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RESEARCH ARTICLE

Vietnamese Insights into Cognitive Aging Program (VIP): Objectives, study design, and cohort description

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Abstract

Introduction: There is a dearth of research on cognitive aging and dementia in Asian Americans, particularly in Vietnamese Americans, the fourth largest Asian subgroup in the United States.

Methods: The Vietnamese Insights into Cognitive Aging Program (VIP) investigates early life adversity and war-related trauma and their associations with cognitive health in a community-based sample of older Vietnamese Americans in Northern California (i.e., Sacramento and Santa Clara counties). Baseline measurements include a comprehensive neuropsychological battery, including measures of global cognition along with executive function, semantic memory, and episodic memory. Data also include measures of functioning, early life adversity and trauma exposure, and psychosocial and traditional cardiovascular disease risk factors. Cognitive assessments will be repeated twice over the course of the data collection period, approximately 12- and 24- months post-baseline. Blood samples collected during Wave 2 will be assayed for biochemical risk factors.

Results: Baseline assessments were conducted from January 2022 to November 2023, with $N = 548$ Vietnamese Americans; mean age ± SD was 73 ± 5.31 years and 55% of participants were women. There were significant differences in social factors by site, with Santa Clara participants having higher education (some college or higher: Sacramento, ≈25%; Santa Clara: ≈48%) and marginally higher incomes compared to Sacramento participants. A higher percentage of Santa Clara participants reported speaking English well or very well (24%) compared to Sacramento participants (13%), although the majority of the entire sample (81%) reported speaking some to no English (response options: not at all; some/a little bit; well/very well).

Discussion: This longitudinal study providea a unique opportunity to more fully delineate psychosocial factors that contribute to dementia disparities in diverse and under-engaged populations. Future work will examine cognition, the prevalence of

mild cognitive impairment and dementia, and other health outcomes, while controlling for site differences in all analyses.

KEYWORDS
Alzheimer's disease, dementia, immigrants, refugees, trauma, Vietnamese American, Asian American, war

Highlights

- Vietnamese Insights into Cognitive Aging Program (VIP) is a new study.
- VIP has detailed early life and health data on 548 older Vietnamese Americans.
- History of war and trauma may contribute to Alzheimer's disease and related dementias (ADRD)–related burden.
- VIP may provide insight into ADRD burden in other understudied groups.

1 | BACKGROUND

Despite the widespread recognition that there is heterogeneity in disease and that diversity in research is crucial, there are no estimates of the prevalence or incidence of mild cognitive impairment (MCI) and Alzheimer's disease and related dementias (ADRD) in Vietnamese Americans; nor do we understand ADRD risk and protective factors in this group. The Vietnamese Insights into Cognitive Aging Program (VIP) was funded by the National Institute on Aging (NIA) in 2021 to address this gap in ADRD research.[1] Meyer et al. described the rationale and conceptual model for VIP; here we describe the design and baseline cohort characteristics of VIP.

Older Asian American (ASA) populations are growing rapidly and are not a monolithic group, representing more than 22 different ethnic groups.[2] Most ADRD studies tend to exclude ASAs in their samples, or lump them together into one large category. The few epidemiological studies that do recruit and engage ASAs have found similar or lower dementia incidence rates compared to those in non-Hispanic Whites (NHWs).[3,4] However, incidence rates varied among ASA subgroups,[5] and these studies have included mostly Chinese, Filipino, and Japanese Americans. In other cases, it is unclear what ASA groups are included. For example, using a large data set from the Veterans Health Administration integrated nationwide health care system, Kornblith et al. found that compared to White participants, ASAs had higher incidence rates of dementia, but ASAs were lumped together in this study.[6] Furthermore, Southeast Asian refugees are rarely studied in cognitive aging research, but their unique migration history and context can provide key insights into life-course influences on ADRD. With the fall of Saigon and communist takeover in 1975, almost 125,000 Vietnamese refugees fled to the United States. Over the next several decades, there were several additional waves of immigration, with hundreds of thousands more Vietnamese seeking refuge in the United States, each wave characterized by different levels of socioeconomic status (SES), exposure to trauma, and familiarity with the United States. These refugees suffered traumatic experiences including combat/war, imprisonment and torture, physical/sexual assault, and escape or sudden evacuation from their country, and faced challenges in the refugee camps and upon arrival to the United States.[7] Middle-aged Vietnamese adults experienced the brunt of this adversity[8] and comprise the current older Vietnamese American population. Miller and Rasmussen's ecological model underscores the importance of war trauma and post-migration stressors on the mental health of refugees.[9] Post-migration stressors included lack of access to health care and economic and social opportunities. In addition, those who were middle-aged and presumably working may have faced more language and ethnic discrimination.

