisure, and three in architecture or urban planning. A total of 29 studies used quantitative analyses and four used qualitative methods. Only one was longitudinal (Tang et al., 2020).

Table 1

Data Extraction and Charting for Articles in Final Sample (N = 33)

Citation	Research Topics in Synthesis	Research Design	Location	Sample Size and Age	Use of PSOC in Analysis	Measure of PSOC (α, if reported)
Au et al. (2020)	Built Environment and Neighborhoods	Quantitative	Hong Kong	55+ (*N* = 898)	Mediator	BSCS, α = .80
Dionigi and Lyons (2010) [c]	Social Participation	Qualitative	Australia	65+ (*N* = 10)	Guided analysis	n/a
Dong et al. (2014) [a]	Relocation	Quantitative	USA (Chinese immigrants)	60+ (*N* = 3159)	DV	SCI, α = .69
Fang et al. (2019)	Social Participation	Quantitative	Hong Kong	60+ (*N* =738)	DV	3 items from BSCS, α = .73
Guo et al. (2021)	Built Environment and Neighborhoods	Quantitative	Hong Kong	60+ (*N* =1553)	Mediator	BSCS, α = .94
He et al. (2020)	Built Environment and Neighborhoods	Quantitative	Hong Kong	~60+ (*N* =271)	Mediator	Single item created by authors
Kim et al. (2018)	Scale Development	Quantitative	South Korea	55+ (*N* = 326)	Concurrent validity	BSCS, α = .87
Kono et al. (2012)	Scale Development	Quantitative	Japan	55+, multiple samples (*N* = 4609)	Concurrent validity	BSCS, α = .90
Lai et al. (2019) [a]	Social Participation, Relocation	Quantitative	Chicago (Chinese immigrants)	60+ (*N* = 3159)	IV	SCI, α = .67

Lai et al. (2021)	Protective Factor	Quantitative	Hong Kong	60+ (*N* = 1793)	Mediator/ moderator	BSCS
Li et al. (2014) [c]	Relocation	Qualitative	New Zealand (Chinese immigrants)	60+ (*N* = 32)	Guided analysis	n/a
Li et al. (2011)	Protective Factor	Quantitative	China	55+ (*N* =298)	IV and moderator	7 items from SCI
Liu and Besser (2003)	Civic Participation	Quantitative	USA (Rural areas)	65+ (*N* = 2802)	IV	Created 2-item measure, α = .69
Lyons and Dionigi (2007) [c]	Social Participation	Qualitative	Australia (Participants in sport competition)	55+ (*N* = 110)	Guided analysis	n/a
Okun and Michel (2006)	Civic Participation	Quantitative	USA	60+ (*N* = 653)	IV	Created 4 item scale, α = .67
Pozzi et al. (2014)	Civic Participation	Quantitative	Italy (Volunteers)	60+ (*N* = 143)	Mediator	15-item PSOC scale, α = .90
Roos et al. (2014) [c]	Relocation	Qualitative	South Africa (Females)	60+ (*N* = 11)	Guided analysis	n/a
Tadaka et al. (2016)	Scale Development	Quantitative	Japan	55+, multiple samples (*N* = 4609)	Concurrent validity	BSCS, α = .90
Tang et al. (2017) [a]	Social Participation, Relocation	Quantitative	USA (Chinese immigrants)	60+ (*N* = 3159)	DV	SCI, α = .67
Tang et al. (2018) [a]	Health and Well-being, Relocation	Quantitative	USA (Chinese immigrants)	60+ (*N* = 3159)	IV	SCI, α = .67
Tang et al. (2020) [a, b]	Health and Well-being, Relocation	Quantitative	USA (Chinese immigrants)	60+ (*N* = 2713)	IV	SCI, α = .69

Tang et al. (2021)	Built Environment and Neighborhoods	Quantitative	Hong Kong	50+ (*N* = 2247)	Mediator	BSCS, α = .84
Toohey et al. (2013)	Built Environment and Neighborhoods	Quantitative	Canada	50+ (*N* = 884)	DV	PSOC in the Neighborhood Scale, a = .86
Yao et al. (2018)	Protective Factor	Quantitative	China	60+ (*N* = 391)	Mediator	Brief SCI, α = .94
Young et al. (2004)	Scale Development	Quantitative	Australia	73+ (*N* = 9445)	Guided analysis	n/a
Yu (2021)	Built Environment and Neighborhoods	Quantitative	Hong Kong	55+ (*N* = 257)	DV	SCI, α = .65
Yu et al. (2019a)	Scale Development	Quantitative	Hong Kong	60+ (*N* = 301)	Concurrent validity	BSCS
Yu et al. (2019b)	Built Environment and Neighborhoods	Quantitative	Hong Kong	60+ (*N* = 1798)	IV and Mediator	BSCS
Zhang et al. (2017)	Health and Well-being	Quantitative	China (Partnered couples)	60+ (*N* = 516)	IV	BSCS, α = .79 to .83 (husband and wife)
Zhang et al. (2018)	Built Environment and Neighborhoods	Quantitative	China	60+ (*N* = 628)	Mediator	BSCS, α = .83
Zhang (2019)	Social Participation, Relocation	Quantitative	China (Females, moved from rural to urban)	50+ (*N* = 205)	Mediator	BSCS, α = .80
Zhang and Zhang (2017)	Built Environment and Neighborhoods	Quantitative	China	50+ (*N* = 720)	Mediator	Created scale based on 10 items, α = .90
Zheng et al. (2020)	Health and Well-being	Quantitative	China	60+ (*N* = 418)	IV	BSCS, α = .94

Note: DV (Dependent Variable), IV (Independent Variable), BSCS (Brief Sense of Community Scale), SCI (Sense of Community Index).

[a] Used Population Study of Chinese Elderly in Chicago (PINE) data

[b] Longitudinal study, all other are cross-sectional.

[c] Defined “community” beyond neighborhood or geographic, local community

Research Question One

The first secondary research was, “with what populations and in what geographic regions has PSOC been studied?” Most studies used age ranges of 60 years or older to define “older adults.” A smaller number used cutoffs of 55+ (4 articles) or 50+ (4 articles), some of which cited WHO (2001) guidelines for age 50 and older in developing countries representing “old age.”

Sixteen studies were set in Hong Kong or China, eight in the USA or Canada, four in Australia or New Zealand, two in Japan, and one each in South Korea, Italy, and South Africa. Of the USA samples, five were from the Population Study of Chinese Elderly in Chicago (PINE), and one study in New Zealand was also with Chinese immigrants (Li et al., 2014). Fully 22 of the studies reviewed were Chinese older adult samples, and 25 of the 33 used East Asian samples.

Research Question Two

Research question two was, “how has PSOC been conceptualized, operationalized, and used in data analyses?”

Definitions of PSOC

Most of the reviewed articles defined PSOC from seminal articles of Sarason (1974) or McMillan and Chavis (1986), and included the four domains: membership, influence, needs fulfillment, and emotional connection. PSOC was phrased as “sense of community” or “psychological sense of community,” and abbreviated as “SOC,” “SoC,” “PSOC,” or “PSoC.” Four articles conceptualized PSOC as part of a latent construct such as “environmental factors” (Lai et al., 2019), “neighborhood factors” (Tang et al., 2020), “resource variable” (Li et al., 2011) or “social inclusion” (He et al., 2020).

The term “community” traditionally refers to a geographic or physical community, but it may also include relational communities that transcend physical and spatial location (Bess et al., 2002). In this review, most studies specified “community” as geographical such as neighborhood or local area. However, this was often not explicitly stated.

The only studies to specifically define community beyond geographic features were four qualitative. Two studies kept definition of “community” open. Older adult participants in an exercise group identified and defined multiple types of communities to which they belong ranging from the micro to macro level (Dionigi & Lyons, 2010). In a study of Chinese immigrants, feelings of community meant feeling sense of a local community and “transnational” community simultaneously (Li et al., 2014).

Other qualitative studies targeted and explored specific communities and used PSOC as a framework to interpret results. One study examined how community develops among participants in a sports contest (Lyons & Dionigi, 2007). Another study explored what community means and how PSOC forms in a relational community of older women who experienced forcible relocation in South Africa during apartheid (Roos et al., 2014).

Use of PSOC in Analysis

The most common use of PSOC was as a mediator (11), followed by independent variable (9), dependent variable (5), concurrent validity measure (4), and moderator (2). Some articles used PSOC in multiple ways, such as a mediator and moderator (Lai et al., 2021) or as independent variable and moderator (Li et al., 2011). All four qualitative studies operationalized PSOC as a key construct to guide or frame their analysis and results (Dionigi & Lyons, 2010; Li et al., 2014; Lyons & Dionigi, 2007; Roos et al., 2014).

Operationalization of PSOC

As seen in Table 1, most studies used the BSCS (Peterson et al., 2008) or the Sense of Community Index (SCI; Perkins et al., 1990) to measure PSOC. The BSCS is an eight-item measure that has a five-point Likert scale response. It consists of the four domains from McMillan and Chavis (1986): membership, needs fulfillment, influence, and emotional connection. The BSCS was used in 14 studies with samples of older adults in Hong Kong, China, Korea, and Japan, with translations in Korean, Japanese, Mandarin, and Cantonese. Cronbach's alphas for the BSCS ranged from .79 to .94. Fang et al. (2019) used a 3-item version of the BSCS ($\alpha = .73$) in a study in Hong Kong.

The SCI is a 12-item measure utilizing a five-point Likert scale (Perkins et al., 1990) that also utilizes the four domains from McMillan and Chavis (1986). The SCI was used in six articles: five in the PINE study and one in China, with translated versions in Mandarin and Cantonese. Cronbach's alphas ranged from .65 to .69. Tang et al. (2018) conducted exploratory factor analysis of the SCI and results failed to support the original four-factor structure of the scale. Instead, the authors found an alternate four-factor structure. Two other articles used shortened versions of the SCI. Li et al. (2011) conducted a factor analysis of the SCI within their study and results suggest a one-factor solution fit the data well for older adults in China. They retained 7 of the 12 items and to use in their measure of PSOC. Another article used the Brief SCI, an eight-item version of the SCI (Long & Perkins, 2003), in a sample in China. The authors reported good fit model fit from confirmatory factor analysis, and $\alpha = .94$ (Yao et al., 2018). However, they did not provide detail on the factor structure.

Six other studies developed or adapted measures of PSOC. He et al. (2020) used a one-item measure, "I think I am part of the community", scored on a five-point Likert scale. Liu and

Besser (2003) created a two-item measure (α = .69) and Okun and Michel (2006) a four-item measure, α = .67. Pozzi et al. (2014) used an adapted Italian version of the 15-item psychological sense of community scale (Chavis et al., 1986) with older Italians, α = .90. Toohey et al. (2014) measured PSOC with 15 items adapted from Nasar and Julian's (1995) Psychological Sense of Community in the Neighborhood Scale, α = .86. Zhang and Zhang (2017) used 10 items from the Community Social Capital survey of urban dwelling Chinese (Gui & Huang, 2008). Exploratory factor analysis supported a one-factor PSOC and α = .90.

Among the measures of PSOC for older adults, the BSCS appears to be the best measure. The SCI failed to capture the multidimensional nature of PSOC in studies with older adults, and internal consistency reliability measures were all slightly below the recommended cutoff of .70. Tang et al. (2020) note potential issues with the SCI in their study. Conversely, the BSCS consistently had α > .70 and performed well in different languages. There articles reviewed did not report additional psychometric testing (e.g., factor analysis) beyond Cronbach's alpha. When possible, future research should consider using the BSCS over the SCI and other measures, but there is a need for more psychometric testing of the BSCS with older adults.

Research Question Three

The third research question was, "what topics related to PSOC have been researched and what were the key findings?" Seven themes were found here: (1) built environment and neighborhoods; (2) social participation and connection; (3) civic participation; (4) PSOC as a protective factor; (5) health and well-being; (6) relocation; and (7) scale development. These themes were all related to the WHO AFC framework, except for relocation, scale development, and, to an extent, health and well-being.

Built Environment and Neighborhoods

Nine articles were grouped in the theme of built environment or neighborhood and community factors. Domains from the WHO AFC framework involved in this theme are *Transportation*, *Outdoor Spaces and Buildings*, and *Community and Health Care* as well as AFC in general. Seven of the nine articles in this theme used PSOC as a mediator.

Most studies used older adults' self-rated perceptions to assess their environment. Satisfaction with transportation was associated with better psychological well-being, and this association was mediated by PSOC (He et al., 2020). Yu et al. (2019b) found that the four domains of PSOC are associated with better self-rated health, and that perceptions of the physical and social environment have an indirect effect on self-rated health through PSOC. Zhang and Zhang (2017) found PSOC partially or fully mediated the relationship between the perceived residential environment with outcomes of life satisfaction, meaning in life, and positive affect. Other studies used general measures of AFC. In Hong Kong, PSOC mediated relationships between general AFC characteristics and life satisfaction (Au et al., 2020), and AFC features of outdoor space and buildings led to better PSOC, which was then associated with better physical and mental health (Tang et al., 2021).

In terms of objective measures of an older adult's environment, Guo et al. (2021) found that PSOC mediated the relationship between the objective environment (e.g., neighborhood population density, land use) and psychological well-being in Hong Kong. Similarly, Zhang et al. (2018) found that PSOC mediated relationship between neighborhood characteristics (e.g., public space, senior population density, and availability of senior services) and well-being of older adults in China.

Public spaces such as parks or walkable sidewalks are related to the *Outdoor Spaces and Buildings* domain of the WHO AFC framework. These age-friendly features can help promote engagement in social and leisure activities and result in higher PSOC for older adults. Yu (2021) found that the quality, but not quantity, of open spaces, such as parks, predicted PSOC. Toohey et al. (2013) found that dog-walking was associated with higher PSOC, and they suggest that neighborhoods with more walkability and parks may support better PSOC among older adults. Resources should be used to improve the quality of existing public spaces, rather than increase the quantity of public spaces, which may encourage more use by older adults and provide more opportunities for engagement in leisure and other social activities. However there remains a need to ensure there are enough public spaces and that they are accessible to all.

Social Participation and Connection

Six articles were grouped in the theme of social participation and connection. These articles were related to the WHO AFC framework domains of *Social Participation* or *Communication and Information*.

Social Participation refers to the need to increase accessibility and affordability of social activities and other strategies to prevent social isolation. The association of social participation and PSOC was not clear in this scoping review. One study grouped PSOC with other constructs under “environmental factors”, and found it predicted more social engagement (Lai et al., 2019). Other studies explored the inverse association. Among Chinese immigrants, engagement in social activities and increased social support were associated with more PSOC (Tang et al., 2017). Likewise, more community involvement was associated with higher PSOC among older women in China (Zhang, 2019). As such, there is conflicting evidence of whether PSOC predicts

more social engagement, or vice versa. PSOC and social participation are clearly related, but research is needed to clarify the directionality or if these work synergistically.

