JAANP

OPEN

Illness perceptions and blood pressure control among hypertensive Filipino Americans: A cross-sectional study

Felicitas A. dela Cruz, RN, DNSc, FAANP (Professor Emerita/Adjunct Professor)[1], Chong Ho (Alex) Yu, PhD, DPhil (Professor and Program Director of Data Science)[2], & Brigette T. Lao, RN, MA (Nursing), NEA-BC, CIC (Clinic Nurse Manager)[3]

ABSTRACT

Background: Among Asian Americans, Filipino Americans (FAs)—who constitute the fourth largest US immigrant group and who fill in health care workforce shortages—experience high prevalence but low control rates of high blood pressure (HBP). Research reveals that patients' illness perceptions, their common-sense model (CSM) of the illness, influence treatment behaviors, and management outcomes. However, scarce information exists about FAs' perceptions about HBP.

Purpose: To address this gap, we conducted a cross-sectional study to (a) identify the illness perceptions of hypertensive FAs, (b) classify these perceptions into clusters, and (c) determine the association between illness perceptions and BP control.

Methodology: The responses of 248 FAs with HBP to the *Brief Illness Perception Questionnaire* were analyzed using JMP Pro version 17 to discover their CSMs or illness perceptions. We used iterative K means cluster analysis to classify variations in CSMs and analysis of means chart to determine the association of illness perceptions and BP control.

Results: Hypertensive FAs expressed threatening (negative) views of HBP through their emotional perceptions of the illness and its chronic time line, whereas their positive views centered on their cognitive beliefs about understanding HBP and its controllability. Based on the biomedical model of HBP, the overall illness perceptions or CSMs encompassed three clusters. Generally, threatening illness perceptions were associated with stage 2 HBP.

Conclusions/Implications: The findings underscore the need for nurse practitioners to elicit, listen, discern, and understand the illness perceptions or CSMs of hypertensive FAs to improve BP treatment and control with scientifically and culturally tailored interventions.

Keywords: Analysis of means chart; beliefs about high blood pressure; common sense model of illness; illness perception clusters, schemas, patterns, or profiles; illness representations; k-means cluster analysis; mosaic plot; or schemas, patterns, or profiles.

Journal of the American Association of Nurse Practitioners 00 (2024) 1–12, © 2024 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of the American Association of Nurse Practitioners

DOI# 10.1097/JXX.0000000000001032

Illness perceptions and blood pressure control among hypertensive Filipino Americans: a cross-sectional study

On receiving a diagnosis of high blood pressure (HBP) or hypertension, individuals construct ideas and beliefs about the clinical condition (Petrie & Weinman, 2006). These beliefs, illness perceptions, or illness representations indicate how the individuals think about and emotionally react to the illness (Broadbent et al., 2006), and how it affects their everyday life. Increasingly, studies have shown that these illness beliefs influence the achievement of BP reduction and control (Goldman et al., 2020; Rivera et al., 2020). Likewise, recent studies have classified illness perceptions or illness representations into clusters (profiles, patterns, or schemas) to distinguish groups that have similar beliefs and health care outcomes (Rivera et al., 2020). Yet, despite the valuable role of HBP illness perceptions, rarely are they brought to light during clinical visits and consultations (Petrie & Weinman, 2006), creating lost opportunities for clinical conversations to occur and improve illness treatment and management.

[1]*Azusa Pacific University School of Nursing, Azusa, California,* [2]*Department of Mathematics, College of Natural and Computational Sciences, Hawaii Pacific University, Honolulu, Hawaii,* [3]*Student Health Center, University of California Irvine, Irvine, California*

Correspondence: *Felicitas A. dela Cruz, RN, DNSc, FAANP; E-mail: fdelacruz@apu.edu*

Received: *18 May 2023; revised: 9 April 2024; accepted 26 April 2024*

Compared with adult non-Hispanic Whites and other non-Hispanic Asian Americans, Filipino Americans (FAs) experience a high prevalence rate of HBP (defined before November 2017 as BP of ≥140/90 mm Hg), ranging from 53% (Ursua et al., 2013) to 67% (Ma et al., 2017) but a low control rate, ranging from 21.7% (Ursua et al., 2014) to 50.2% (Zhao et al., 2015). These are alarming figures, given that FAs constitute the fourth largest US immigrant population group and fill in workforce shortages in nursing, medicine, management, business, and the arts more than other immigrants do (Migration Information Source, 2023). Therefore, their health status is essential to their continued high participation in the labor force.