Today, there are almost 2 million Vietnamese Americans in the United States, with ≈15% being 65 years or older. Immigrants from Vietnam are most highly concentrated in California (38%), followed distantly by Texas (14%) and Washington State (5%).[10] Based on life-course theories and socioecological models of health,[11,12] we propose a conceptual model of early life adversity and trauma and potential mechanisms for how they may influence later-life cognition and dementia in older Vietnamese Americans (see Figure S1). This model and its hypothesized mechanisms, including sociocontextual and cardiovascular disease (CVD) risk factors (hypertension, pre-diabetes, and diabetes),[13–16] are the focus of VIP, and have been described elsewhere.[1]

In VIP, early life adversity is characterized by a wide range of circumstances or events that pose a serious threat to physical or psychological well-being (e.g., serious accidents/injuries, community violence). In contrast, trauma "occurs when a person perceives an event or set of circumstances as extremely frightening, harmful, or threatening—either emotionally, physically, or both."[17] Trauma is one possible outcome of exposure to adversity.

The objectives of VIP are as follows: (1) characterize longitudinal cognitive trajectories and ADRD risk in a community-based cohort of older Vietnamese Americans living in Northern California; (2a) examine the role of adversity and trauma on cognitive health and ADRD risk in older Vietnamese Americans, hypothesizing that greater adverse experiences will be associated with worse baseline cognitive function,

prevalent MCI/dementia, and faster cognitive decline; (2b) evaluate the influence of current sociocontextual factors on ADRD risk in older Vietnamese Americans, hypothesizing that higher SES and acculturation, as well as a supportive environment, will attenuate the effect of adversity and trauma on baseline cognition, MCI/dementia, and cognitive decline, whereas depression will exacerbate their effects; and (3) determine the role of CVD and health risk factors on cognition in older Vietnamese Americans, hypothesizing that higher CVD risk will be associated with poorer cognition, MCI/dementia, and faster cognitive decline and that depression and CVD risk will partially mediate the effect of prior adversity and trauma on baseline cognition, cognitive decline, and MCI/dementia.[1]

RESEARCH IN CONTEXT

1. **Systematic review**: We reviewed the literature using historical and standard sources (e.g., PubMed) to provide a brief history of the context of Vietnamese American immigration and cognitive aging studies on Asian Americans, respectively.
2. **Interpretation**: The Vietnamese Insights into Cognitive Aging Program (VIP) is the first known study to enroll a prospective cohort of Vietnamese Americans to study early life factors and cognitive aging. This article describes the study design and methods of VIP, and the baseline characteristics of the VIP cohort are compared to the Vietnamese American population in the United States.
3. **Future directions**: VIP demonstrates the importance of community-engaged research for advancing the understanding of life-course factors that impact cognitive aging in an understudied Southeast Asian population. VIP will establish a population that has been traditionally neglected in Alzheimer's disease and related dementias (ADRD) research and provide information about life-course and risk and resilience factors that can offer key insights into cognitive aging in other diverse populations.

2 | METHODS

2.1 | Study design and setting

VIP is a prospective, longitudinal cohort study in Northern California. The institutional review boards at University of California, Davis (UCD) and University of California, San Francisco (UCSF) approved the study protocol. Study enrollment began in January 2022 and concluded in November 2023. Informed consent was obtained from participants at the start of the baseline visit (Visit 1). All examiners were trained to certification before administering the neuropsychological battery and the CVD/health measures. The entire baseline visit lasted ≈3–3.5 h, whereas the follow-up assessments (conducted ≈12–15 months after the previous assessment) lasts ≈2–3 h; two follow-up assessments are planned. All batteries were conducted in the Vietnamese language and administered on a tablet, except for the neuropsychological items, which were paper and pencil forms. Wave 2 assessments started in April 2023, and they include repetition of selected baseline cognitive measurements and new measures that were not collected at baseline (e.g., venipuncture for CVD risk factors). Wave 3 examinations began in April 2024.

2.2 | Inclusion/exclusion criteria

Participants had to self-identify as Vietnamese or Vietnamese American, speak Vietnamese or English, be 65 years of age or older, live in the Sacramento or Santa Clara (SC) areas in Northern California (UCD or UCSF study sites, respectively), and have immigrated to the United States from Vietnam. Participants also had to be living in the community (e.g., not in an assisted living facility) and have no major unstable medical conditions (e.g., active cancer with chemotherapy, severe dementia) that prevented completion of the assessments. Although we expected to recruit mostly Vietnamese Americans who were cognitively normal or had MCI, we enrolled everyone who had the capacity to consent. This allowed us to have diversity across the full range of cognition. Only one participant per household was allowed to participate in the study (to ensure the assumption of independence among observations and have sufficient variability in exposures including stress, lifestyle, etc.).

2.3 | Recruitment and screening

Each study site recruited diverse stakeholders to their respective Community Advisory Board (CAB) at the start of the study (CAB members did not participate in the study). Prior to recruitment, we convened a CAB meeting at each site to discuss the purpose, rationale, and design of the VIP study. CAB members provided their perspectives on how to best publicize the study and engage with the local community. Study participants were recruited through a variety of methods: giving presentations at community centers, Vietnamese churches and temples, and social service and other organizations, and by advertisements in local Vietnamese television, radio, and print media. We also utilized the Collaborative Approach for Asian Americans and Pacific Islanders Research and Education (CARE) Registry.[18] At each site, we partnered with a community-based organization (CBO), which was a trusted source in the community and that provided social and cultural services to thousands of Vietnamese community members each year. These two CBOs had a history of working with the principal investigator at each study site (e.g., Drs. Meyer and Park had given health education presentations, interviewed the Executive Director, and interacted with staff), and thus relationships had been built prior to the submission of the VIP grant application. The Sacramento CBO, Asian Resources, Inc. (ARI), has been providing services to low-income and limited English-speaking communities for more than 43 years. ARI engaged 200–350 older Vietnamese monthly through their English-language classes, social/recreational programs, and translation services. The SC CBO