A smaller group of articles explored leisure activities, which also falls under *Social Participation* in the WHO AFC framework. Such activities are thought to be an effective strategy for increasing social connections and reducing social isolation. Two qualitative articles set in Australia explore PSOC with older adults participating in a sports contest (Lyons & Dionigi, 2007) and in an exercise group (Dionigi & Lyons, 2010). Both studies used samples of older adults in Australia. The four domains of PSOC (membership, needs fulfillment, influence, and emotional connect) emerged as themes in their analysis. These studies suggest older adults participating in the activities presents an avenue to build PSOC and feel part of multiple communities ranging from the micro level (community with other participants) and the macro level (local communities and larger community). Leisure activities may be a way to promote PSOC among older adults as it offers opportunities to connect with others in ways outside of the local neighborhood and build PSOC in different contexts.

Communication and Information, another domain in the AFC framework, is thought to promote social connection and improve access to information and services. Fang et al. (2019) found that using more information and communication technology, such as computers or smartphones, was associated with lower PSOC, particularly for lonelier older adults. Contrary to the AFC framework, this study suggests that increased use of information and communication technology may lead to more social exclusion and lower PSOC. However, this study focused on PSOC in terms of the neighborhood community. It is possible that while this may cause one to feel less connected to their local, geographic community, they may supplement this with meaningful connections with online communities.

Civic Participation

Three articles were grouped into the theme of *Civic Participation*, another domain of the WHO AFC framework. This domain involves encouraging active roles for older adults in civic processes, such as elections or community improvement, and increasing access to employment and volunteer activities. Okun and Michel (2006) found that among older adults in the United States, PSOC predicted more involvement in volunteering. Likewise, Pozzi et al. (2014) found that PSOC is associated with better psychological well-being among older adults who volunteer, and that PSOC mediates the relationship between both religiousness and global sense of responsibility with well-being. Liu and Besser (2003) found that higher PSOC was associated with more involvement in community improvement activities among older adults in rural areas in the USA. PSOC can be used to promote civic engagement of older adults, such as volunteering and more active involvement in community improvement.

PSOC as a Protective Factor

Three articles were grouped in the theme of PSOC as a protective factor. This review found that PSOC serves as a protective factor for negative outcomes of stressors such as traumatic experiences and structural inequities.

In a study with older adults in Hong Kong, PSOC moderated the relationship between education and self-rated health and mediated the relationship between income and self-rated health such that higher income predicted higher PSOC, and in turn, better self-rated health (Lai et al., 2021). With respect to traumatic events, PSOC was found to moderate the relationship between exposure to an earthquake in China and depressive symptoms. Older adults with higher PSOC had fewer depressive symptoms even when they had more exposure to the earthquake. PSOC also independently predicted fewer depressive symptoms (Li et al., 2011). These two

studies show that PSOC can help address systemic inequalities such as education and wealth gaps, as well as reduce deleterious effects of exposure to acute adverse events like natural disasters. This theme may also help explain relevance of PSOC to ETA, because PSOC serves as a resource that can be drawn upon meet demands of stressors from one's environment (*environmental press*), whether it be an acute or systemic stressor.

Yao et al. (2018) reported a path from perceived age discrimination to life satisfaction through PSOC. A domain of the WHO AFC framework is *Respect and Social Inclusion*, which speaks to the need to address ageism. Internalized ageism may lead older adults to feel excluded in their local community and lower levels PSOC, which then results in worse life satisfaction. This finding presents an opportunity not often discussed in the literature on building PSOC of older adults- targeting interventions to younger age groups to reduce ageism.

Health and Well-being

PSOC is a robust predictor of health and well-being and was a recurrent theme throughout. Four articles were specifically grouped in the health and well-being theme. These four explored the relationship between PSOC and health and well-being outcomes specifically and did not fit naturally in other themes.

PSOC was associated with less depressive symptoms and better self-rated health among older Chinese adults in the USA (Tang et al., 2018). Tang et al. (2020) further explored the association between neighborhood characteristics (which included PSOC along with social cohesion and neighborhood disorder) and cognitive functioning, which was not affected by PSOC.

PSOC was also associated with better life satisfaction, and this relationship was moderated by levels of resilience (Zhang et al., 2017). Zheng et al. (2020) also found that PSOC

was a predictor of psychological resilience and life satisfaction, and that resilience mediated the relationship between PSOC and life satisfaction. These two studies indicate the importance of incorporating individual resilience in research on PSOC and well-being. This finding also supports PSOC as an important resource in the ETA framework, as it may promote social relations and connections and protect against social isolation (Zheng et al., 2020).

As presented in prior themes in this scoping review, PSOC was associated with health and well-being outcomes. For example, PSOC was a mediator with outcomes of life satisfaction (see Au et al., 2020; or Zhang and Zhang, 2017), well-being (see Guo et al., 2021; or Zhang et al., 2018), or health (see Tang et al., 2021; or Yu et al., 2019b). Mediation requires a statistically significant relationship between the mediator and an outcome variable (Baron & Kenney, 1986). So, while these articles did not focus specifically on PSOC as a predictor of health and well-being, and were not grouped specifically in this theme, results of mediation analyses support this relationship.

Relocation

Relocation, either by choice or by force (e.g., forcible relocation, see Roos et al., 2014), was another theme in this scoping review. PSOC can facilitate the transition, as ETA supports PSOC as a resource or protective factor to help meet environmental press that results from immigration or relocation. Eight articles were grouped in this theme.

Five articles in this review were based on the PINE study, which focused on Chinese older adults, many of them immigrants to the USA. Dong et al. (2014) found increased age, females (compared to males), higher income, and having more children were associated with better PSOC. More years in the USA were also associated with better PSOC. As noted earlier, the social engagement was related to PSOC (Lai et al., 2019; Tang et al., 2017). PSOC was

associated with better health and mental health outcomes (Tang et al., 2018) but not associated with cognitive functioning (Tang et al., 2020).

Aside from the PINE studies, other articles examined this theme. Zhang (2019) that in studied PSOC among older women in China who relocated from rural to urban areas. The author found that engagement in community activities led to higher PSOC, and PSOC was a predictor of psychological adjustment following a move, such as depression, well-being, and loneliness. Another study explored experiences of Chinese immigrants to New Zealand (Li et al., 2014). In this qualitative study, PSOC was vital to multiple communities simultaneously: PSOC as related to their new local community and the importance of maintaining PSOC from where they emigrated.

Roos et al. (2014) studied experiences of PSOC among older women who were forcibly relocated during apartheid in South Africa. In this qualitative study, several themes emerged as representations of PSOC including connections to place, the importance of belonging, and peer relationships. This study also found that shared rituals may help build PSOC in this group. Studies on relocation, either forcibly or by choice, show the importance of considering life course perspectives in understanding PSOC for older adults.

Scale Development

The final theme was the use of PSOC in scale development of other constructs. Five articles were grouped in this theme. One study used PSOC to develop a measure of "sense of neighborhood and belonging" (Young et al, 2004). Four studies used PSOC as a measure of concurrent validity, two to test for concurrent validity for a measure of community commitment (Community Commitment Scale) in Japan (Kono et al., 2012) and South Korea (Kim et al., 2018). The Community Commitment Scale was positively correlated with PSOC in both studies.

A study in Japan developed a measure of community self-efficacy (Community Self-Efficacy Scale) in Japan and found PSOC was positively corelated with this measure (Tadaka et al., 2016). Yu et al. (2019a) evaluated psychometric properties of the Hong Kong version of Neighborhood Cohesion Instrument by establishing convergent validity with PSOC. This group of studies show PSOC is a valuable construct to aid in scale development, especially related to neighborhood and community factors in samples of older adults.

Discussion

There is a growing interest in the role of PSOC in older adult populations. PSOC has a natural fit in gerontological research, especially as related to ETA and AFC frameworks, as PSOC seeks to understand individuals' feelings of their surrounding community, that they are part of a larger social structure, and to understand the relationship between PSOC and various well-being outcomes (McMillan & Chavis, 1986; Sarason, 1974, 1986). The purpose of this study was to conduct a scoping review on how the concept of PSOC has been used in research among community dwelling older adults. In the final sample of 33 articles, I reviewed research design, sample characteristics, conceptual and operation definitions of PSOC, topics areas and constructs researched with PSOC, and main findings related to PSOC. Results from this review can be used to guide future research and inform theory, policy and practice, especially related to ETA and AFC frameworks.

The first research question explored populations and geographic regions studied with PSOC. About two thirds of the articles focused on Asian samples of older adults, showing a need to explore PSOC in other regions and ethnic groups. Notably, there were zero studies of older adults and PSOC with Latin American and Black communities, and only one study took place in Africa. Tang et al. (2017) suggest that PSOC is an important construct for Chinese older adults

because of the importance of collectivism in this culture. However, collectivism is an important construct for North American and Western European cultures as well (Brewer & Chen, 2007). For example, PSOC has been used in samples of Hispanic youth (Lardier et al., 2018) and Hispanic immigrants (Ramos et al., 2017). Hispanic older adults are traditionally embedded in and interdependent with members of dense familial networks for emotional, instrumental, and social support (Centers for Disease Control and Prevention, 2012). Yet no studies to date have examined PSOC with older adults in this population. In fact, Montero (2008) identifies the need for further research in community psychology on PSOC in Latin American communities. Research should incorporate geographically and culturally diverse samples in studies of PSOC with older adults.

The next research question explored conceptualization, operationalization, and use in analysis of PSOC. While most studies applied proper definitions of the construct "psychological sense of community," it was phrased and abbreviated in multiple ways, such as "sense of community", "psychological sense of community", "SOC" (or SoC) or "PSOC" (or PSoC). To distinguish research on PSOC with general research on community not related to PSOC, researchers should consistently use the phrase "psychological sense of community" and abbreviation PSOC. Results from the article selection stage further highlight the need for consistency in references to PSOC. During the full-text review stage, 64 articles were excluded because their use of the term "sense of community" was completely unrelated to PSOC. Intentional and consistent use of "psychological sense of community" instead of "sense of community" may help further clarify references to the construct PSOC instead of a general phrase of "sense of community," which could be unrelated to PSOC.

Most studies conceptualized “community” as referring to the geographic neighborhood, however this was not always explicitly stated. Future research should specify the type of community being studied, as the conceptualization of community can have different ramifications. For example, even within geographic communities, there can be vast differences in PSOC between close neighbors on a block or street, and feelings of PSOC with the whole town or city (or rural area).

Research also needs to continue to explore PSOC in other types of communities besides neighborhoods and local geographic communities. Qualitative research is shown to be a useful research design for exploring community beyond one’s neighborhood or local geographic community and for understanding what PSOC means for different groups of older adults. Measures of PSOC, such as the Brief Sense of Community Scale (BSCS), even use the term “neighborhood” in reference to what community means, such as the scale item, “I feel like a member of this neighborhood” (Peterson et al., 2008). However, it seems reasonable the term neighborhood can be replaced with other types of communities and still be a valid measure, but this would require additional research in scale development. Research on different types of communities will yield important insights to how PSOC operates for older adults.

There were two primary measures of PSOC: the BSCS and SCI. The BSCS showed more promise, however, additional psychometric testing is needed to confirm the multidimensional nature of PSOC in a measure and across cultures populations, and settings, which the SCI has failed to do. Further validation for a measure of PSOC will strengthen research and practice. In analyses, PSOC was served as an independent variable, dependent variable, moderator, mediator, measure of concurrent validity, and as a framework to interpret qualitive results. This variability in analyses shows the conceptual flexibility of PSOC to serve in different roles in analyses, and

further emphasizes the importance of a psychometrically sound measure that accurately captures the four dimensions of PSOC and can be used with different populations (Peterson et al., 2008).

The final research question addressed themes in research topics with PSOC and older adults. Drawing upon the AFC framework and ETA, 7 themes were present: (1) built environment and neighborhoods; (2) social participation and connection; (3) civic participation; (4) PSOC as a protective factor; (5) health and well-being; (6) relocation; and (7) scale development. To highlight and summarize these themes, one can look to the role of PSOC as a mediator between aspects of the environment or community and health and well-being outcomes. This relationship reveals several important relationships that help underscore the implications of these themes.

First, environmental and neighborhood features predicted better PSOC in multiple studies. Age-friendly community or environments were associated with better PSOC. This held for general measures of "age-friendliness" and specific domains of WHO AFC framework: *Transportation*, *Outdoor Spaces and Buildings*, and *Community and Health Care*. These studies included objective measures (e.g., availability of services, land use, population density) and subjective appraisals of the environment (e.g., satisfaction with transportation, quality of public spaces, or features of outdoor space and buildings). Given these strong associations, another set of studies used PSOC as a measure to validates scales of community efficacy, community commitment and neighborhood cohesion.

Next, PSOC was a robust predictor of better health and well-being outcomes, including life satisfaction, mental health, and self-rated health. PSOC was a consistent predictor of these outcomes in different ethnic and geographic samples. Further, PSOC served as a protective factor against traumatic events and structural inequities. These findings were consistent with

theoretical propositions of PSOC, which state that PSOC should be associated with better well-being and mental health outcomes for individuals (Bess et al., 2002; Sarason, 1986). Aside from health and well-being measures, PSOC was associated with more civic engagement. In this review, results were unclear whether PSOC predicted social engagement or vice versa.

Last, PSOC is an important mechanism for understanding how AFC features or other environmental influences affect well-being outcomes. This review found that PSOC fully or partially mediated these constructs across different studies. However, these studies all used cross-sectional data, which is a notable limitation in mediation models to determine causality and temporality of variables. Furthermore, all studies were conducted in China or Hong Kong, so more research is needed to explore potential mediations of PSOC with the environment and well-being outcomes.

This review demonstrates that PSOC connects objective community measures or subjective perceptions of the neighborhood with health and well-being outcomes. While not included in the AFC framework, PSOC is thus an important construct to explain how AFC framework affects health and wellbeing outcomes for older adults. These mediational analyses imply that AFC promote PSOC among older adults, which in turn leads to better health and well-being outcomes.

PSOC was also an important factor for older adults who experienced relocation either through choice or by force. Across these studies, PSOC was consistently associated with better well-being outcomes. Strategies and interventions should focus on building PSOC in immigrant's new communities, such as targeting those most and risk and promoting social engagement, while also helping them maintain a PSOC with their home country or region.

In several studies of leisure activities, PSOC served as a theme to understand how PSOC manifests in sports or exercise groups. These themes show the importance of promoting PSOC in these groups, as well as revealing the ways these samples feel parts of different communities simultaneously, extending beyond just their current neighborhood.