Despite these disturbing figures and given the role of illness perceptions in the reduction and control of HBP, a paucity of information exists regarding hypertensive FAs' perceptions and beliefs about HBP. To fill in this gap, we conducted an exploratory study with a trifold aim: (a) to identify the illness perceptions about HBP among hypertensive FAs, (b) to classify these illness perceptions into clusters (also known as profiles, patterns, or schemas) of groups with similar HBP beliefs, and (c) to determine the association between illness perceptions and BP control. The results of this study provide insights into FAs' beliefs about HBP that can serve as the springboard for better communication between FAs and nurse practitioners (NPs) and other health care team clinicians in clarifying misinformation, bridging differences in health beliefs, and developing illness perceptions that can lead to better HBP reduction and control. These outcomes in turn can improve the quality of life, reduce HBP mortality and morbidity, and shrink costs for HBP control.

Theoretical framework

This study uses the Common Sense Model (CSM) of Illness Representation as its theoretical framework (Diefenbach & Leventhal, 1996). This model posits cognitive (Leventhal et al., 2016) and emotional (Broadbent et al., 2006) elements of illness perceptions. Together, these interrelated components, embodied in *The Brief Illness Perception Questionnaire (BIPQ),* make up an illness representation profile, pattern, or schema, identifying the layman's total beliefs about the illness. The consequences, time line, personal control, treatment control, identity, causes, emotional concern, understanding of the illness (coherence), and emotional effect of the illness comprise the dimensions of illness perceptions. Illness perceptions arise from knowledge and information about the illness along with personal and family experiences as well as cultural beliefs about health and illness. Studies indicate that patients' CSMs shape how they manage their illness and its treatment (Rivera et al., 2020), especially when medications and lifestyle changes—the pillars of HBP reduction and control— are required.

Methods

Study design

We used a cross-sectional study design. This study is part of a larger research project that examined the illness and medication beliefs of FAs with HBP.

Recruitment of study participants

We designed a culturally appropriate flyer with the logo of the university and distributed copies in places we know FAs frequently go to, such as malls with Filipino retail stores and shops, churches, and a community center. We also mobilized our professional network by sending these colleagues the flyers so that they can help us recruit. The easy-to-read flyer depicted the title of the study, an image of FAs as the study participants, the purpose and aims of the study, criteria for study inclusion and exclusion, study procedures, incentives for the study, and contact information of the Principal Investigator for those interested in participating in the study.

This flyer distribution was followed by in-person recruitment during 4 weekends at a mall with a large Filipino grocery store, at the end of each mass on three separate Sundays at three Catholic churches with large number of FA parishioners, and on a weekend at the community center when an event was scheduled. We held three informal gatherings at private residences to collect data from the referred eligible FAs from our professional network.

At the mall in front of a Filipina American-owned beauty salon, at the churches' community rooms, and at the FA community center, two posters describing the study were posted, so passersby could see and read them. Designated research team members screened individuals who indicated interest in participating in the study. We acquired a room that provided privacy for data collection in the beauty salon and in the churches and the community center.

Each participant met these inclusion criteria: (a) self-identified as FA, (b) 18 years or older, (c) awareness of having HBP and/or taking anti-HBP medications, and (d) can read, write, and speak English. In general, Filipino immigrants to the United States are proficient in the English language (Pew Research Center, 2019). The study excluded conditions that may increase BP: (a) pregnancy or use of contraceptives; (b) chronic kidney disease, and (c) cognitive and physical impairment that prevents the individual from responding to the questionnaires.

Human Subjects protection

The Institutional Review Board of Azusa Pacific University approved the study. Each study participant signed an informed consent form and received $25 for participating.

Study measures

1. Sociodemographics and clinical characteristics. The questionnaire asked about the study participants'

sex, age, marital status, education, employment status, household income, years in the United States, years with HBP, and family history of HBP; about the study participants' medication adherence using a subscale of the Hypertension Self-Care Activity Level Effects (Warren-Findlow et al., 2013). With a Cronbach alpha of 0.77, the subscale asks: How many of the past 7 days did you (a) take your blood pressure pills? (b) take your blood pressure pills at the same time everyday? and (c) take the recommended number of blood pressure pills? Each question is scored on a range of 0–7 points, and sums range from 0 to 21. In our study, the subscale's Cronbach alpha was 0.84.