was the International Children Assistance Network (ICAN). Founded in 2000, ICAN was one of the leading Vietnamese CBOs in Northern California providing prevention and early intervention services to Vietnamese and other Asian communities. Each CBO had bilingual and bicultural Vietnamese staff who recruited participants into VIP and screened for eligibility. If a prospective participant was eligible, an appointment was made to conduct the examination at the CBO or in the participant's home. This was the major source of recruitment at each site (Sacramento: 94% of participants were recruited from ARI; SC: 99% of participants were recruited from ICAN).

2.4 | Examination components

Table 1 provides a list of components by examination. After informed consent, a 10- to 15-min semi-structured interview about the participant's early life in Vietnam and subsequent immigration to the United States was administered. Participants were asked specifically to discuss their early life in Vietnam in an open-ended format, and then to describe how and when they came to the United States. This short interview was meant to build rapport with the participant and elicit potentially stressful and traumatic experiences with the war and immigration (and/or escape) to the United States. Examiners underwent multiple trainings and consulted regularly with the research team (including a clinical psychologist and a psychiatrist) to address any psychological or well-being issues that arose. The interview was audio-recorded and qualitative data will be examined for major themes related to early life adversity, trauma exposures, and immigration to the United States.

2.4.1 | Cognitive battery

Following the interview, all participants were examined using the Cognitive Abilities Screening Instrument (CASI), a global measure of cognition. The CASI taps 10 cognitive domains commonly assessed in dementia: attention, concentration, orientation, short-term memory, long-term memory, language ability, constructional praxis, verbal fluency, abstraction, and everyday problem-solving skills. Total CASI score ranges from 0 to 100.[19] The test was designed for cross-cultural application and has been translated and used in the Vietnamese population in the United States.[20] Additional items in the cognitive battery can be seen in Table 1 and assess the domains of memory, executive function and processing speed, visuospatial, and language. These measures were translated by native Vietnamese-language speakers and vetted by a team of bilingual neuropsychologists, clinical psychologists, community partners, and staff, who met at length to discuss the translation and adaptation of the items.

To further evaluate the potential for cognitive impairment and/or dementia, those who performed poorly on the CASI, defined as a total score of ≤70 (see Dick et al.[20]) were administered the Clinical Dementia Rating scale (CDR).[20] The CDR is a global clinical scale based on a structured interview with both the older adult and a knowledgeable informant (defined as someone who interacts with the participant at least once per week and can provide information about the participant's functioning). The CDR has been used in previous studies as a proxy for a diagnosis of MCI and dementia,[21,22] including demonstrating congruency with the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) approach of identifying dementia in an Asian population[23] (i.e., similar rates of diagnostic categories).[24,25] A random 25% sub-sample undergo the CDR; screening results from this sub-sample will be used to develop an optimal algorithm to identify potential dementia cases in the other 75% of the sample. This practice has been done in previous studies of large, diverse cohorts,[26,27] and allows for the estimation of dementia prevalence and incidence using a combination of the random sub-sample and the screened-positive cases who are found to have dementia.

2.4.2 | Adversity and trauma

Early life adversity was measured using a composite score from items of the Life Experience and Activities Form (LEAF), an interview-based instrument developed by faculty at the UCD Alzheimer's Disease Research Center. The LEAF characterizes experience across the participant's life span, including early life adversity. Our group has demonstrated the effect of early life conditions on baseline cognition and cognitive change.[28,29] Similar to these studies, early life adversity was measured as a composite variable reflecting the number of siblings who died before age 18 and financial and food deprivation. We also used the MacArthur scale of subjective social status—a ladder that functions as a measure of social standing in childhood.[30] Trauma exposures were assessed via detailed inquiry into witnessing or being a victim (if applicable) of imprisonment, violence, and death; and trauma symptoms were measured using the Post-traumatic Stress Disorder (PTSD) Checklist for DSM-5.[31] In addition, a measure of acculturative stress (upon immigration to the United States) from the National Latino and Asian American Study was administered.

2.4.3 | Sociocontextual factors

We collected information on age, self-reported gender, marital status, size/composition of household, educational attainment, current/most recent job, ability to pay for basics, home ownership, and household income. Exposure to U.S. culture (i.e., years lived in the United States) may affect risk factors (such as social integration and obesity) and served as a proxy for acculturation, as did age at immigration and English-language proficiency.[32] Information on psychosocial and mental health factors were also collected. Depressive symptoms were assessed using the Depression subscale of the Hopkins Symptom Checklist-25 (two items were removed due to cultural and practical concerns about safety: loss of sexual interest or pleasure and thoughts of ending life).[33] Information about social networks and support was collected via questions about neighborhood safety and cohesion from the California Health Interview Survey[32] and the Lubben Social Network Scale.[34]

TABLE 1 VIP assessment components.