In sum, these themes promote the relevance of PSOC to the ETA framework. ETA stresses the ability of individuals to meet the demands of the environment. This scoping review demonstrates the salience of PSOC as an important feature in P-E fit, as the four domains the construct (*membership, needs fulfillment, influence,* and *emotional connection*) help older adults meet the demands of their environment. *Influence* and *needs fulfillment* are tangible processes that promote personal agency, allowing one to draw on their community for resources or support as needed. *Membership* and *emotional connection* are more abstract concepts that may lead to more feelings of belonging that are essential the ETA framework (Wahl et al., 2012). A point of intervention for building PSOC among older adults is to improve age-friendly features of the environment, which will promote better P-E fit.

Limitations

This scoping review had several limitations. First, I was the sole researcher. A crucial step in scoping reviews is to ensure consistency among reviewers in the process, such as article selection and data charting (Levac et al., 2010). To improve consistency in my judgments, I kept a detailed journal, noting decisions and their rationale at each step in the process. This allowed me to reflect on and reference my notes when there was ambiguity at decision points. I also consulted with topic area experts and a research librarian at the university to aid in the review process, which Arksey and O'Malley (2005) suggests as a mean to strengthen methodology.

Another limitation was the article selection process. I excluded articles that did not have full-text available in English. Multiple articles in other languages appeared to be potentially relevant, but the full text was not available in English. I excluded 22 such articles, most of them in Korean. Future reviews could examine these articles. Given the emphasis on studying PSOC in Asian samples, researchers might also focus on this region. I also excluded non-community dwelling older adults, which could yield important insights for older adults residing in nursing homes, assisted living facilities, or other types of senior housing.

Last, I did not specifically examine sociodemographic correlates of PSOC; however, most articles reported on these variables, including statistical associations with PSOC. Exploring this topic in more detail may help establish if there are certain demographic risk factors for lower PSOC among older adults, which Sarason (1986) notes is essential to the field.

Conclusion

This scoping review examined how the construct of PSOC has been used in studies with community dwelling older adults since 1986. Results are relevant for refining theory and research on PSOC, and for guiding policy and practice with community dwelling older adults. A more robust understanding of PSOC will help further knowledge about how AFC affects well-being outcomes, as it provides a link between an older adult's environment and outcomes. This was especially strong for topics such as life satisfaction or psychological well-being, and to an extent, self-rated health. Finally, this research supports the relevance of PSOC in designing cities and communities that are "age-friendly." Practitioners, planners, and policy makers can improve the health and well-being of older adults by focusing on strategies and interventions that enhance their PSOC.

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Note: * References included in scoping review.

Chapter 3.

Psychometric Testing of the Brief Sense of Community Scale with Older Adults in Puerto Rico

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Dissertation Paper #2

Abstract

Psychological sense of community (PSOC) has been associated with better health and well-being outcomes with older adults and in Latin American populations. The Brief Sense of Community Scale (BSCS) is a widely used measure of PSOC. The scale has been translated into Spanish and validated in multiple populations. However, it has yet to be tested with Spanish-speaking older adults, or older adults in general. This study aims to test a Spanish translation of the BSCS with older adults in Puerto Rico. Data are from face-to-face interviews with a non-probability sample of 154 community-dwelling older adults in Puerto Rico. I tested for internal consistency reliability and convergent validity, then used confirmatory factor analysis (CFA) to test three competing factor structures. The BSCS showed good internal reliability ($\alpha = .85$) and was correlated in the expected direction with social network size ($r = .34$, $p < .001$) and loneliness ($r = -.27$, $p < .001$). CFA results show the higher-order four-factor model was the best fit ($\chi^2 (16) = 20.78$, $p = .187$; CFI = .997, TLI = .995, SRMR = .026, RMSEA= .044, 90% CI [< .001, .092]). These findings indicate the BSCS comprises the four domains (membership, needs fulfillment, emotional connection, and influence) from the original PSOC theory and that the BSCS is a valid and reliable measure for use with older adults in Puerto Rico. These results inform theory development and can be used to aid program planning, policy, and practice with older adults in Puerto Rico.

Keywords: Psychological sense of community; Hispanic; Aging; Measurement

Psychometric Testing of a Measure of Psychological Sense of Community Among Older Adults in Puerto Rico

Seymour Sarason (1974) introduced the concept of psychological sense of community (PSOC) to describe the feeling that an individual is part of larger social structures that are supportive, present, and dependable and is characterized by interdependence, mutual responsibility, and a collective consciousness. Sarason (1986) later noted that the goals of his original work were to explore the prevalence of low PSOC, highlight the negative effects of low PSOC, and understand how to prevent low PSOC. The term 'community' traditionally refers to a geographic or physical community, but it may also include relational communities that transcend physical and spatial location (Bess et al., 2002). This study utilizes the term community in the traditional sense, referring to the physical, geographical community such as one's neighborhood.

Extending Sarason's work, McMillan and Chavis (1986) identified four key domains and processes of PSOC: (1) Membership- a feeling of belonging or shared personal relations, (2) Influence- a sense of mattering and making a difference in one's community, and the bidirectional relationships between members and their communities, (3) Fulfillment of Needs- the idea that a member's needs will be met by resources provided through being in the community, and (4) Shared Emotional Connection- a commitment and belief that members have shared and will continue to share a history, common places, time with each other, and events or experiences. PSOC may thus be best understood in terms of how these mechanisms operate in relation to Sarason's interests in the prevalence of low PSOC, psychological well-being outcomes, and a potential point of intervention.

Community psychology has identified "sense of community" as a relatively new and important area of research to be developed in Latin American populations (Montero, 2008,

2018). PSOC can be a protective factor against substance use (Lardier et al., 2018a), for example, and it is associated with higher life satisfaction among Hispanic immigrants (Ramos et al., 2017). Likewise, Hombrados-Mendieta et al. (2013) found that PSOC was associated with better life satisfaction among adults in Spain.

While there is growing interest in PSOC in Latin American populations, I was not able to identify any research on PSOC with Latin American older adults, including Puerto Ricans. There is a need for comprehensive measures of PSOC that can be used across diverse groups (Tang et al., 2018), however, there is currently no validated measure of PSOC for this population. The purpose of this current study is to test a Spanish version of a measure of PSOC for use with older adults in Puerto Rico.

PSOC and Older Adults

PSOC is an essential component of older adults' health and well-being. Their interactions with their neighborhoods and communities and their subjective feelings about agency and belonging in their environment contributes to health, mental health, and other well-being outcomes (Lawton & Nahemow, 1973; Wahl et al., 2012). Higher levels of PSOC are associated with fewer depressive symptoms (Li et al., 2011) and better self-rated health (Tang et al., 2018), and may moderate the effects of socioeconomic status on health (Lai et al., 2021). PSOC plays an important part in life satisfaction (Zhang et al., 2017; Zheng et al., 2020) and reduced loneliness (Prieto-Flores et al., 2011). Studies with older adults in China report that PSOC mediates the relationship between the built environment and mental health and well-being (Guo et al., 2021) and between neighborhood characteristics and individual-level well-being (Zhang et al. 2018) and life satisfaction (Au et al., 2020).

As a protective factor in situations of trauma, such as natural disasters (Li et al., 2011) and maltreatment (Chang et al., 2021), PSOC also provides a strong framework for developing and implementing interventions to increase well-being and promote positive change for older adults (Kweon et al., 1998; Toohey et al., 2013). While studies have examined the concept of PSOC with older adults under various conditions and across different regions, there is no research to date with older adults in Latin America. This is surprising since community is an integral feature of collectivist cultures, including those throughout this region.

PSOC among Older Adults in Puerto Rico

PSOC may be especially salient for older adult survivors of natural disasters, including Puerto Ricans who experienced Hurricane María's long-term damage to communities and social support systems in 2017 (Downer et al., 2019). In the context of ongoing economic and political turmoil described in Paper 3 of this dissertation, these changes left older adults, who already faced vulnerabilities due to health-related reasons and gaps in social and health care services, especially vulnerable (Benach et al., 2019; Burnette et al., 2020; Ramphal, 2018). Compared to mainland U.S. age-peers, older adult islanders are more likely to have chronic health conditions, such as hypertension and diabetes; and they often rely on informal support from their family and community to fill gaps in formal services (Downer et al., 2017; Pérez & Ailshire, 2017).

When existing structural inequalities are compounded by external forces such as natural disasters and economic hardship, there may be more pressure on communities to respond to needs. Community support is a valuable resource for regions with histories of economic hardship and ineffective government support (Hargrove et al., 2021), such as Puerto Rico. After Hurricane María, community members turned to each other for support instead relying on government aid to arrive (Hayward et al., 2019). It is thus important to understand the role of PSOC for older

adults' well-being in Puerto Rican communities. To do so requires a valid and reliable measure that can be used in research and in screening and interventions with this population.

Measurement of PSOC

The Sense of Community Index (SCI) was the first formal measure of PSOC and was created to capture the four domains of PSOC (Chavis et al., 1986). The SCI, and subsequent iterations such as the 12-item SCI (Perkins et al., 1990) and the 8-item SCI (Long & Perkins, 2003) have been widely used. However, since these measures lack internal consistency across studies/samples and do not accurately capture the four domains of PSOC theory, there are questions about measurement validity (Lardier et al., 2018b; Peterson et al., 2008). Results from psychometric studies failed to find the four-factor structure from the original scale, and instead have found varying factor solutions, such as a one-factor model of PSOC (Chipuer & Pretty, 1999). Li et al. (2011) conducted a factor analysis of the 12-item SCI with older adults and also found a one-factor solution, however, they only retained 7 of the 12 items and to use in their measure of PSOC. Another study modified the scale to create a three-factor model (Long & Perkins, 2003). Other studies found an alternative four-factor model with items corresponding to different factors than the original SCI (Obst & White, 2004), including with a sample of older adults (Tang et al., 2018). As Peterson et al. (2008) note, modifying the factor structure of a scale without strong theoretical or conceptual grounding can cause concern the scale may not be accurately measuring PSOC.

To address such measurement challenges, Peterson et al. (2008) created the Brief Sense of Community Scale (BSCS). The BSCS is an eight-item measure that utilizes the four domains from McMillan and Chavis (1986), with two questions per domain. The BSCS has consistently performed well across samples that vary by age group, language, and geographic region. The

BSCS has been validated in several languages including German (Wombacher et al., 2010), and among urban youth in the U.S (Lardier et al., 2018b). Results of confirmatory factor analysis (CFA) in these studies report that both a higher-order four-factor model and a correlated four-factor model fit the data well. The higher-order four-factor model is preferred because the BSCS was created to capture McMillan and Chavis' (1986) framework of PSOC, which states the four domains work together to compose PSOC. In the higher-order models, PSOC is the higher-order (or second order), the four domains are lower-order (or first order) factors that load onto PSOC, and individual items load onto the four factors.

Rivera-Segarra et al. (2016) translated the BSCS into Spanish and validated it with young adults in Puerto Rico. They found a correlated two-factor structure was the best fit in their sample. The two factors were combinations of the four BSCS factors; one was termed "membership and emotional connection" and the other "needs fulfillment and influence."

A large gap in the literature on PSOC is the lack of psychometric studies of the BSCS with older adults. The BSCS was used with samples of older adults in Hong Kong (Au et al., 2020; Guo et al., 2021; Tang et al., 2021), China (Zhang, 2019; Zheng et al., 2020), Korea (Kim et al., 2018), and Japan (Kono et al., 2012; Tadaka et al., 2016), with translations of the BSCS in Korean, Japanese, Mandarin, and Cantonese. Whereas studies that have used the BSCS with this age group tend to report only internal consistency reliability is the only psychometric property, Cronbach's alphas are high, ranging from .79 to .94 (Au et., 2020; Guo et al., 2021, Kim et al., 2018; Kono et al., 2012; Tadaka et al., 2016; Tang et al., 2021; Zhang et al., 2017; Zhang et al., 2018; Zhang, 2019; Zheng et al., 2020).

These reports show initial promise for use of the BSCS with older adults, but more rigorous testing is needed to confirm the factor structure and establish further psychometric

properties of the scale. Moreover, the BSCS has yet to be tested for use with Spanish-speaking older adults. Validating this scale with older adults in Puerto Rico will advance theoretical knowledge of PSOC and determine whether the BSCS is a valid and reliable measure for this population.

This current study tests the psychometric properties of the BSCS with a sample of community- dwelling older adults in Puerto Rico two years after Hurricane María. I first examined the validity and reliability of the scale, and then used CFA to test several competing factor structures. I hypothesized that the BSCS would:

(a) Display good internal consistency reliability,

(b) Have convergent validity through a Pearson correlation with measures of social network size and loneliness, and that

(c) A higher-order four-factor model would provide a better fit than other models tested.

Methods

Sampling and Data Collection

Data are from a larger cross-sectional study on the mental health needs of older adults two years after Hurricane María. The nonprobability sampling approach used convenience sampling and, to a lesser extent, snowball sampling. A team of trained interviewers conducted face-to-face with participants in their homes, senior centers, and public spaces from September 2019 to January 2020 in Puerto Rico. All participants provided informed consent and were compensated $15.00. The study was approved by the IRB at Virginia Commonwealth University. More details on the study methodology are described in Paper 3.

Measures

PSOC

PSOC was measured with the Spanish version of the BSCS (Rivera-Segarra et al, 2016). The BSCS is an eight-item measure consisting of the four domains from the original PSOC theory (*membership, needs fulfillment, influence*, and *emotional connection*) with two items for each domain (Peterson et al., 2008). Each domain, referred to as factors, can be interpreted as a subscale. Responses are scored on a five-point Likert scale ranging from 0 (*strongly agree*) to 4 (*strongly disagree*) and summed to create a composite score with a theoretical range of 0 to 32. Higher scores indicate higher levels of PSOC. The original English version is included in Appendix 3-A and Spanish version in Appendix 3-B.

Social Network Size

Social network size was measured with the Spanish version of the abbreviated Lubben Social Network Scale (LSNS-6; Lubben, 2019). The LSNS-6 assesses the size of a respondent's social network through six items (Lubben et al., 2006). The scale has two subscales (Friends, Family), with the same three questions in each subscale. Items are scored on a scale from 0 (*none*) to 5 (*nine or more*) and summed to create a continuous score (theoretical range = 0–30). Higher scores indicate larger social networks. This scale had acceptable internal consistency in our sample ($\alpha = .74$) and was validated with this sample in a prior study (Buckley et al., under review).

Loneliness

Loneliness was measured with the Three-Item Loneliness Scale (TILS; Hughes et al. 2004). Items are scored (1 = *hardly ever,* 2 = *some of the time,* 3 = *often*), then summed (theoretical range = 3–9). Higher scores indicate greater loneliness. We used Pinazo Hernandis and Bellegarde Nunes's (2018) TILS translation with one minor adaptation. We phrased the item

"How often do you feel left out" as "¿Con qué frecuencia se siente excluído?" rather than "¿Con qué frecuencia se siente usted solo?" Sancho et al. (2020) reported favorable validity and reliability (α = .90) of the TILS with older adults in Spain. In our sample, internal consistency reliability was good, α = .81.