2. A Short Acculturation Scale for FAs. This is a unidirectional ethnic-specific measure that assesses on a five-point Likert type scale, language use and preference at home, work, and with friends, as well as in media, and ethnic social relations. The measure that has undergone psychometric testing on first-generation FAs showed a Cronbach alpha of 0.85 (dela Cruz et al., 1998) and with a Cronbach alpha of 0.82 on US-born FAs (dela Cruz et al., 2018). Studies that used this measure have shown appropriate coefficient alphas as evidence of its reliability (Ayers et al., 2010).
3. The BIPQ. In this study, the word "illness" was replaced with "HBP" (Broadbent et al., 2006), clearly specifying the target illness under assessment. The BIPQ measures the participants' illness perceptions of the dimensions or components that comprise their CSM of HBP: consequences, time line, personal control, treatment control, identity, emotional concern, coherence, emotional effect, and causes (Broadbent et al., 2006). Specifically, the measure consists of eight items rated on a 0–10 response scale—an item for each dimension or component—plus an additional open-ended item asking the study participants to list the three most important causal factors of their illness (Broadbent et al., 2006). **Table 1** shows the BIPQ domains, dimensions (component beliefs), descriptions, and specific items and questions. Previous psychometric testing of the BIPQ showed good test–retest reliability, concurrent validity, and predictive validity (Broadbent et al., 2006). With our sample, the reliability (Cronbach alpha) of the BIPQ (items 1–8) ranged from 0.69 to 0.74, which is considered acceptable (Nunnally, 1978).
4. Anthropometric measures and BP readings. Trained research team members measured the study participants' height and weight for body mass index (BMI) calculation and waist circumference, according to the Centers of Disease Control (CDC, 2022) guidelines. The team members used aneroid sphygmomanometers to measure BP, following AHA (2018) BP measurement guidelines.

Statistical analysis

We used JMP Pro version 17 (SAS Institute, 2022) for data analysis and calculated appropriate descriptive statistics for each measure. We calculated the frequency and percentages of categorical variables and means and standard deviations of continuous variables. To determine whether there are significant differences in the sample's sociodemographic, clinical, and social characteristics, Chi square analysis was used for categorical data. Analysis of variance (ANOVA) was used to compare the means of the entire sample and its three subgroups or clusters of belief profiles along with the sample characteristics. When ANOVA showed significant differences among groups, post hoc Tukey test was applied to determine where the exact differences came from.

To determine the participants' illness perceptions about HBP, we computed the means of the total sample's beliefs about each BIPQ dimension or component of HBP. However, in calculating the means of the responses to the BIPQ, it became apparent that the structure of the questionnaire items had to be considered. Five items of the BIPQ (item 1- consequences, 2- time line, 5- identity, 6- emotional concern, and 8- emotional effect) were stated in a way that higher scores reflect threatening (negative) view of the illness. By contrast, the remaining three items (item 3- personal control, item 4- treatment control, and item 7- coherence) were stated so that higher scores indicated less-threatening or benign (positive) views about HBP. Hence, the scores of these three items had to be reversed for the statistical analysis, to ensure consistency in the scoring direction of the other five items (Alfian et al., 2022; Broadbent, n.d.; Figueiras et al., 2010). A line graph (**Figure 1**) showing the means of the belief dimensions of the total sample visually depicts the overall HBP CSM.

To classify the diversity in the overall illness perceptions, we used iterative K-means cluster analysis, which is an unsupervised machine learning algorithm for organizing data into similar groups called clusters. The computed arithmetic means of the scores (also known as the centroid) of each of the illness dimensions and the proximity to the means served as the basis for cluster grouping. K-means clustering maximizes the grouping of similar data and minimizes the similarity of data between the clusters (Liu, 2022). To visualize the varied patterns or profiles of each cluster's illness beliefs, we generated parallel coordinate plots (**Figure 2**). These plots show line graphs that compare the means of the illness beliefs or illness perceptions about HBP along the dimensions of consequences, time line, personal control, treatment control, identity, emotional concern, coherence, and emotional effect. In this study, on the BIPQ scale of 0–10,