Neuropsychological battery		
Domain/construct	**Test(s)**	**Visit**
Global cognition and dementia	Cognitive Abilities Screening Instrument (CASI); Clinical Dementia Rating scale (CDR)	All
Memory	Word list (WHO/UCLA AVLT); Benson Complex Figure Copy-Delay	All
Executive function and processing speed	Trails A; Digit span forward; Digit span backward; WAIS-IV coding subtest	All
Visuospatial functioning	Benson Complex Figure Copy-Immediate	All
Language	Category fluency (Animals)	All
Function	Independent activities of daily living (IADLs); activities of daily living (ADLs)	All
Adversity and trauma		
Early life adversity	Life Experience and Activities Form (LEAF), plus additional items from MacArthur scale of subjective social status, and the WHO Adverse Childhood Experiences International Questionnaire (ACE-IQ)	1
Trauma	War trauma questionnaires from Vietnamese Health and Aging Study; PTSD Checklist for DSM-5 (PCL-5)	1
Post-immigration stress	Acculturative Stress Scale	1
Sociocultural and contextual battery		
Demographics	Age, gender, socioeconomic status	1
Acculturation	Years in the United States; English language proficiency; age at immigration	1
Depression	Hopkins Symptom Checklist 13 (HSCL-13)-depression	All
Supportive environment	Neighborhood cohesion and safety; social and family support	All
Cardiovascular disease risk and health		
Medical history	Diagnosis of hypertension, diabetes, hyperlipidemia; anthropometrics	All
Overweight/obesity	Weight is measured by a digital scale and height measured by a stadiometer. BMI is calculated as weight in kg divided by height in (meters).[2] Waist measured twice at the level of the umbilicus with a flexible tape measure. Hip measured twice at the maximum circumference of the buttocks. An average of waist and hip measures, waist-hip, and waist-height ratio is calculated.	All
Diabetes and prediabetes	HbA1c and fasting glucose are assessed with standardized assays at Quest lab. Participants taking diabetes medications and/or those with HbA1c ≥6.5% will be classified as having diabetes. Those with HbA1c 5.7%–6.4% will be classified as having pre diabetes.	All
Hypertension	After sitting at rest for 5 minutes, participants have three seated blood pressure measurements with an automated blood pressure monitor. The average of the last two of three readings will be used for the analysis. Hypertension will be defined by the use of anti-hypertensive medication, systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg.	All
Dyslipidemia	Total cholesterol, triglycerides, and HDL cholesterol are measured by enzymatic methods and LDL cholesterol calculated. We use continuous measures of these values to dichotomize them, as necessary.	All
Smoking	Information is obtained on current and former history of smoking.	All

Abbreviations: PTSD, post-traumatic stress disorder; VIP, Vietnamese Insights into Cognitive Aging Program.

2.4.4 | CVD risk and health measures

Table 2 lists the assessment and protocol for assessing CVD risk factors and the physical exam measures. As with the neuropsychological battery, an administration and procedural manual was developed and used to train all examiners with certification. Fasting blood collection has begun at a local Quest laboratory close to the participant's home or at the CBO during Wave 2 with assays for high-sensitivity C-reactive protein (hs-CRP), lipid panel, basic metabolic panel with serum creatinine, and hemoglobin A1c (HbA1c).

3 | RESULTS

Figure 1 shows the screening and recruitment flow diagram for the study. Through engagement of our CAB, outreach via our CBOs, and

TABLE 2 Baseline VIP demographic characteristics by site.