Data Analysis

Reliability and Validity

I first assessed internal consistency reliability of the BSCS using Cronbach's α, with Nunnally and Bernstein's (1994) threshold of .70 or greater indicating acceptable reliability. I also tested the internal consistency reliability of the four subscales. Next, I examined convergent validity against the LSNS-6 and TILS with Pearson correlations, using Cohen's (1992) recommended thresholds (.10 = low, .30 = medium, .50 = large).

Confirmatory Factor Analysis

I used CFA to test three competing models. Model 1 consisted of all eight items in a unidimensional structure. Model 2 was a correlated two-factor model based on a CFA conducted among young adults in Puerto Rico (Rivera-Segarra et al, 2016). The two factors were "membership and emotional connection" and "needs fulfillment and influence". Each factor has four items, based on the factors with which they correspond in the original scale. Model 3 was a higher-order four-factor model based on the original scale creation (Peterson et al., 2008). The higher order is PSOC and four factors under that are membership, needs fulfillment, influence, and emotional connection. Two items correspond to each of these four factors. All models were properly identified with the *t* rule and rules for standard CFA models (see Kline, 2016, p. 201).

I used Mplus version 8.4 (Muthén & Muthén, 2019) to conduct CFA. I used weighted least square mean and variance adjusted (WLSMV) estimation for CFA because individual items

were scored on a five-point Likert scale, which are better treated as ordinal variables in CFA (Kline, 2016). WLSMV is best for this type of data as it does not assume normal distribution (Brown, 2015). I prepared and screened data, checked assumptions, assessed reliability, and examined validity in IBM SPSS Version 27. Prior to the CFA, I checked for sufficient sample size and assumptions of outliers, multivariate normality, factorability of R, problematic multicollinearity, and singularity (Tabachnick & Fidell, 2019). There were no missing data in the CFA (N = 154).

I examined model fit with χ^2 statistics, CFI, TLI, SRMR, and RMSEA. Results of the χ^2 goodness-of-fit are favorable if nonsignificant and χ^2 -to-df ratios < 3 indicate good fit (Kline, 2016). CFI and TLI should be > .95 (Hu & Bentler, 1999). RMSEA (including the upper limit of the 90% CI) should be < .06 for good fit and < .10 for acceptable fit, (Brown, 2015; Hu & Bentler, 1999; MacCallum et al., 1996). SRMR should be < .08 (Hu & Bentler, 1999).

Results

Table 1 presents the demographic characteristics of the sample and scores for scales used in analysis. Table 2 displays descriptive statistics for the BSCS, subscales, and individual items.

Table 1

Sample Characteristics

Characteristic	*M* (*SD*) or *n* (%)
Age [a] (range = 60–96)	73.8 (8.7)
Gender	
Female	95 (62)
Male	59 (38)
Education [b]	
Less than high school	76 (50)
Completed high school	77 (50)
Marital status	
Not married	101 (66)
Married or cohabitating	53 (34)
Living arrangement	
Live alone	84 (55)
Live with others	70 (45)
Annual income [c]	11,780.0 (9,167.4)
Social isolation (LSNS-6) (range = 0–30)	14.0 (5.9)
Loneliness (TILS) [b] (range = 3–9)	5.2 (2.0)

Note. *N* = 154. All statistics are presented as *n* (%) except for age, annual income, LSNS-6, and TILS, which are presented as *M* (*SD*). LSNS-6 = Lubben Social Network Scale; TILS = Three-item Loneliness Scale.

[a] *n* = 151. [b] *n* = 153. [c] *n* = 150.

Table 2

Descriptive Statistics of the Brief Sense of Community Scale (BSCS)

Variable	M (SD)
Needs fulfillment	5.2 (2.4)
I1: I can get what I need in this neighborhood.	2.6 (1.2)
I2: This neighborhood helps me fulfill my needs.	2.6 (1.3)
Membership	6.9 (1.6)
I3: I feel like a member of this neighborhood.	3.4 (0.9)
I4: I belong in this neighborhood.	3.5 (0.8)
Influence	5.8 (2.0)
I5: I have a say about what goes on in my neighborhood.	2.8 (1.2)
I6: People in this neighborhood are good at influencing each other.	3.0 (1.1)
Emotional connection	6.8 (1.6)
I7: I feel connected to this neighborhood.	3.3 (1.0)
I8: I have a good bond with others in this neighborhood.	3.4 (0.8)
BSCS (total) (range = 0–32)	24.8 (6.0)

Note. N = 154. The sum of subscales does not equal the BSCS total score, and the sum of Q7 and Q8 does not equal emotional connection, due to rounding.

Reliability and Validity

The BSCS showed good internal consistency reliability (α = .85). The subscales of needs fulfillment (α = .85) and membership (α = .85) showed good reliability, while subscales of influence (α = .66) and emotional connection (α = .69) showed near acceptable reliability. The BSCS showed a moderate correlation with the LSNS-6 (r = .34, p < .001) and a medium-low correlation with the TILS (r = -.27, p < .001), both in expected directions.

Confirmatory Factor Analysis

Assumptions

I screened for adequate sample size prior to running CFA. First, I checked the *N:q* rule, which recommends the ratio between number of respondents (N = 154) to parameters that are being estimated (q = model df) be at least 5 and preferably > 10 (Jackson, 2003). Model 1 (q = 20, ratio = 7.7), Model 2 (q = 19, ratio = 8.1) and Model 3 (q = 16, ratio = 10.4) obtained this recommendation. The sample size was determined to be adequate based on all communalities being > .60 (Tabachnick & Fidell, 2019), except for one item (.46); however, this was still near the recommended range of .50 (MacCallum et al., 1999). There were no missing data and no correlated errors in any model, both of which support smaller than ideal sample sizes (Wolf et al, 2013).

I then conducted a post-hoc RMSEA power analysis to determine the power of each model based on sample size using Preacher and Coffman's (2006) code for R software (R Core Team, 2019). In the RMSEA power analysis I used: alpha = .05, df = 20 (Model 1), 19 (Model 2) and 16 (Model 3), N = 154, null RMSEA = .00, alternative RMSEA = .08. I followed general guidelines for power that (β) > .70 is adequate and β > .80 is good. Results showed each model had adequate power (Model 1: β = 0.76; Model 2: β = 0.75; Model 3: β = 0.69). Because the

power should ideally be > .80, I ran follow up RMSEA power analyses using an RMSEA alternative value of .10, as this is the upper limit of acceptable model fit (Brown, 2015, MacCallum et al., 1996). Here, Model 1 (β = 0.95), Model 2 (β = 0.94) and Model 3 (β = 0.91) had very good power for the sample size. In sum, the sample size (N = 154) was acceptable for testing each model and obtained necessary power for the RMSEA.

I assessed multivariate outliers with Mahalanobis distance (D^2) using a critical χ^2 value of 26.12 (df = 8, p < .001). Seven cases were multivariate outliers (D^2 > 26.12). Multivariate normality was assessed by looking at the univariate normality of each variable and results of the Kolmogorov Smirnoff (KS) test. All variables had skewness and kurtosis within +/- 3, except for one variable (Item 3 kurtosis = 6.4). However, kurtosis within +/- 10 is acceptable for SEM (Brown, 2015). Results of the KS test were significant (p < .05) for all items, suggesting data may not be normally distributed. While there were some violations of normality and several outliers, this can be expected with ordinal data. Further, normality and outliers were not an issue in the CFA since I used WLSMV estimation, which does not assume normal distribution (Brown, 2015; Kline, 2016).

I examined multicollinearity and singularity by looking at the eigenvalues of the eight individual items in the BSCS and inspecting whether any values came close to zero, which would indicate multicollinearity or singularity may be present (Tabachnick & Fidell, 2019). None approached zero (lowest was .21), so multicollinearity and singularity were likely not present. I further examined multicollinearity and singularity by evaluating squared multiple correlation (SMC) and variance inflation factors (VIF) scores of each item, where one item serves as the DV and the other seven as IV. All VIF scores were < 3 and all SMC values were well below one, indicating no multicollinearity and singularity (Tabachnick & Fidell, 2019).

I first examined factorability of R with a Spearman rank correlation matrix of the eight individual items; 26 of the 28 correlations were moderate (i.e., > .3, $p < .001$), the other two were low (i.e., > .10, $p < .001$), and no correlations were too high (e.g., > .8 or .9). I further assessed factorability of R by determining if the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) is close to 1 and definitely > .5, and whether Bartlett's test of sphericity was statistically significant (Tabachnick & Fidell, 2019). KMO = .81 and results of the Bartlett's test of sphericity, χ^2 (28) = 555.89, $p < .001$, further supported factorability of R.

Factor Structure

Table 3 presents CFA results of model fit indices for the three models tested. Model 1 approached acceptable fit indices in several categories, but overall, it demonstrated poor model fit, χ^2 (20) = 142.90, $p < .001$, χ^2 / *df* ratio > 3 (CFI = .927, TLI = .898, SRMR = .072, RMSEA= .200, 90% CI [.170, .231]). Similarly, fit indices for Model 2 approached or obtained several acceptable fit indices, but overall did not fully demonstrate good model fit, χ^2 (19) = 113.42, p = .009, χ^2 / *df* ratio > 3 (CFI = .944, TLI = .918, SRMR = .066, RMSEA= .180, 90% CI [.149, .212]). Model 3 demonstrated good model fit across fit indices, χ^2 (16) = 20.78, p = .187, χ^2 / *df* ratio < 3 (CFI = .997, TLI = .995, SRMR = .026, RMSEA= .44, 90% CI [<.001, .092]).

Table 3

Model Fit Indices of the Brief Sense of Community Scale

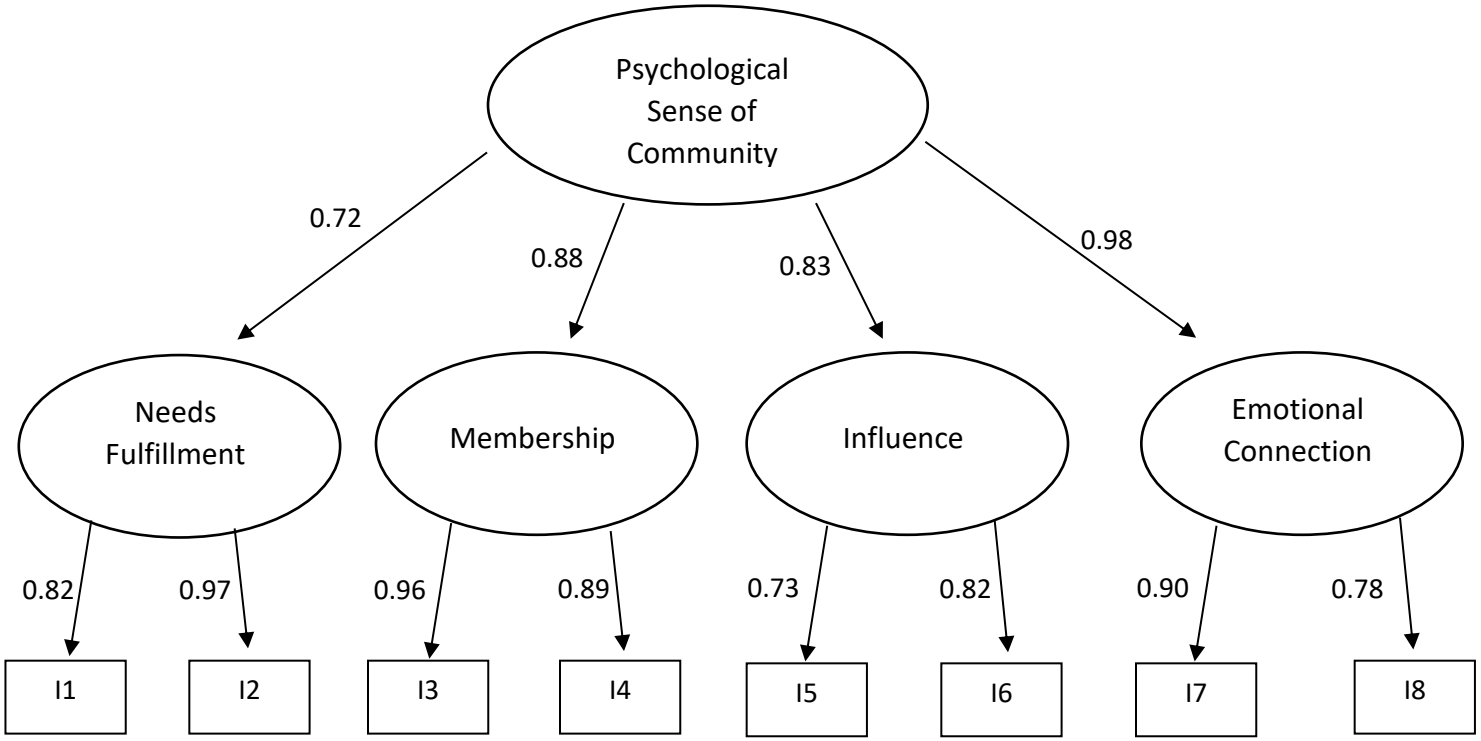
Statistic	Model 1: One-factor	Model 2: Correlated two-factor	Model 3: Higher-order four-factor
χ^2	142.90	113.42	20.78
df	20	19	16
χ^2 / *df*	7.15	5.97	1.30
χ^2 *p*	<.001	.009	.187
CFI	.927	.944	.997
TLI	.898	.918	.995
SRMR	.072	.066	.026
RMSEA [90% CI]	.200 [.170, .231]	.180 [.149, .212]	.044 [<.001, .092]

Note. *N* = 154. CFI = Comparative Fit Index; TLI = Tucker–Lewis Index; SRMR = standardized root mean squared residual; RMSEA = root mean square error of approximation

In comparing the three models, the hypothesized Model 3 was the best fit for the data. Figure 1 shows the factor structure and standardized factor loadings for Model 3. Standardized factor loadings for individual items onto the four factors ranged from 0.73 to 0.97 and all were statistically significant ($p < .001$). Standardized factor loadings from the four latent factors (membership, needs fulfillment, emotional connection, and influence) to the higher-order factor (PSOC) ranged from 0.72 to 0.99 and were also statistically significant ($p < .001$).

Figure 1

Confirmatory Factor Analysis with Standardized Factor Loadings of Higher-Order Four Factor Model



Note: All factor loadings, $p < .001$

Discussion

The aim of this study was to test the psychometric properties of the BSCS with a sample of older adults in Puerto Rico using a Spanish translation of the scale by Rivera-Segarra et al. (2016). PSOC is an essential construct for assessing well-being among older adults (Tang et al., 2018; Zhang et al., 2017). Despite the growing number of Hispanic older adults in the U.S. (U.S. Census Bureau, 2020) and in Puerto Rico (Worldometer, 2020), the BSCS has not yet been validated for use with these populations. A valid measure for use in this population will be useful for clinical practice, program and policy design, and future research.