Table 1. The Brief Illness Perception Questionnaire

Domains	Dimensions (Component Beliefs)	Descriptions	Item No.	Questions
Cognitive representation	Consequences	The expected effects and outcomes of the illness	1	How does your illness affect your life?
	Time line	The course and duration of the illness: acuteness, chronicity, or cyclicality	2	How long do you think your illness will continue?
	Personal control	The belief that the illness can be controlled by the patient or by the treatment	3	How much control do you feel you have over your illness?
	Treatment control		4	How much do you think your treatment can help your illness?
	Identity	The label the person uses to describe the illness and the symptoms they view as being part of the disease	5	How much do you experience symptoms from your illness?
Emotional representation	Concern	The concerns about the illness	6	How concerned are you about your illness?
	Coherence	Understanding and "making sense" of the illness	7	How well do you feel you understand your illness?
	Emotional effect	Reactions to or feelings about the illness (e.g., anger, anxiety, depression, fear, etc.)	8	How much does your illness affect you emotionally?
Cognitive representation	Cause	Personal ideas about the cause of the illness	9	List in rank order the three most important factors that you believe cause the illness

Source: Broadbent, E., Petrie, K. J., Main, J., & Weinman, J. (2006). The Brief Illness Perception Questionnaire. Journal of Psychosomatic Research, 60(6), 631–637. https://doi.org/10.1016/j.jpsychores.2005.10.020.

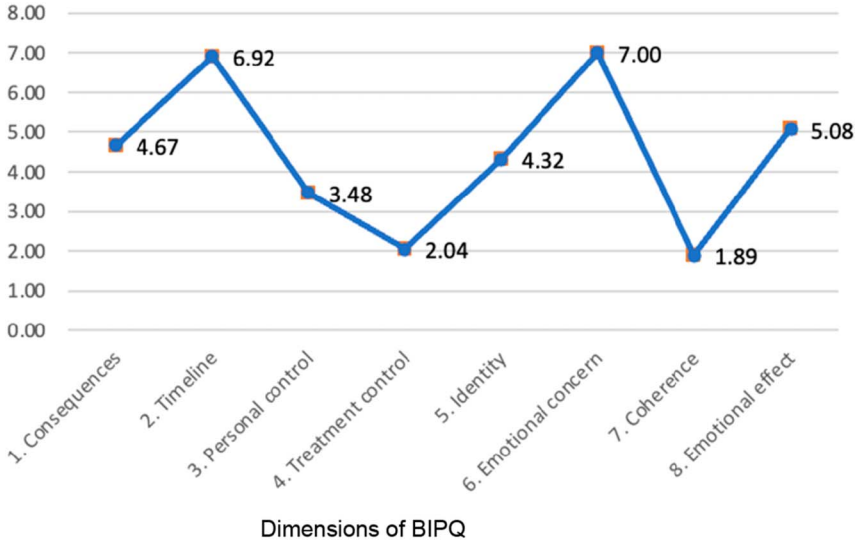

Figure 1. The *y* axis represents the BIPQ scale scores. The values on the line graph show the means of the BIPQ dimensions; the overall mean score is 4.425 (SD = 1.358). The BIPQ dimensional mean scores of item 3 (personal control), item 4 (treatment control), and item 7 (coherence) are reversed scores. BIPQ = Brief Illness Perception Questionnaire.

a score of 7–10 indicates a highly negative or threatening view of the illness dimensions. A score of 4–6 reflects a moderate view of the threatening dimensions of HBP. Lower scores such as 0–3 suggest views about dimensions of HBP that are more positive (less threatening or benign). The categorical data on the causes of HBP (item 9) were inappropriate for cluster analysis. Hence, this article excludes the results of this item.

To ascertain if there is an association between the illness perceptions and BP control, we first determined how each cluster fitted the 2017 American College of Cardiology (ACC) and American Heart Association (AHA) BP Guidelines (Whelton et al., 2018). The guidelines maintained normal BP as <120/<80 mm Hg but redefined BP categories as elevated (120–129/<80 mm Hg), hypertension stage 1 (130–139 or 80–89 mm Hg), and hypertension stage 2 (≥140 or ≥90 mm Hg). With the 2017 BP guidelines, controlled HBP refers to BP readings of <130/<80 mm Hg. The mosaic plot (JMP Statistical Discovery, 2022) in **Figure 3A** visually represents the distribution of the belief clusters in relation to the 2017 ACC/AHA BP categories.