Variable	Overall	Sacramento	Santa Clara	*p*	% Missing data
N	548	274	274		
Female, *n* (%)	301 (54.9)	156 (56.9)	145 (52.9)	0.391	0.0
Age mean (SD)	72.78 (5.3)	72.89 (5.6)	72.67 (5.1)	0.631	0.0
Education, *n* (%)				<0.001	0.4
Did not go to school	8 (1.5)	7 (2.6)	1 (0.4)		
Primary school (1–5)	72 (13.2)	57 (20.8)	15 (5.5)		
Middle school (6–9)	74 (13.6)	49 (17.9)	25 (9.2)		
High school (10–12)	191 (35.0)	92 (33.6)	99 (36.4)		
Some college/associate degree	129 (23.6)	40 (14.6)	89 (32.7)		
Bachelor's/graduate degree	72 (13.2)	29 (10.6)	43 (15.8)		
Marital status, *n* (%)				<0.001	0.7
Never Married	30 (5.5)	19 (7.0)	11 (4.0)		
Married/living with partner	324 (59.6)	135 (49.6)	189 (69.5)		
Separated/divorced	92 (16.9)	57 (21.0)	35 (12.9)		
Widowed	98 (18.0)	61 (22.4)	37 (13.6)		
Annual household income, *n* (%)				0.049	
$25,000 or less	212 (86.9)	105 (92.9)	107 (81.7)		
$25,001 to $75,000	28 (11.5)	8 (7.1)	20 (15.3)		
$75,001 to $150,000	3 (1.2)	0 (0.0)	3 (2.3)		
$150,001 to $200,000	1 (0.4)	0 (0.0)	1 (0.8)		
Employment, *n* (%)				0.005	2.6
Full-time work	11 (2.1)	7 (2.6)	4 (1.5)		
Part-time work	45 (8.4)	25 (9.2)	20 (7.6)		
Homemaker	28 (5.2)	9 (3.3)	19 (7.3)		
Unemployed	9 (1.7)	0 (0.0)	9 (3.4)		
Retired	441 (82.6)	231 (84.9)	210 (80.2)		
Age at arrival in the United States (in years), mean (SD)	45.77 (13.26)	46.71 (13.20)	44.83 (13.29)	0.098	0.2
Year arrived in the United States, *n* (%)				0.374	0.2
Before 1975	5 (0.9)	2 (0.7)	3 (1.1)		
1975–1979	50 (9.1)	24 (8.8)	26 (9.5)		
1980–1984	87 (15.9)	41 (15.0)	46 (16.8)		
1985–1989	42 (7.7)	19 (6.9)	23 (8.4)		
1990–1994	133 (24.3)	63 (23.0)	70 (25.6)		
1995–1999	35 (6.4)	14 (5.1)	21 (7.7)		
2000 and after	195 (35.6)	111 (40.5)	84 (30.8)		
Primary language, *n* (%)				0.520	1.6
Vietnamese	476 (88.3)	242 (88.3)	234 (88.3)		
More than one	58 (10.8)	31 (11.3)	27 (10.2)		
English	4 (0.7)	1 (0.4)	3 (1.1)		
Cantonese	1 (0.2)	0 (0.0)	1 (0.4)		
English-speaking proficiency, *n* (%)				<0.001	0.0
Very well/well	103 (18.8)	36 (13.1)	67 (24.5)		
Some/a little bit	390 (71.2)	191 (69.7)	199 (72.6)		
Not at all	55 (10.0)	47 (17.2)	8 (2.9)		

Abbreviation: VIP, Vietnamese Insights into Cognitive Aging Program.

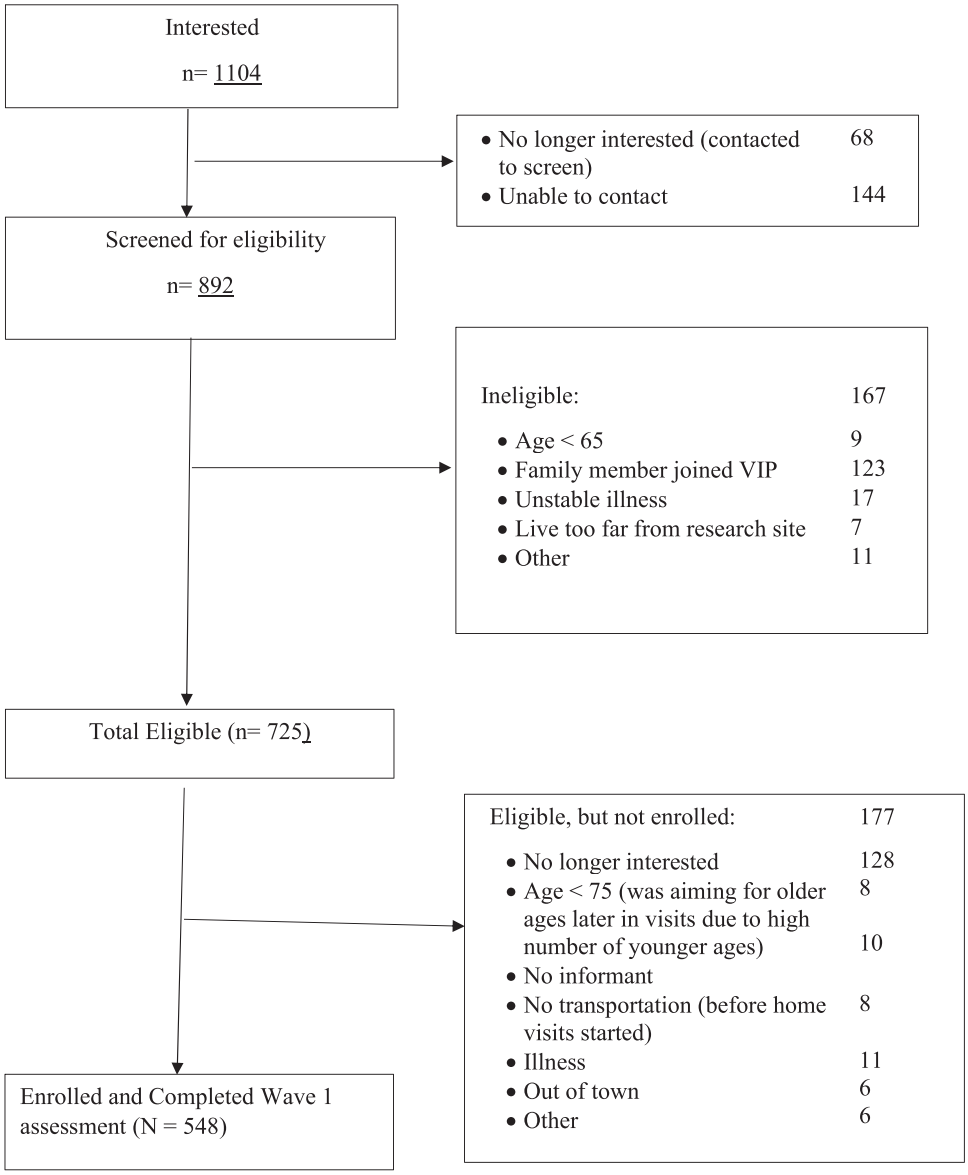

FIGURE 1 VIP screening and recruitment flow diagram. The first Wave 1 participant was seen in January 2022, and the last participant was seen in November 2023.