I hypothesized that the BSCS would have good internal consistency reliability and would display convergent validity. Results supported these hypotheses, as BSCS had good reliability and was correlated in expected directions with the LSNS-6 and TILS. I further hypothesized that the higher-order four-factor model (Model 3) would be a better fit for the data than a unidimensional model (Model 1) or a correlated two-factor model (Model 2). The CFA results supported this hypothesis, as Model 3 was a good fit for the data overall and provided superior fit compared to the other models tested.

Reliability and Validity

Results from internal consistency reliability suggest that the BSCS has good reliability in this sample, $\alpha = .85$, and is in comparable ranges with other scale validation studies of $\alpha = .85$ to .92 (Lardier et al., 2018b; Peterson et al., 2008). This finding was also similar to studies that have used the BSCS with older adults, $\alpha = .79$ to .94 (Au et., 2020; Guo et al., 2021, Kim et al., 2018; Kono et al., 2012; Tadaka et al., 2016; Tang et al., 2021; Zhang et al., 2017; Zhang et al., 2018; Zhang, 2019; Zheng et al., 2020) and in studies with Spanish-speaking samples, $\alpha = .85$ to

.93 (Hombrados-Mendieta et al., 2013; Rivera-Segarra et al., 2016). Good reliability across diverse samples of older adults shows initial promise of cross-cultural utility of the BSCS.

Reliabilities for the four subscales (membership, needs fulfillment, influence, and emotional connection) ranged from acceptable to good (α = .66 to .85). Peterson et al. (2008) found slightly higher reliabilities (range α = .77 to .94), as did Lardier et al. (2018b), α = .70 to .80. Because each subscale only contains two items, a reliability measure between two items may not be the best representation for measuring internal consistency reliability. Indeed, one critique of the BSCS (i.e., use of subscales with only two items) is that high reliability of subscales may be due to having only two items that are worded similarly (Jason et al., 2015). However, the BSCS is still widely used given its strong psychometric properties, relevance to the original theory, and ease of administration. Additionally, subscales help identify points of intervention and can help aid program planning to build PSOC.

Convergent validity of the BSCS was supported through statistically significant associations with measures of social network size and loneliness. The BSCS was positively correlated with the LSNS-6 (i.e., higher PSOC associated with larger social networks) and negatively correlated with TILS (i.e., higher PSOC associated with lower levels of loneliness). This was the first study to examine convergent validity of this scale in this population. Findings were consistent with Peterson et al. (2008), who found that BSCS was correlated with measures of mental health and community participation. In addition to supporting convergent validity, these associations suggest important relationships that bear further investigation in future studies and may be apt targets for practice and policy interventions.

Factor Structure

Results from the CFA suggest that Model 3 was the best fit among the models tested and fit the data well overall. In this sample, this means that four latent factors are present in this scale, and that there is a higher-order factor of PSOC. This is expected given that this structure was based on the original theory (McMillan & Chavis, 1986), was the basis for the creation of the scale (Peterson et al., 2008) and was consistent with the findings of other validation studies (Lardier et al., 2018b; Wombacher et al., 2010).

However, this finding was inconsistent with the only other scale validation of the BSCS in Puerto Rico (Rivera-Segarra et al., 2016), which found a correlated two-factor model to be the best fit. I also tested their correlated two-factor model (Model 2), and while some fit indices were good, overall, it did not provide adequate fit. Difference may mean that the factor structure for Puerto Ricans differs among age groups, as their study focused on young adults, whereas this current study focused on older adults. In fact, Peterson et al. (2008) pointed out the need for this scale to be tested in different regions, languages, and age groups because factor structures may differ among groups.

This study extends theoretical knowledge about PSOC and older adults in Puerto Rico. Higher-order models can be important to test as they can be used to test and build theory (Brown, 2015). Empirical research had yet to examine whether the domains and constructs of PSOC hold for samples of older adults in general, and more specifically, older adults in Puerto Rico. Confirmation of the higher-order model advances PSOC theory by providing evidence that PSOC operates in the way it was intended. McMillan and Chavis (1986) proposed four domains that comprise PSOC, which were found to be the four BSCS subscales (or factors). In addition to results on reliability and convergent validity testing, these findings therefore also suggest that the

BSCS accurately captures these four domains (*membership, needs fulfillment, influence* and *emotional connection*) for older adults in Puerto Rico.

Limitations

One limitation was sample size, as it is commonly recommended for CFA to have a minimum of 200 in the sample (Kline, 2016). However, as Wolf et al. (2013) point out, there is no "one size fits all approach" for determining adequate sample size in CFA (p. 10-11). I reviewed multiple parameters to determine this sample size adequacy, such as RMSEA power analyses, communalities, factor structure and lack of missing data. The other limitation was sampling strategy. Since the study sample was obtained using non-probability sampling, the results may not be generalizable. However, the data collection strategy purposefully sacrificed sample size to include respondents of traditionally underrepresented populations in research, e.g., older adults who live in rural, mountainous, or otherwise remote regions in Puerto Rico. Future research should utilize a larger sample and random sampling if possible.

Conclusion

Results of this study support the use of the BSCS to measure PSOC among older adults in Puerto Rico. This population has experienced, and continues to experience, numerous adverse events including natural disasters, economic and political instability, outmigration of younger age groups, overall population decline and rapid population aging and, more recently, the COVID-19 epidemic. PSOC is an important construct for this population and may serve as a protective factor against these and other hazards. The brevity and ease of administration makes the BSCS an ideal assessment tool for research and clinical practice settings. Establishing a measure of PSOC will help advance service development, policy planning, and research, and will enable practitioners to better screen for and monitor PSOC. Future research should continue to

examine PSOC among older adults in Puerto Rico, including associations with contextually relevant outcomes such as well-being and health, and should extend research to other groups of older adults.

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Appendix 3-A.

Brief Sense of Community Scale

	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
1. I can get what I need in this neighborhood.	1	2	3	4	5
2. This neighborhood helps me fulfill my needs.	1	2	3	4	5
3. I feel like a member of this neighborhood.	1	2	3	4	5
4. I belong in this neighborhood.	1	2	3	4	5
5. I have a say about what goes on in my neighborhood.	1	2	3	4	5
6. People in this neighborhood are good at influencing each another.	1	2	3	4	5
7. I feel connected to this neighborhood.	1	2	3	4	5
8. I have a good bond with others in this neighborhood.	1	2	3	4	5

Appendix 3-B.

Spanish Translation of Brief Sense of Community Scale

	Totalmente en desacuerdo	Parcialmente en desacuerdo	Ni de acuerdo ni en desacuerdo	Parcialmente de acuerdo	Completamente de acuerdo
1. Puedo conseguir lo que necesito de esta comunidad.	1	2	3	4	5
2. Esta comunidad me ayuda a llenar mis necesidades.	1	2	3	4	5
3. Me siento como un miembro de esta comunidad.	1	2	3	4	5
4. Yo pertenezco a esta comunidad.	1	2	3	4	5
5. Tengo influencia en lo que sucede en mi comunidad.	1	2	3	4	5
6. Las personas en esta comunidad se influyen unas a otras	1	2	3	4	5
7. Me siento conectado a esta comunidad.	1	2	3	4	5
8. Tengo un buen vínculo con las personas de esta comunidad.	1	2	3	4	5

Chapter 4.

Psychological Sense of Community, Self-Rated Health and Quality of Life among Older Adults in Puerto Rico Two Years after Hurricane María

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Dissertation Paper #3

Abstract

Objectives:

Older adults are at high risk for immediate and longer-term negative health outcomes and diminished quality of life (QOL) in natural disasters, in part due to disruption of social protections. We use a risk and resilience framework to examine the association of psychological sense of community (PSOC) with self-rated health (SRH) and QOL among Puerto Rican older adults two years after Hurricane María.

Methods:

Between September 2019 and January 2020, five bilingual, bicultural interviewers conducted face-to-face interviews with a nonprobability sample of 154 community-dwelling adults aged 60+ in Puerto Rico. We used validated Spanish-language versions of measures when available, and standard translation protocols. Using two hierarchical linear regression models, we tested the hypotheses that PSOC would be independently associated with SRH and QOL, while controlling for relevant covariates.

Results:

The first model explained 21% of the variance in SRH. Higher income, higher PSOC and social isolation were associated with better SRH, while mental health was inversely related to SRH. The second model explained 61% of the variance in QOL. Higher income, living alone, better SRH and higher PSOC were associated with better QOL, whereas worse mental health and higher levels of loneliness were associated with lower QOL.

D**iscussion**:

Our data supported our hypotheses that PSOC would be independently associated with better SRH and, after also controlling for the effects of SHR, with better QOL. PSOC serves as a

protective factor for older adults in Puerto Rico following a natural disaster, and focus should be given to strategies on building community support.

Keywords: Natural disaster; Community effects; Hispanic

Psychological Sense of Community, Self-Rated Health and Quality of Life among Older Adults in Puerto Rico Two Years after Hurricane María

Each year, floods, hurricanes, fires and other natural disasters threaten the lives of more than 160 million people, and these events are on the rise due to increasing population density and climate change (World Economic Forum, 2020). Shultz et al. (2020) describe more specifically how climate change is making Atlantic hurricanes more dangerous--stronger, wetter and slower moving--over coastal and island populations. In September, 2017, Hurricane María devastated the small island of Puerto Rico in one of the deadliest hurricanes in U.S. history.

The impact of natural disasters varies depending on factors such as the characteristics of affected individuals, their social and physical environments, the type and severity of the hazard, and the adequacy of disaster response and management systems. Older adults, especially those with preexisting health and mental health conditions, low financial and social resources, and/or who live in highly vulnerable locales, are among those at highest risk of experiencing immediate and long-term negative outcomes that include poor mental and physical health and diminished quality of life (Goldmann & Galea, 2014). A key factor in the likelihood, severity and duration of adverse outcomes is the extent to which social factors and social processes that buffer and protect older adults in the aftermath of disasters are disrupted.

The purpose of this study was to examine the well-being of older adults in Puerto Rico two years after Hurricane María. Drawing on theories of risk and resilience and psychological sense of community (PSOC), we first assess current levels of self-rated health (SRH) and quality of life (QOL) in a sample of 154 community-dwelling adults aged 60 and over who survived this hurricane. We then test two hypotheses: (1) after controlling for sociodemographic covariates and relevant risk and protective factors, stronger PSOC will be associated with better SRH; and

(2) controlling for the effects of these same covariates *and* SRH, stronger PSOC will be associated with better QOL.

Puerto Rican Context

In addition to vulnerabilities associated with the physical features of a geographic locale, economic, political, and social contexts help determine the impact of disasters. When Hurricane María struck, Puerto Rico's economy had been in recession for nearly a decade, forcing the U.S. territory into bankruptcy early that year. In 2019, the poverty rate stood at 43.5%, nearly double that of Mississippi, the most impoverished state on the mainland (U.S. Census Bureau, 2019). In July of 2019, the Governor of Puerto Rico was ousted for scandal and corruption, and later that year and into early 2020, the still-recovering island was wracked by major earthquakes.

Within 6 months of Hurricane María, an estimated 2,975 people, the majority of them older adults, had died (Santos-Burgoa et al., 2018) and nearly 200,000 islanders, mostly working-age adults and families, had migrated to the mainland. By 2020, the overall population of Puerto Rico declined by 10%, from 3.16 million to 2.86 million, the median age of the population rose from 39.2 to 44.5 years, and 20.7% of individuals who remained on the island were aged 65 or over (Worldometer, 2020). These multiple sources of strain, coupled with unprecedented U.S. government restrictions on aid to Puerto Rico following María (U.S. Government Accounting Office, 2020) made for a painfully slow recovery and compounded existing risks for older adults.

Older Adults and Disasters: Health, Sense of Community and Quality of Life

The term 'natural disaster' remains ill-defined, but Goldmann and Galea (2014) note three common features: (1) they threaten harm or death to a large group of people; (2) they affect

social processes, causing disruption of services and social networks and communal loss of resources; and (3) affected persons experience secondary health and mental outcomes, which may persist. With respect to the latter, natural disasters are widely associated with negative health and mental health (Bourque et al., 2006). Most age-group comparisons report that older adults are more susceptible to adverse physical health effects than younger people due to conditions such as reduced sensory awareness, pre-existing physical impairments and chronic medical conditions, and socio-economic constraints (Bell et al., 2020).

Research on mental health is less conclusive. In a systematic review and random-effects meta-analysis of studies on the effects of natural disasters, Parker et al. (2016) found that older adults were 2.11 times more likely to experience PTSD symptoms and 1.73 more likely to develop adjustment disorder than younger adults. Jia et al. (2010) found older adults reported more PTSD and mental distress than younger age groups following a 2008 earthquake in Sichuan, China. Likewise, Liddell and Ferreira (2019) reported that age was negatively associated with individual resilience in the Gulf Coast region following the Horizon Deepwater oil spill in 2011. Older adults' elevated risks may be attributable to disruptions to longstanding routines and patterns of daily living, loss of social relationships and support systems, effects on physical space, and reluctance to evacuate (Jia et al., 2010). Yet, others argue that previous exposures to stressful life events may in some cases enhance resilience and inoculate older adults against disaster-related mental stress. In study of long-term effects of earthquakes in Azerbaijan in 2012, older adults reported better mental health than younger ages three years post-earthquakes (Rafiey et al., 2016).

Disasters can bring families and communities closer together or they can disrupt and disperse them at times when they are needed most (Bonanno et al., 2010). As Downer et al.

(2019) point out, post-María disruptions have created new and deepened existing fissures in formal and informal structures that fill large gaps in health care and social services for older adults. Negative health and economic effects of familial and community disruption are also influenced by culture, perhaps even more so than age (Norris et al., 2002). Older Puerto Ricans are traditionally embedded in and interdependent with dense familial and community networks for emotional, instrumental, and social support -- networks that are in turn associated with better health outcomes (Pérez & Ailshire, 2017) and higher quality of life (Gattino et al., 2013).

Mollenkopf and Walker (2007) suggest that it may not be possible to articulate a theory of QOL in old age as it operates in practice as a meta-level construct that encompasses different dimensions of a person's life. The WHO defines QOL as one's perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns (World Health Organization Quality of Life [WHOQOL] Group, 1998). Hawthorne et al. (2006) put a finer point on one's personal views of QOL vis-à-vis their ecological context, noting that "although social indicators (e.g., economic resources, gross domestic product) form the milieu within which individuals live, their quality of life is determined by evaluation of their personal lives and social situation" (p. 37).

Older adults routinely identify health as an essential component of QOL (van Leeuwen et al., 2019). Moreover, one's sense of community is associated with self-perceptions of health status (Michalski et al., 2020; Tang et al. 2018) and QOL (Gattino, et al., 2013; Michalski et al., 2020).

Theoretical Framework

We use a risk and resilience framework, while also drawing on recent advances in the ecological theory of aging (ETA) and the theory of PSOC, to examine the association of PSOC

with older adults' self-assessments of their health and quality of life in Puerto Rico two years after Hurricane María.

Ecological Theory of Aging

Lawton and Nahemow's (1973) ETA focuses on interactions between older adults and their physical and social environments and the quality of fit between these entities. Goodness of fit is evaluated in terms of combinations and interactions of personal characteristics and environmental influences, with good person and environment (P-E) fit leading to positive outcomes and poor P-E fit leading to negative outcomes.

Person-related characteristics include sociodemographic characteristics, health and functioning, and social resources. The ETA refers to these factors collectively as 'personal competence'. Environments can be physical or social. The former includes physical location, type of community or residence, and features of one's living space. Social environments consist of formal and informal relationships and social and supportive service systems; they occur at different levels, such as the immediate personal environments, small group environments, social networks, and larger sociocultural factors (Lawton, 1989).

The ETA posits that environments create demands or strains on individuals, referred to as 'environmental press.' Older adults with higher levels of personal competence are better able to respond effectively to environmental stress, whereas those who have lower levels of competence function best in environments with lower demands (Lawton & Nahemow, 1973). Poor outcomes result when there is a mismatch between level of competence and environmental press.

Psychological Sense of Community

PSOC refers to an individual's perceptions that they are part of a social structure that is supportive, present, and dependable and that is characterized by interdependence, mutual responsibility, and a collective consciousness (Sarason, 1974). The construct helps to explain variations in psychological well-being within and among different populations and outcomes (Bess et al., 2002). McMillan and Chavis (1986) refined PSOC as a four-dimensional concept that encompasses: (1) *Membership*- a feeling of belonging or shared personal relations, (2) *Influence*- a sense of mattering and making a difference in one's community, and bidirectional relationships between members and their communities, (3) *Fulfillment of Needs*- the idea that a member's needs will be met by the resources provided through being in the community, and (4) *Shared Emotional Connection*- a commitment and belief that members have shared and will continue to share a history, common places, time with each other, and events or experiences.

Risk and Resilience Framework

The risk and resilience framework provides a useful structure for conceptualizing how protective factors (resiliency) can mitigate the effects of risk factors (e.g., adversity) (Ong et al., 2009). It is a particularly apposite framework for examining the effects of individual and social risk and protective factors on outcomes of natural disasters (Bonanno et al., 2010). We conceptualized Hurricane María as a general risk factor for older adults in Puerto Rico. Mental health, social isolation, and loneliness were also conceptualized as specific risk factors for worse SRH and QOL, given the known adverse effects of disasters on these specific risk factors, and their known associations with SRH and QOL. Following Zhang et al. (2017), we conceptualize PSOC and individual resiliency as protective factors against poor SRH and QOL among older adults.

Despite known adverse effects of Hurricane María and the vulnerabilities of older adults, studies have not yet examined the longer-term effects of this disaster on the well-being of this age sector in Puerto Rico. To address this gap, we used well-established measures of social and community support to examine how a combination of risk and protective factors affect two key measures of well-being for older adults in this post-disaster context.

Methods

Sampling and Data Collection

Data are from a cross-sectional study on the mental health of older Puerto Ricans who survived Hurricane María. We used non-probability sampling strategies to recruit participants from community and senior centers, social service agencies, primary care clinics, and social spaces such as town plazas and private porches. From September 2019 to January 2020, five bilingual, bicultural interviewers conducted face-to-face interviews with 154 adults aged 60 and older in five of the island's six geographic regions. We could not access the South due to earthquakes (U.S. Geological Survey, 2020). Participants gave written informed consent and were compensated $15.00. The Virginia Commonwealth University Institutional Review Board approved this study.

Translation / Adaptation and Measures

To translate and adapt the data collection instrument, we used a standard protocol that aims for cross-cultural and conceptual, more so than linguistic, equivalence (WHO, n.d.). We operationalized the process as follows: 1) *Forward translation* from English to Spanish by a bilingual, bicultural investigator; 2) *Expert panel back translation* by two Puerto Rican team members, one in the U.S. and another who was other working with older adults in Puerto Rico; 3) *Pre-testing* with 10 older adults in Puerto Rico and *item review* by two Puerto

Rican interviewers and a team investigator; 4) *Final version* accomplished and used to train the interviewers, which resulted in a few minor adjustments to the local context. When available, we used standardized measures that had been validated with Hispanic older adults.

Demographics

Sociodemographic variables included gender (female or male), age (continuous variable), income (annual household), and living arrangement (living alone: yes or no). Prior to analyses, we divided income by 1,000 for easier interpretation.

Psychological Sense of Community

We used a Spanish version of the Brief Sense of Community Scale (BSCS; Rivera-Segarra et al., 2016). The BSCS is an 8-item scale comprising two items in each of four domains (membership, needs fulfillment, emotional connection, and influence; Peterson et al., 2008). Responses were scored 0 (*strongly disagree*) to 4 (*strongly agree*), then summed to create a composite score with a range of 0–32. Higher scores indicate higher levels of PSOC.

Quality of Life

We measured QOL with the EUROHIS-QOL 8-Item Index, a brief version of the WHOQOL-BREF (WHOQOL Group, 1998). The first two items ask a respondent whether they have enough energy and money (*not at all* = 0 to *completely* = 4). The next six items ask about level of satisfaction with health, oneself, relationships, ability to perform activities, living space, and overall QOL (*very dissatisfied* = 0 to *very satisfied* = 4). Items are summed to create a scale with a possible range of 0–32; higher scores indicate better QOL.

Self-rated Health

We asked respondents, "In general would you say your health is…." *poor = 0, fair = 1, good = 2, very good = 3,* or *excellent = 4*. This item is widely used with older adults, including

in Puerto Rico (Palloni et al., 2013). The Spanish translation was "¿En general, usted diría que su salud es excelente, muy buena, buena, regular, o mala?"

Social Isolation

We measured social isolation with the Lubben Social Network Scale (LSNS-6; Lubben et al, 2006). The LSNS-6 assesses social networks with family (3 items) and friends (3 items). Likert scales capture the size of active and intimate networks, e.g., people with whom they can talk or can call on for help. Items are scored 0 (*none*) to 5 (*nine or more*). Total scores are an equally weighted sum of the 6 items, ranging from 0–30. Higher scores indicate stronger social networks and are interpreted as less social isolation (Lubben et al., 2006). The LSNS was developed for use with older adults, and it has been used with Hispanics (Moreno-Tamayo et al., 2019). We have validated the LSNS-6 with data from the current study (Buckley et al., under review*)*.

Mental Health

The 20-item Self Reporting Questionnaire (SRQ-20) was developed by the World Health Organization (Beusenberg & Orley, 1994) as a screen for the common mental disorders of depression, anxiety, and traumatic stress in primary care. It has been used in post-disaster contexts (Stratton et al., 2014) and with older adults in Brazil (Scazufca et al., 2009). Responses (*yes* = 1, *no* = 0) are summed for a range of 0-20. Higher scores mean greater mental distress.

Loneliness

We measured loneliness with the Three-Item Loneliness Scale (TILS; Hughes et al., 2004). Items are scored on a three-point scale (*hardly ever* = 1, s*ome of the time* = 2, *often* = 3) and summed for a range of 3 to 9, with higher scores indicating more loneliness. We used a Spanish translation from Pinazo Hernandis and Bellegarde Nunes (2018) with one minor

adaptation in item wording. We phrased the item “How often do you feel left out” as “¿Con qué frecuencia se siente excluído?” rather than “¿Con qué frecuencia se siente usted solo?” Sancho et al. (2020) reported favorable validity and reliability (α = .90) of the TILS with older adults in Spain.

Resiliency

We measured resiliency with the 4-item Brief Resilient Coping Scale (BRCS; Sinclair & Wallston, 2004). Respondents rate their agreement with each statement from 1 (*does not describe me at all*) to 5 (*describes me very well*). Items are summed for a theoretical range of 4–20. The Spanish version of the BRCS has been validated with older adults in Spain (Navarro-Pardo et al., 2015).

Data Analysis

We ran two hierarchical linear regression models. The first model tested the hypothesis that PSOC would be significantly associated with SRH, after accounting for relevant covariates. The second model tested the hypothesis that PSOC would be significantly associated with QOL, after accounting for relevant covariates, including SRH. Each model involved three steps. Step one included sociodemographic variables (gender, age, income, living arrangement). Step two added risk measures of mental health, loneliness, social isolation and, in the QOL model, SRH. Step three added PSOC and resiliency to the model.

We screened for outliers and missing data on variables in the regression models. Income had two outliers; we retained these observations (Tabachnick & Fidell, 2019), as we expected a few individuals to have much higher incomes. There were few missing data for each variable (< 3%). Results of Little’s MCAR test, χ^2 (8) = 9.96, p = .268, determined data was missing completely at random. We deleted cases listwise in the regression analyses, which resulted in a

final analytic sample of 145. Table 1 shows descriptive statistics of the sample and indicates the variables with missing data. Data met all assumptions for multiple linear regression including linearity, normality, absence of problematic multicollinearity, and homoscedasticity. We conducted all analyses in IBM SPSS Version 27.

We conducted a post-hoc power analysis in G*Power 3.1.97 (Faul et al., 2007) to assess the adequacy of our sample given the parameters in each model. For the SRH model, we achieved a power of .996 (n =145, number of predictors = 9, alpha = .05, and medium effect size, f^2 = 0.26). In the QOL mode, power was > .999 (n =145, number of predictors = 10, alpha = .05, and large effect size, f^2 = 1.557). Effect size for each model was calculated using Cohen's (1988) guidelines for multiple linear regression models, $f^2 = R^2 / (1 - R^2)$.

Results

Descriptive Statistics

Table 1 presents sample characteristics and descriptive statistics of risk, protective and outcome variables. Ages ranged from 60 to 96 (M = 73.8; SD = 8.7). The majority of participants were female (62%) and lived alone (55%). The median annual income was $9,552 (*Interquartile Range* = $9,650). Means scores were 24.8 (*SD* = 6.0) for PSOC, 1.6 (*SD* = 1.0) for SRH and 21.6 (*SD* = 5.9) for QOL.

Table 1

Sample Characteristics

Characteristic	*M* (*SD*) or *n* (%)	Range
Age [a]	73.8 (8.7)	60–96
Gender		
Female	95 (62)	--
Male	59 (38)	--
Living arrangement		
Live alone	84 (55)	--
Live with others	70 (45)	--
Annual income [b]	11,780.0 (9,167.4)	--
Psychological sense of community (BSCS; α = .85)	24.8 (6.0)	0–32
Quality of life [c] (EUROHIS-QOL 8-Item Index; α = .84)	21.6 (5.9)	0–40
Self-rated health	1.6 (1.0)	0–4
Poor	8 (5.2)	--
Fair	78 (50.6)	--
Good	39 (25.3)	--
Very Good	21 (13.6)	--
Excellent	8 (5.2)	--
Mental health (SRQ-20; α = .89)	6.6 (5.1)	0–20
Loneliness [c] (TILS; α = .81)	5.2 (2.0)	3–9
Social isolation (LSNS-6; α = .74)	14.0 (5.9)	0–30
Resiliency (BRCS; α = .71)	16.7 (2.8)	4–20

Note. *N* = 154. All statistics are presented as *M* (*SD*) except for gender, living arrangement and self-rated health categories, which are presented as *n* (%).
α = Cronbach's alpha
[a] *n* = 151.
[b] *n* = 150.
[c] *n* = 153.

Regression Results

Self-rated Health

Table 2 shows the results of the hierarchical regression with SRH as the outcome. The final model explained 21% of the variance in SRH (F (9, 136) = 4.06, $p < .001$), and all three steps in the model were statistically significant. In Step 1 (R^2 = .07, F (4, 141) = 2.53, p = .043), higher income was associated with better SRH (B = 0.02, p = .010). With risk factors added in

Step 2 (R^2 = .18, *F* (7, 138) = 4.44, *p* < .001), higher income was associated with better SRH (*B* = 0.02, *p* = .014), and mental health and SRH were inversely associated (*B* = -0.06, *p* < .001). In the final step (R^2 = .21, *F* (9, 136) = 4.06, *p* < .001), higher levels of PSOC (*B* = 0.03, *p* = .041) and of social isolation (*B* = -0.03, *p* = .017) were associated with better SRH, and worse mental health was associated with lower SRH (*B*= -0.06, *p* < .001).

Table 2

Hierarchical Regression Results for Self-Rated Health

Variable	*B*	95% CI for *B*		*SE B*	β	*p*	R^2	ΔR^2
		LL	*UL*					
Step 1							.07	.07*
Constant	0.78	-0.60	2.16	0.70	--	.266		
Female	-0.27	-0.59	0.06	0.17	-0.13	.108		
Age	0.01	-0.01	0.03	0.01	0.08	.335		
Income	0.02	0.01	0.04	0.01	0.21	.010		
Living Alone	0.16	-0.16	0.48	0.16	0.08	.333		
Step 2							.18	.11***
Constant	2.23	0.61	3.84	0.82	--	.007		
Female	-0.24	-0.55	0.07	0.16	-0.12	.128		
Age	<0.01	-0.02	0.02	0.01	<0.01	.987		
Income	0.02	0.01	0.04	0.01	0.20	.014		
Living Alone	0.20	-0.11	0.50	0.15	0.10	.205		
Mental health	-0.06	-0.10	-0.03	0.02	-0.33	<.001		
Loneliness	-0.01	-0.10	0.08	0.05	-0.02	.852		
Social isolation	-0.03	-0.05	0.01	0.01	-0.16	.064		
Step 3							.21	.03*
Constant	1.57	-0.32	3.45	0.95	--	.102		
Female	-0.23	-0.54	0.08	0.16	-0.12	.144		
Age	-0.01	-0.02	0.02	0.01	-0.02	.772		
Income	0.02	0.01	0.04	0.01	0.17	.033		
Living Alone	0.19	-0.11	0.49	0.15	0.10	.220		
Mental health	-0.06	-0.10	-0.03	0.02	-0.31	<.001		
Loneliness	<0.01	-0.09	0.09	0.05	0.03	.977		
Social isolation	-0.03	-0.06	-0.01	0.01	-0.21	.017		
PSOC	0.03	0.01	0.06	0.01	0.17	.041		
Resiliency	0.01	-0.04	0.07	0.03	0.04	.633		

Note. CI = confidence interval, *LL* = lower limit, *UL* = upper limit, PSOC = Psychological sense of community. Income = annual income divided by 1,000.
Reference groups: Living alone- lives with others.
*p < .05; **p < .01; ***p < .001.