community events, we had a list of 1104 individuals who were interested in the study. Of those, 212 were not screened: 68 were no longer interested, and we could not reach 144 individuals. We screened 892 individuals, and of this number, 725 were eligible and invited to participate. Figure 1 indicates the reasons that people were ineligible, with the most frequent being already having a family member as a VIP study participant. A total of 548 individuals (274 at each site) completed the baseline assessment.

Table 3 displays the baseline demographic characteristics of VIP participants and differences by study site (Sacramento vs SC). About 55% of the sample was female and the mean age was 73 years (SD = 5.3). There were significant differences in social factors, with SC participants having higher education than Sacramento participants and marginally higher incomes. A higher percentage of SC participants were married or living with a partner compared to Sacramento participants (69% vs 50%). More Sacramento participants than SC participants worked part time (9% vs 7%) and had retired (85% vs 80%). Finally, a higher percentage of SC participants compared to Sacramento participants reported speaking English well or very well (24% vs 13%).

In addition, there were site differences in diastolic blood pressure; compared to Sacramento participants, SC participants had slightly higher diastolic blood pressure, and both sites had elevated systolic blood pressure (mean = 135.97, SD = 19.8). More Sacramento participants met the cutoff for depressive symptoms (39.8%) compared to SC participants (30.3%). Furthermore, Sacramento participants had lower global cognition scores (mean = 82.30, SD = 9.44) than SC participants (mean = 86.08, SD = 7.17), and a greater percentage who met the cutoff criteria for additional CDR assessment (8.4% vs 1.1%). In terms of adversity and trauma exposures (Table 4), there were more

TABLE 3 Baseline VIP health characteristics by site.

Variable	Overall	Sacramento	Santa Clara	*p*	% Missing data
N	548	274	274		
Physical exam					
Body Mass Index classification, *n* (%)				0.571	0.4
Underweight (BMI <18.5)	8 (1.5)	3 (1.1)	5 (1.8)		
Normal weight (18.5 ≥ BMI <23)	161 (29.5)	74 (27.2)	87 (31.8)		
Overweight (23 ≥ BMI <27.5)	258 (47.3)	134 (49.3)	124 (45.3)		
Systolic blood pressure (mmHg), mean (SD)	135.97 (19.8)	134.43 (21.0)	137.51 (18.3)	0.068	0.0
Diastolic blood pressure (mmHg), mean (SD)	71.54 (11.30)	69.61 (11.05)	73.48 (11.23)	<0.001	0.0
Cognitive					
Depression cut-point (>1.75), *n* (%)	192 (35.0)	109 (39.8)	83 (30.3)	0.025	0.0
PTSD symptom score, mean (SD), range 0–80	9.54 (9.81)	8.75 (8.89)	10.34 (10.59)	0.058	0.5
CASI total score, mean (SD)	84.19 (8.59)	82.30 (9.44)	86.08 (7.17)	<0.001	0.0
CASI cut-point (<70), *n* (%)	26 (4.7)	23 (8.4)	3 (1.1)	<0.001	0.0
Self-report health and medical conditions					
Self-rated health, *n* (%)				0.675	1.5
Excellent	6 (1.1)	2 (0.7)	4 (1.5)		
Very good	32 (5.9)	15 (5.5)	17 (6.4)		
Good	155 (28.7)	81 (29.6)	74 (27.8)		
Fair	246 (45.6)	120 (43.8)	126 (47.4)		
Poor	101 (18.7)	56 (20.4)	45 (16.9)		
Hypertension, *n* (%)[a]	389 (73.7)	201 (75.0)	188 (72.3)	0.546	3.6
High cholesterol, *n* (%)	420 (80.0)	218 (81.3)	202 (78.6)	0.499	4.2
Diabetes, *n* (%)	206 (40.2)	105 (39.5)	101 (40.9)	0.813	6.4
Heart condition, *n* (%)[b]	76 (15.4)	34 (13.1)	42 (17.9)	0.182	9.9

Abbreviations: CASI, Cognitive Abilities Screening Instrument; VIP, Vietnamese Insights into Cognitive Aging Program.
[a]Conditions have been diagnosed by a doctor.
[b]Heart conditions include heart attack, coronary heart disease, angina, congestive heart failure, or other heart problem.

SC participants than Sacramento participants who had served in the military in Vietnam (59.9% vs 28.1%), although Sacramento had more participants who sustained a serious injury or illness (35.1%) resulting from military service compared to SC (20.7%), and a higher percentage who had a family member die or go missing (22.6%) compared to SC (15.2%). Sacramento participants also had a higher percentage who reported that their family was forced to move due to required evacuations (56.6%) compared to SC participants (46.3%). More SC participants reported an inability to sleep due to noise or inhospitable conditions (39.3%) than Sacramento participants (30.6%), whereas the latter were more likely to report experiencing sexual assault, molestation, or unwanted sexual contact (2.6%) compared to SC participants (0%).

4 | DISCUSSION

By 2030, the number of ASAs living with ADRD in California is expected to triple, whereas it will double among NHW and Black individuals.[35] By 2055, ASAs are projected to become the largest group of immigrants in the United States, and by 2065, nearly two of five immigrants will be ASAs.[36] Despite the rapid growth of this population, cognitive aging and dementia data from ASA subgroups are sparse. Older Vietnamese Americans are vulnerable to dementia because of the social context with which they arrived in the United States (i.e., many coming as refugees) and prior trauma, and yet whose risk factors for ADRD are unknown. Studying a large cohort of Vietnamese Americans longitudinally may contribute to a better understanding of ADRD in general and offers unique opportunities for elucidating life-course and sociocultural factors that contribute to cognitive aging disparities. The specific context of Vietnamese Americans (i.e., high exposure to life-course trauma and adversity, and high prevalence of CVD risk factors) offers an opportunity to examine the interplay of adversity and trauma, CVD, social factors, and ADRD risk and resilience that may have relevance for other U.S. immigrants and individuals from adverse backgrounds. With the growing influx of refugees from war-torn countries seeking asylum in the United States today,[37] it is essential that more is known about how their early life

TABLE 4 Adversity and trauma exposures of VIP participants.

Variable	Overall	Sacramento	Santa Clara	*p*	Missing
N	548	274	274		
Number of children participant's mother lost before or during childbirth, *n* (%)				0.522	28.1
0	257 (65.2)	139 (63.2)	118 (67.8)		
1	69 (17.5)	39 (17.7)	30 (17.2)		
2 or more	68 (17.3)	42 (19.1)	26 (14.9)		
Death of children in immediate family before age 18, *n* (%)	222 (42.7)	121 (45.7)	101 (39.6)	0.191	5.1
Household member abused substances, *n* (%)	26 (4.8)	11 (4.0)	15 (5.6)	0.502	1.3
Household member experienced mental illness, *n* (%)	24 (4.4)	7 (2.6)	17 (6.4)	0.053	1.5
Household member sent to jail, prison, or re-education camp, *n* (%)	23 (4.3)	15 (5.5)	8 (3.0)	0.231	1.6
Parents separated or divorced, *n* (%)	28 (5.2)	13 (4.8)	15 (5.7)	0.783	1.8
Participant served in the military in Vietnam, *n* (%)	241 (44.0)	77 (28.1)	164 (59.9)	<0.001	0.0
Participant suffered serious injury or illness resulting from formal military service,[a] *n* (%)	61 (25.3)	27 (35.1)	34 (20.7)	0.026	56.0
Participant spent time in jail, prison, or re-education camps, *n* (%)	143 (26.1)	68 (24.8)	75 (27.4)	0.559	0.0
Participant suffered serious injury or illness resulting from jail, prison, or re-education camps,[b] *n* (%)	67 (46.9)	27 (39.7)	40 (53.3)	0.143	73.9
Family member died or went missing in military service, as civilian casualty, or another war-related cause, *n* (%)	103 (18.9)	62 (22.6)	41 (15.2)	0.035	0.7
Family member became disabled due to warzone bombings or shooting, or during evacuation, *n* (%)	34 (6.2)	21 (7.7)	13 (4.8)	0.223	0.4
Participant witnessed dead or seriously injured civilians, *n* (%)	259 (50.0)	126 (46.8)	133 (53.4)	0.159	5.5
Participant knew persons seriously injured or killed in battle, *n* (%)	260 (50.8)	146 (53.9)	114 (47.3)	0.163	6.6
Participant wounded or injured in warzone, *n* (%)	60 (11.3)	32 (11.7)	28 (10.8)	0.846	2.9
Participant's family forced to move due to bombing of home, *n* (%)	207 (39.2)	110 (40.4)	97 (37.9)	0.610	3.6
Participant's family forced to move due to required evacuations, *n* (%)	274 (51.6)	154 (56.6)	120 (46.3)	0.022	3.1
Participant experienced illness, weakness, or discomfort due to shortage of food, *n* (%)	148 (28.3)	71 (26.1)	77 (30.7)	0.288	4.6
Participant experienced inability to sleep due to noise or inhospitable conditions, *n* (%)	184 (34.8)	83 (30.6)	101 (39.3)	0.046	3.6
Participants experienced fear of being injured or killed, *n* (%)	213 (40.4)	115 (42.3)	98 (38.4)	0.417	3.8
Participants experienced exposure to toxic chemicals, *n* (%)	16 (3.1)	7 (2.6)	9 (3.6)	0.692	6.2
Participants experienced fear of sexual assault, molestation, or unwanted sexual contact, *n* (%)	24 (4.6)	16 (5.9)	8 (3.1)	0.190	4.0
Participants experienced sexual assault, molestation, or unwanted sexual contact involving the use or threat of force or mental or psychological coercion, *n* (%)	7 (1.3)	7 (2.6)	0 (0.0)	0.026	2.9

Abbreviation: VIP, Vietnamese Insights into Cognitive Aging Program.
[a]Percentage is based on the number of participants who served in the military.
[b]Percentage is based on the number of participants who reported spending time in a jail, prison, or re-education camp.

experiences, trauma, and sociocultural factors impact their risk for dementia.