Quality of Life

The final model explained 61% of the variance in QOL (F (10, 135) = 21.02, p < .001). Table 3 displays the hierarchical regression analysis with QOL as the outcome. All three steps in the QOL model were statistically significant. In the first step (R^2 = .11, F (4, 141) = 5.24, p < .001), higher income was associated with better QOL (B = 0.21, p = < .001). With risk factors added in Step 2 (R^2 = .54, F (8, 137) = 20.14, p < .001), higher income (B = 0.11, p = .007), living alone (B = 1.67, p = .021), and better SRH (B = 1.79, p < .001) were associated with better QOL, while worse mental health (B = -0.52, p < .001) and higher levels of loneliness (B = -0.50, p = .022) were associated with lower QOL. PSOC and resiliency were added in Step 3 (R^2 = .61, F (10, 135) = 21.02, p < .001). Higher PSOC was associated with better QOL (B = 0.26, p < .001), as were higher income (B = 0.09, p = .022), living alone (B = 1.69, p = .013), and better SRH (B = 1.46, p < .001). Worse mental health (B = -0.51, p < .001) and higher levels of loneliness (B = -0.41, p = .046) were associated with lower QOL.

Table 3

Hierarchical Regression Results for Quality of Life

Variable	*B*	95% CI for *B*		*SE B*	β	*p*	R^2	ΔR^2
		LL	*UL*					
Step 1							.13	.13***
Constant	13.02	4.83	21.20	4.14	--	.002		
Female	-1.43	-3.37	0.50	0.98	-0.12	.146		
Age	0.09	-0.02	0.20	0.06	0.13	.112		
Income	0.21	0.11	0.31	0.05	0.32	<.001		
Living Alone	1.16	-0.74	3.05	0.96	0.10	.228		
Step 2							.54	.41***
Constant	24.47	16.78	32.16	3.89	--	<.001		
Female	-0.72	-2.18	0.73	0.74	-0.06	.329		
Age	-0.02	-0.10	0.06	0.04	-0.03	.628		
Income	0.11	0.03	0.19	0.04	0.17	.007		
Living Alone	1.67	0.26	3.11	0.72	0.14	.021		
Self-rated health	1.79	1.01	2.57	0.39	0.29	<.001		
Mental health	-0.52	-0.69	-0.36	0.08	-0.44	<.001		
Loneliness	-0.50	-0.94	-0.07	0.22	-0.16	.022		
Social isolation	<0.01	-0.12	0.13	0.06	<0.01	.972		
Step 3							.61	.07***
Constant	17.52	9.25	25.79	4.18	--	<.001		
Female	-0.72	-2.07	0.64	0.69	-0.06	.298		
Age	-0.05	-0.12	0.03	0.04	-0.07	.251		
Income	0.09	0.01	0.16	0.04	0.14	.022		
Living Alone	1.69	0.36	3.01	0.67	0.14	.013		
Self-rated health	1.46	0.72	2.20	0.37	0.24	<.001		
Mental health	-0.51	-0.66	-0.35	0.08	-0.42	<.001		
Loneliness	-0.41	-0.81	-0.01	0.20	-0.13	.046		
Social isolation	-0.09	-0.21	0.04	0.06	-0.09	.161		
PSOC	0.26	0.14	0.38	0.06	0.26	<.001		
Resiliency	0.23	-0.02	0.49	0.13	0.11	.073		

Note. CI = confidence interval, *LL* = lower limit, *UL* = upper limit, PSOC = Psychological sense of community. Income = annual income divided by 1,000.
Reference groups: Living alone- lives with others.
*$p < .05$; **$p < .01$; ***$p < .001$.

Discussion

Social and communal support are well-established protective factors in post-disaster settings (Bonnano et al., 2010), perhaps even more so for older adults (Hargrove et al., 2020). This study used a risk and resilience framework to examine PSOC as a protective factor for well-being among older adults in Puerto Rico two years after Hurricane María, while also examining relevant risk factors. We hypothesized that PSOC would be independently associated with better SRH and, after also controlling for the effects of SHR, with better QOL. Consistent with previous studies of older adults living in post-disaster situations, our data supported both hypotheses. We also found income was a predictor of better SRH and QOL. For risk factors, worse mental health was a predictor of lower SRH and QOL, social isolation was associated with better health, and loneliness was a predictor of lower QOL.

Our findings also add to and advance this literature in several ways. First, we focused on an often-overlooked population of older adults that is particularly vulnerable to natural disasters, which are expected to worsen with climate change. In addition, while SRH is a well-established correlate of QOL among older adults, studies on PSOC tend to examine one or the other of these as outcomes. By focusing first on SRH and then controlling for health in the QOL model, we observe that PSOC contributes significantly to both measures of well-being; and, furthermore, PSOC is associated with QOL even with the effects of SRH and other risk factors controlled.

Our findings also advance the use of ETA as a theoretical perspective for understanding the mechanisms through which PSOC may serve as a protective factor for older adults after a natural disaster. Those with higher PSOC may be better able to adapt to environmental stressors given the vital role of communal support in such situations (Hargrove et al., 2020; Kaniasty et

al., 2020). They also may be more likely to turn to their own communities and neighborhoods for support before engaging with or waiting for formal support systems (Cagney et al., 2016). Hayward et al. (2019) described the crucial role of local communities in the wake of Hurricane María, for example, particularly in light of high levels of uncertainty and low confidence in governmental support. As such, PSOC may function as a protective factor by improving the P-E fit -- directly or indirectly-- by buffering the negative effects of expected and unexpected risks.

Furthermore, older adults may use PSOC as a resource to address health needs and maintain a healthy lifestyle. Involved here are PSOC processes of *influence*, which speaks to the ability of an individual to exert control in their community, and *needs fulfillment*, the community's ability to meet individuals' needs through resources and support, help explain how older adults draw on resources and support from their community. Additionally, PSOC is related to more social connection and engagement (Lai et al., 2019; Tang et al., 2017), which are associated with better health outcomes (National Academies of Science, Engineering, and Medicine (NASEM), 2020). PSOC domains of *membership* (feelings of belonging and shared relationships) and *emotional connection* (feeling committed and connected to other community members) may play a role in promoting social contacts with other community members. These take on particular importance in promoting SRH and QOL in Puerto Rico because of the disruptions to social, familial, and community structures caused by María (Downer et al., 2019).

Our findings also contribute to knowledge about risk factors and potential points for targeted interventions for older adults after natural disasters. As in previous studies (Bei et al., 2013; Jia et al., 2010; Parker et al., 2016), study participants continued to experience high levels of distress two years after Hurricane María. But whereas most studies examine mental health as

an outcome, we were interested in how common mental disorders may affect SRH and QOL in a post-disaster setting, especially in the longer term.

We examined loneliness and social isolation, two highly salient risk factors for poor health and QOL for older adults (NASEM, 2020). Consistent with the NASEM report, we found a high prevalence of loneliness, which was associated with worse QOL but was not with SRH. This finding may be due in part to the subjective nature of loneliness and the objective nature of social isolation. The effects of massive out-migration of working-aged adults after Hurricane María (Benach et al., 2019) may well have contributed to the high rates of loneliness and its relationship to poor quality of life.

On the other hand, social isolation was associated with better SRH but not with QOL. In a recent review of studies in the area of disaster mental health, Kaniasty (2020) speculates that individuals with more robust supports may report more distress because they need more help and thus have more frequent contact with formal and informal support systems. We observed this pattern, especially in more remote areas of Puerto Rico, where healthier older adults had more options to live independently and could afford to maintain less dense support networks than those in poor health. Future research may also further explore how family networks and friend networks (each a subscale of the LSNS-6) individually affect health.

Finally, the relationship of PSOC and social isolation is noteworthy. Isolation was a statistically significant correlate of SRH only after PSOC was added to the model. This finding warrants further investigation and could inform our understanding of how communal support can be a protective factor and social isolation may pose less risk than might be expected. We did not test for interaction effects, as our focus was on the role of PSOC in promoting better QOL and

health following a disaster, but future research might examine whether and to what extent PSOC may moderate the relationship between isolation and health outcomes.

Limitations

Owing to the cross-sectional design of this study, causality cannot be inferred. Future studies that use longitudinal design are needed to clarify how changes to communal and social support systems affect well-being for older adults over time after natural disasters. In addition, although we sampled from 5 of the 6 regions of Puerto Rico and from remote, rural and low-income areas, our use of a non-probability sampling approach also means that results cannot be generalized to the larger population of older adults in Puerto Rico.

Conclusion

This study examined the role of PSOC in SRH and QOL, two key well-being outcomes for older adults, in Puerto Rico two years after Hurricane María. Our findings are important as the frequency and severity of natural disasters in the area are expected to increase and the proportion of older adults in Puerto Rico continues to rise. Further, owing to ongoing adverse economic conditions, there may be increased expectations that family and local community structures will meet these demands (Downer et al., 2019).

Our findings can be used to inform research, policy and practice within and potentially beyond Puerto Rico. To promote older adults' health and quality of life, the U.S. and Puerto Rican governments should partner with civil society to proactively establish, promote and maintain best practices for building PSOC in post-disaster situations. Knowing that social disruptions and dispersions of support are common when emergency relief efforts wind down (Bonanno et al., 2010; Kaniasty, 2020), prevention and intervention strategies should also focus on longer-term strengths and needs.

Montero (2018) presents a framework for implementing interventions in Latin American regions for community psychology and PSOC. This includes actively involving local community members in the planning, design and implementation of any community intervention work. Additionally, the work being done needs to address social inequalities that are identified as important by community members. Montero (2018) suggests participatory action research (PAR) can be a strong methodology to implement interventions in community psychology in Latin American regions. Future research needs to continue to examine the role of PSOC for older adults following natural disasters, and develop best practices for building and maintaining PSOC.

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Chapter 5. Discussion and Conclusion

Hurricane María devastated the island of Puerto Rico when it stuck in September of 2017. The effects are still being felt years later and will likely continue to affect people in Puerto Rico for years to come. María, in part, has led to population aging and population decline in Puerto Rico (Benach et al., 2019), as well as affecting communal and social support systems (Downer et al., 2019) which are essential for health and well-being of older adults (Perez & Ailshire, 2017). Furthermore, older adults may already be particularly vulnerable to the effects of natural disasters (Parker et al., 2016). Community and social support can be important resources to offset risk factors presented by natural disasters (Kaniasty et al., 2020), especially when government aid is insufficient, as was the case in Puerto Rico. The findings from this dissertation can be used to inform practice and interventions to build psychological sense of community (PSOC) among older adults in Puerto Rico. Results also show the relevance of PSOC to the Ecological Theory of Aging (ETA) and risk and resilience framework. PSOC can help improve the fit between an older adult and their environment (person-environment fit; Lawton & Nahemow, 1973), and can serve as a protective factor against traumatic events, such as hurricanes.

This dissertation utilized a three-paper format to examine to role of PSOC among older adults in Puerto Rico. PSOC has been shown in other samples of older adults to be a protective factor against natural disasters (Li et al., 2011) and promotes better health (Tang et al., 2018) and well-being (Zhang et al., 2017). Paper 1 provided a scoping literature review of research on PSOC with community dwelling older adults. Papers 2 and 3 used data collected in Puerto Rico two years after Hurricane María. Paper two tested and validated a measure of PSOC, the Brief Sense of Community Scale (BSCS; Peterson et al., 2008). The third paper examined the

association between PSOC with self-rated health (SRH) and quality of life (QOL), while also exploring relevant risk factors as covariates.

The scoping review revealed different ways PSOC is used in research with community dwelling older adults. A notable finding was the relevance of PSOC to ETA and the World Health Organization (WHO) Age-friendly City (AFC) framework (WHO, 2007). PSOC serves as a mechanism to explain how features of the environment affect well-being of older adults. Another important finding revealed that PSOC is a robust predictor of health and well-being for older adults, including protecting against risk factors. This review also noted several important research gaps, that in part, were addressed by the second and third paper.

First, there was a need for more psychometric testing of measures of PSOC. Existing psychometric research with the Sense of Community Index (Perkins et al., 1990) failed to adequately capture the multidimensional nature of PSOC (Tang et al., 2018), and Cronbach's alpha measures were below recommended values. The BSCS consistently showed strong Cronbach's alpha among different samples and languages. However, there was no psychometric testing in existing research with older adults. Paper 2 addressed this gap. Results found the higher-order four factor structure was the best fit for the data and fit the data well overall, confirming the BSCS as a multidimensional measure of PSOC. The BSCS also showed good internal consistency reliability, and it displayed convergent validity with measures of loneliness and social support. These results provide preliminary evidence that the BSCS is a valid and reliable measure of PSOC for older adults. A valid and reliable measure will aid in assessment of PSOC for research, practice settings, and in designing or evaluating interventions.

The scoping review (paper 1) found no existing research on PSOC with Latin American or Hispanic older adults despite the relevance of community psychology in this population

(Montero, 2008). Paper 3 used a risk and resilience framework to examine the role of PSOC as a protective factor for better QOL and SRH among older adults in Puerto Rico two years after Hurricane María. Results show even when accounting for relevant sociodemographic variables and risk factors of mental health, loneliness, and social isolation, that higher levels of PSOC was associated with better SRH and higher QOL. These results align with other existing research from the scoping review and add to knowledge about how PSOC operates in this population. Results from this paper also show effects of known risk factors of mental health and loneliness on SRH and QOL following natural disasters.

Implications

Consistent with ETA and AFC, the scoping review shows the role of environmental and neighborhood characteristics in promoting better PSOC. Therefore, focusing on these factors can serve as a point of intervention for policy and practice, such as improving quality of public spaces, increasing access to transportation services, and providing more opportunities for social engagement. Policy initiatives need to focus on "age-friendly" features of the environment as a strategy to build PSOC. However, most of the research on PSOC was conducted in samples of older adults in China or Hong Kong. Community psychology work in Latin America can provide additional frameworks to guide future intervention strategies for PSOC. This can help improve cultural competence of interventions and supplement existing research.

Montero (2018) presents the following concepts that support community psychology work in Latin America, which can be used to design interventions for PSOC. S*hared agency* involves facilitating active participation of community members to share and distribute work in ways that allow community members to buy into the community's goals and maintain community well-being. *Participation in communities* then involves carrying out activities or

tasks with other members, and seeks to strengthen community ties, facilitate exchange of ideas and knowledges, and improve organization and decision making of the community. *Conviction*, described as a complex topic by Montero (2018), involves the belief that the community work being done *is done by the actual community*. Inherent to this is the autonomy of the community to establish norms and participation guidelines, especially for outsiders. *Justice* is the importance of communities being able to address social inequities and suffering of community members. *Complexity* speaks to the fact that, "those who need help can be at the same time the best collaborators because they are the ones who know what is necessary" (p. 203). Montero (2018) suggest participatory action research (PAR) can be a strong methodology to implement interventions in community psychology in Latin American regions.