The characteristics of the VIP cohort appear to be closely representative of the Vietnamese American population in California and the United States, as about 55% of the sample are female, compared to 51% in both California and the United States. In terms of educational attainment, significant differences were found by site, with SC participants more likely to have higher levels of education than Sacramento participants (15.8% of SC participants had a bachelor's degree or higher compared to 10.6% in Sacramento). These numbers are lower than the national average, with 29% of Vietnamese immigrants reporting a bachelor's degree or higher, compared to 35% of all immigrant adults.[38] This may be because VIP participants are 65 years of age or older, whereas the educational data come from all Vietnamese

immigrants who are 25 years of age or older. Thus, there may be younger Vietnamese who immigrated to the United States, and who received their bachelor's degree in the United States. About 64% of the VIP cohort arrived in the United States before 2000, similar to the 60% of Vietnamese immigrants in the United States. There were site differences in marital status, with almost 70% of SC participants being married or living with a partner, compared to 50% of Sacramento participants. For the entire cohort of VIP participants, almost 60% were married or living with a partner compared to 65% of Vietnamese immigrants in the United States.

In the VIP cohort, about 81% of participants reported their English-speaking proficiency to be some/a little bit/not at all, compared to 65% of Vietnamese immigrants nationally reporting limited English proficiency. This difference may be because U.S. population numbers include all individuals ages 5 and older, and not just older adults. National data on only older Vietnamese Americans might also indicate limited English-speaking proficiency as high as our VIP cohort. The SC site had a higher number of participants who spoke English well or very well. Overall, it appeared that the SC site had more participants with higher educational attainment and better English-language proficiency than the Sacramento site had. Future analyses in VIP will have to account for this difference by controlling for site. Although site differences exist, depression and CVD risk factors were very high for the entire sample, ranging from 40% (diabetes) to 80% (high cholesterol). Results highlight the urgent need to address health and ADRD disparities in the Vietnamese population.

The NIA published "Together We Make the Difference: National Strategy for Recruitment and Participation" in *Alzheimer's and Related Dementias Clinical Research* in 2019.[39] VIP will help to achieve these national goals, specifically in its role to help diversify ADRD research in terms of racial diversity and including healthy, cognitively normal volunteers. Moreover, VIP also engages community partners, which is one of the hallmarks of this national strategy.

VIP is a first-of-its-kind cohort study that examines MCI and dementia in an ASA refugee population to assess how early life adversity and war- and immigration-related traumatic experiences are associated with depression, PTSD, and CVD health, and how this, in turn, is associated with present-day cognition and ADRD risk. For the first time, we will potentially have normative cognitive data in a large and well-characterized cohort of older Vietnamese Americans. Study limitations of the VIP include the fact that by lowering the cutoff of the CASI to 70 for additional CDR testing (as opposed to 85 following Dick et al.[20]), we may be expending more time and resources for individuals who are cognitively normal; this is to ensure that we do not miss anyone with MCI. At the same time, administering the CDR to everyone in the sample would have been ideal, as it could provide even more detailed information regarding cognition and ADRD risk. Another limitation of the study sample is that it is a community-based convenience sample and not a representative population-based sample based on an explicit sampling frame. Thus the generalizability of the VIP data to the national U.S. population of Vietnamese Americans may be limited. However, considering that no other studies of its kind exist currently, VIP as it stands is an important first step in deeply phenotyping a distinct Asian subgroup at risk for poor cognitive health. Our study will add to the work conducted by Dick et al.[20] that provided normative data on a small sample of Vietnamese Americans in Southern California.

VIP presents many potential opportunities for future scientific inquiries and lessons learned, including adapting outreach and recruitment strategies based on constant monitoring of enrollment metrics (e.g., targeting participants who were older and male when these numbers initially seemed low). Given that the sample includes roughly equal numbers of men and women, this will allow for the examination of gender differences in risk factors and cognition among older Vietnamese American adults, particularly those factors that may be related to gender-specific experiences of war (e.g., military service). VIP may include other U.S. sites in the future to expand geographic diversity and varied immigration experiences. Moreover, the future goals of VIP include obtaining imaging, DNA, and other biomarkers that will more fully capture biology–environment interactions and provide insight into prevention and intervention strategies. Understanding disparities in cognitive aging of older Vietnamese Americans who directly experienced war-related trauma has the potential to reduce disparities for younger generations of Vietnamese Americans who might also face health and ADRD-related burdens through intergenerational transmission of trauma.[40] This could offer deeper insights into ADRD pathophysiology and have implications for delaying and preventing the onset of dementia for Vietnamese Americans and other groups.[41]

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CONFLICT OF INTEREST STATEMENT

The authors report no conflicts of interest.

CONSENT STATEMENT

Written informed consent was obtained from all participants before enrolling in the study.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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