In Puerto Rico following Hurricane María, there were noticeable gaps in services and relief from the government or other formal service providers, so community members tended to turn inwards to address gaps and needs (Hayward et al., 2019). In fact, Hargrove et al. (2021) noted that communities with a history of economic hardship and lack of effective government support, such as Puerto Rico, tend to "turn to initiatives spearheaded by fellow community members in times of crisis, as they cannot always rely on formal support" (p. 40). Future interventions can draw on frameworks from Montero and PSOC to: (1) proactively promote strategies for PSOC, and (2) develop best practices to mobilize community support and PSOC following disasters. As noted, PAR is a powerful tool to accomplish these goals and is aligned with Latin American community psychology values (Montero, 2018).

Methodological Implications

A secondary implication was revealed through field notes, observations, and discussion between research team members and with participants and community partners. We found that

older adults participating in the study received some benefits through the act of participation. This provided an avenue for them to share their stories relating to María. Multiple participants noted they did not have many opportunities to talk about the lasting impacts of María, especially regarding constructs like mental health or QOL.

Many participants commented that their reason for participating in the survey was so people outside Puerto Rico could bear witness to the extreme impact María had and continues to have on their lives by sharing their experiences with us. They wanted their stories to be heard. Many participants depicted vivid accounts of the ferocity of the storm, describing it as a monster and mimicking such noises. They also recounted stories and personal experiences of the suffering experienced in the aftermath of the María, including the short-term, such as destruction, loss of power, absence of government support, and lack of medical care or supplies, as well as the long-term effects, like increased caregiving roles and loss of relatives or close friends due to death or migration. We intentionally sampled from rural and remote areas that may be underrepresented in research, which further allowed stories to be shared form people whose voices may otherwise go unheard. These benefits may have helped further incentive recruitment.

It should also be noted the process of conducting face-to-face interviews affected the research team members. During our discussions and debriefings, we often recapitulated themes and stories from the interviews. While this increased our investment and understanding in the project, this also required mutual support of team members, especially since several were native Puerto Ricans who experienced María firsthand. It is vital for primary data collection efforts to establish guidelines for attending to needs and emotions of team members.

These supplemental findings can help inform best methodological practices and future research design. Researchers should try to anticipate and adapt to the lived experiences of

research participants. Strategies should be developed to incentivize participation outside of just monetary compensation. Researchers need to effectively respond to important and relevant experiences that arise during face-to-face interviews, above and beyond the intended survey items. We felt it was essential to capture these stories and participants noted their personal benefits.

The research design phase should include detailed, comprehensive training materials, practice sessions, and opportunities for feedback. For example, during training of team members, we conducted simulated role-playing interviews where a research team member played the role of the Puerto Rican older adult, and the mock interview room was set up similar to a traditional living room in Puerto Rico. In the field, student interviewers first shadowed senior team members during interviews with older adults in Puerto Rico. Then, roles were reversed, and the senior team members observed the student interviewers conduct interviews and provided feedback after. Future research should examine and continue to develop best practices for research study implementation in potentially hard to reach samples, such as older adults in Puerto Rico.

Limitations

A notable limitation is my positionality as an outsider in this research study. I am a white male from the U.S conducting research among older adults in Puerto Rico. As a cultural outsider, it is crucial for me to examine and understand my potential biases in this research. While impossible to completely overcome, there were several methods I employed to account for this. I kept a detailed journal of field notes and reflections on this topic that I could refer to when writing, analyzing the data, and interpreting results. The research team in the larger data collection project included several native Puerto Ricans and a Cuban. I was able to examine my

biases and learn from them through our research team discussions. Our research team met regularly during study implementation and then weekly following the end of the data collection efforts where we discussed the results of the María study, as well as planning and implementing a new study on COVID-19 among older adults in Puerto Rico. Furthermore, we partnered with local community agencies and community leaders in Puerto Rico to help guide our data collection and interpretation of results.

Methodological limitations are discussed in more detail in each paper.

Conclusion

This dissertation was among the first studies to examine the long-term impact of Hurricane María on health and well-being of older adults. PSOC serves as an essential resource and protective factor for older adults in Puerto Rico following Hurricane María. These results can be used to inform policy and practice, especially in regard to strategies and interventions to promote PSOC.

Findings can be extended beyond Puerto Rico, as other regions globally are experiencing similar trends. Puerto Rico serves as the "canary in the coalmine." While some factors are unique to Puerto Rico, the overall convergence of forces is being felt in other regions across the globe currently and is likely to increase in the future with other regions as well. These factors include increase in frequency and severity of natural disasters, continued effects of climate change, global population aging, and migration patterns. Low- and middle-income countries may be especially at risk in these cases. However, deleterious effects can be offset, in part, by community and social support, such as PSOC. This dissertation shows the powerful role of PSOC to be valuable resource for older adults to meet these challenges. Future research needs to

continue to focus on these trends in different populations across the globe and develop ways to build and maintain PSOC.

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Appendix A.

English Version of Measures Used in Data Collection

1) Psychological Sense of Community: Brief Sense of Community Scale

	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
1. I can get what I need in this neighborhood.	1	2	3	4	5
2. This neighborhood helps me fulfill my needs.	1	2	3	4	5
3. I feel like a member of this neighborhood.	1	2	3	4	5
4. I belong in this neighborhood.	1	2	3	4	5
5. I have a say about what goes on in my neighborhood.	1	2	3	4	5
6. People in this neighborhood are good at influencing each another.	1	2	3	4	5
7. I feel connected to this neighborhood.	1	2	3	4	5
8. I have a good bond with others in this neighborhood.	1	2	3	4	5

2) Self-rated Health:

In general, would you say your health is poor, fair, good, very good or excellent?

Poor	Fair	Good	Very Good	Excellent
1	2	3	4	5

3) Quality of Life: EUROHIS-QOL 8-Item Index

		Not at all	A little	Moderately	Mostly	Completely
1	Do you have enough energy for everyday life?	1	2	3	4	5
2	Do you have enough money to meet your needs?	1	2	3	4	5

How satisfied are you with:		Very dissatisfied	Dissatisfied	Neither Satisfied nor Dissatisfied	Satisfied	Very Satisfied
3	Your health	1	2	3	4	5
4	Yourself	1	2	3	4	5
5	Your ability to perform your daily activities	1	2	3	4	5
6	Your personal relationships	1	2	3	4	5
7	The conditions of your living space	1	2	3	4	5
8	Your overall quality of life	1	2	3	4	5

4) Loneliness: Three-Item Loneliness Scale

	When you think about your life these days:	Often	Some of the time	Hardly Ever
1.	How often do feel that <u>you lack companionship</u>?	1	2	3
2.	How often do you feel <u>left out</u>?	1	2	3
3.	How often do you feel <u>isolated from others</u>?	1	2	3

5) Social Isolation/Social Network Size: Abbreviated Lubben Social Network Scale (LSNS-6)

FAMILY: Considering the people to whom you are related by birth, marriage, adoption, etc.

1. How many relatives do you see or hear from at least once a month?
   ☐ none ☐ one ☐ two ☐ three or four ☐ five thru eight ☐ nine or more

2. How many relatives do you feel at ease with that you can talk about private matters?
   ☐ none ☐ one ☐ two ☐ three or four ☐ five thru eight ☐ nine or more

3. How many relatives do you feel close to such that you could call on them for help?
   ☐ none ☐ one ☐ two ☐ three or four ☐ five thru eight ☐ nine or more

FRIENDSHIPS: Considering all of your friends including those who live in your neighborhood

4. How many of your friends do you see or hear from at least once a month?
   ☐ none ☐ one ☐ two ☐ three or four ☐ five thru eight ☐ nine or more

5. How many friends do you feel at ease with that you can talk about private matters?
   ☐ none ☐ one ☐ two ☐ three or four ☐ five thru eight ☐ nine or more

6. How many friends do you feel close to such that you could call on them for help?
   ☐ none ☐ one ☐ two ☐ three or four ☐ five thru eight ☐ nine or more

6) Mental Health: Self-Reporting Questionnaire (SRQ-20)

		YES	NO
1	Do you often have headaches?	1	0
2	Is your appetite poor?	1	0
3	Do you sleep badly?	1	0
4	Do your hands shake?	1	0
5	Are you easily frightened?	1	0
6	Do you feel nervous, tense, or worried?	1	0
7	Is your digestion poor?	1	0
8	Do you have trouble thinking clearly?	1	0
9	Do you feel unhappy?	1	0
10	Do you cry more than usual?	1	0
11	Do you find it difficult to enjoy your daily activities?	1	0
12	Do you find it difficult to make decisions?	1	0
13	Is your daily work suffering?	1	0
14	Are you unable to play a useful part in life?	1	0
15	Have you lost interest in things?	1	0
16	Do you feel that you are a worthless person?	1	0
17	Are you easily tired?	1	0
18	Do you have uncomfortable feelings in your stomach?	1	0
19	Do you feel tired all the time?	1	0
20	Has the thought of ending your life been on your mind?	1	0
	TOTAL SCORE		

7) Resiliency: 4-item Brief Resilient Coping Scale

1	I look for creative ways to alter difficult situations	1	2	3	4	5
2	Regardless of what happens to me, I believe I can control my reaction to it	1	2	3	4	5
3	I believe I can grow in positive ways by dealing with difficult situations	1	2	3	4	5
4	I actively look for ways to replace the losses I encounter in life	1	2	3	4	5

1 = describes me not at all

2 = describes me a little bit

3 = describes me neither a little or a lot

4 = describes me a lot

5 = describes me very well

Note: References for each measure are provided in Paper 2 and Paper 3 in the dissertation.

Appendix B.

Spanish Version of Measures Used in Data Collection

1) Psychological Sense of Community: Brief Sense of Community Scale

	Totalmente en desacuerdo	Parcialmente en desacuerdo	Ni de acuerdo ni en desacuerdo	Parcialmente de acuerdo	Completamente de acuerdo
1. Puedo conseguir lo que necesito de esta comunidad.	1	2	3	4	5
2. Esta comunidad me ayuda a llenar mis necesidades.	1	2	3	4	5
3. Me siento como un miembro de esta comunidad.	1	2	3	4	5
4. Yo pertenezco a esta comunidad.	1	2	3	4	5
5. Tengo influencia en lo que sucede en mi comunidad.	1	2	3	4	5
6. Las personas en esta comunidad se influyen unas a otras	1	2	3	4	5
7. Me siento conectado a esta comunidad.	1	2	3	4	5
8. Tengo un buen vínculo con las personas de esta comunidad.	1	2	3	4	5

2) Self-rated Health:

¿En general, usted diría que su salud es excelente, muy buena, buena, regular, o mala?

Mala	Regular	Buena	Muy Buena	Excelente
1	2	3	4	5

3) Quality of Life: EUROHIS-QOL 8-Item Index

		Ninguna	Muy poca	Moderada-mente	Mayor-mente	Completa-mente
1	¿Tiene suficiente energía para sus actividades de día-a-día?	1	2	3	4	5
2	¿Tiene dinero suficiente para cubrir sus necesidades?	1	2	3	4	5

Por favor, indique que satisfecho(a) se siente con las siguientes cosas:		Muy insatisfecho	Insatis-fecho	Ni satisfecho o insatisfecho	Satisfecho	Muy satisfecho
3	Su salud	1	2	3	4	5
4	Usted mismo	1	2	3	4	5
5	Su capacidad para realizar sus actividades diarias	1	2	3	4	5
6	Sus relaciones personales	1	2	3	4	5
7	Las condiciones de su vivienda	1	2	3	4	5
8	Su calidad de vida en general	1	2	3	4	5

4) Loneliness: Three-Item Loneliness Scale

		a menudo	a veces	casi nunca
1	¿Con que frecuencia siente que le falta compañía?	1	2	3
2	¿Con que frecuencia se siente excluido?	1	2	3
3	¿Con que frecuencia se siente aislado de los demás?	1	2	3

5) Social Isolation/Social Network Size: Abbreviated Lubben Social Network Scale (LSNS-6)

FAMILIA: Teniendo en cuenta las personas con las que está relacionado por nacimiento, matrimonio, adopción, etc.

1. ¿Cuántos parientes ve o con cuantos tiene contacto de al menos una vez al mes?

   0 1 2 3 – 4 5 – 8 9+

2. ¿Con cuántos parientes se siente a gusto con el que puede hablar sobre asuntos privados?

   0 1 2 3 – 4 5 – 8 9+

3. ¿Con cuántos parientes tiene confianza para poder pedirles ayuda?

   0 1 2 3 – 4 5 – 8 9+

AMISTADES: Teniendo en cuenta a todos sus amigos, incluyendo los del barrio,

4. ¿Cuantos amigos ve o con cuantos tiene contacto de al menos una vez al mes?

   0 1 2 3 – 4 5 – 8 9+

5. ¿Con cuántos de sus amigos se siente a gusto para tratar asuntos privados?

   0 1 2 3 – 4 5 – 8 9+

6. ¿Con cuántos de sus amigos tiene confianza para poder pedirles ayuda?

   0 1 2 3 – 4 5 – 8 9+

6) Mental Health: Self-Reporting Questionnaire (SRQ-20)

		Si	No
1	¿Tiene dolores frecuentes de cabeza?	1	0
2	¿Tiene mal apetito?	1	0
3	¿Duerme mal?	1	0
4	¿Se asusta fácilmente?	1	0
5	¿Le tiemblan las manos?	1	0
6	¿Se siente nervioso, tenso, o preocupado?	1	0
7	¿Sufre de mala digestión?	1	0
8	¿No puede pensar con claridad?	1	0
9	¿Se siente triste?	1	0
10	¿Llora más de lo normal?	1	0
11	¿Le es difícil disfrutar de sus actividades diarias?	1	0
12	¿Le es difícil tomar decisiones?	1	0
13	¿Está afectado su trabajo diario?	1	0
14	¿Le es difícil desempeñar un papel útil en la vida?	1	0
15	¿Ha perdido interés en las cosas?	1	0
16	¿Se siente que usted es una persona sin valor?	1	0
17	¿Se siente cansado todo el tiempo?	1	0
18	¿Tiene sensaciones desagradables en el estómago?	1	0
19	¿Se cansa fácilmente?	1	0
20	¿Ha pensado en quitarse la vida?	1	0
	Puntuación total		

7) Resiliency: 4-item Brief Resilient Coping Scale

1	Busco formas creativas para cambiar las situaciones difíciles	1	2	3	4	5
2	Independientemente de lo que me suceda, creo que puedo controlar mis reacciones	1	2	3	4	5
3	Creo que puedo crecer positivamente haciendole frente a las situaciones difíciles	1	2	3	4	5
4	Busco activamente formas de superar las pérdidas que tengo en la vida	1	2	3	4	5

1 = no me describe en absoluto
2 = me describe poco
3 = ni poco ni mucho
4 = me describe bastante
5 = me describe muy bien

Note: References for each measure are provided in Paper 2 and Paper 3 in the dissertation.