Second, we generated an analysis of means (ANOM) chart to analyze the association between BIPQ scores and the 2017 ACC/AHA BP categories. ANOM is a graphical method that plots the differences among the means of

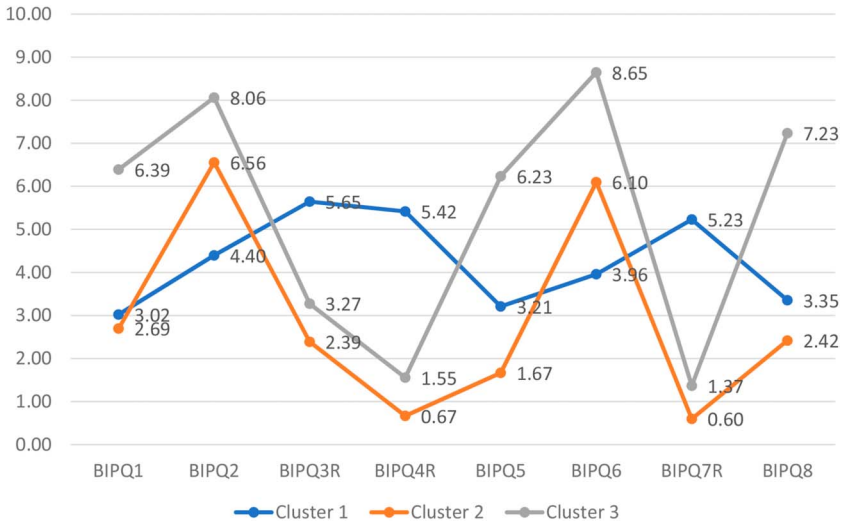

Figure 2. The *y*-axis represents the BIPQ scale scores. The values in the line graphs show the means of the BIPQ dimensions for each cluster. Overall mean score of each cluster: cluster 1 (4.28, SD = 0.86); cluster 2 (2.89, SD = 1.05); and cluster 3 (5.35, SD = 0.70). BIPQ1 = consequences, BIPQ 2 = time line, BIPQ3R = personal control (reversed score), BIPQ4R = treatment control (reversed score), BIPQ5 = identity, BIPQ6 = emotional concern, BIPQ7R = coherence (reversed score), BIPQ8 = Emotional Effect. BIPQ = Brief Illness Perception Questionnaire.

the BIPQ scores in the four BP categories against a reference value to determine whether the differences are substantial (**Figure 3B**). We used the grand mean of the BIPQ scores of the overall CSM or illness perceptions of the total sample as the reference. The upper decision limit (UDL) and lower decision line (LDL) are references to determine whether any group mean is out of the ordinary. Similar to hypothesis testing, the UDL and LDL are determined by alpha level = 0.05.

ANOM captures differences in variability between the groups rather than within groups, thus enabling the identification of particular groups that exhibit significant deviations from the expected mean. The ANOM has some advantages over traditional statistical tests, such as its ability to visually detect patterns and trends and its ease of interpretation (Jayalath & Turner, 2021). Data visualization techniques like the ANOM chart is a form of data science in which the conclusion relies on pattern recognition, rather than a cutoff criterion.

Results

Characteristics of study participants

A total of 250 eligible study participants were recruited, but due to incomplete data, two participants were excluded from the statistical analysis. The Supplemental Digital Content (Appendix, http://links.lww.com/JAANP/A301) shows the study participants' demographic, clinical characteristics, acculturation, and distribution into the three illness perception clusters. Overall, male and female participants were almost equally represented, with a mean age of 64.31 years (SD = 10.93), mostly married (71.37%); 63.16% with a college degree; 40.32% retired; 25.20% with a household income of >$75,000; and have resided in the United States for an average of 26.49 years (SD = 12.60). The illness perceptions or CSMs of the participants comprised three clusters or profiles. Of the total number of study participants, 19.35%, 29.03%, and 52.61% shared the CSM profile of cluster 1, cluster 2, and cluster 3, respectively, with the majority of the study participants

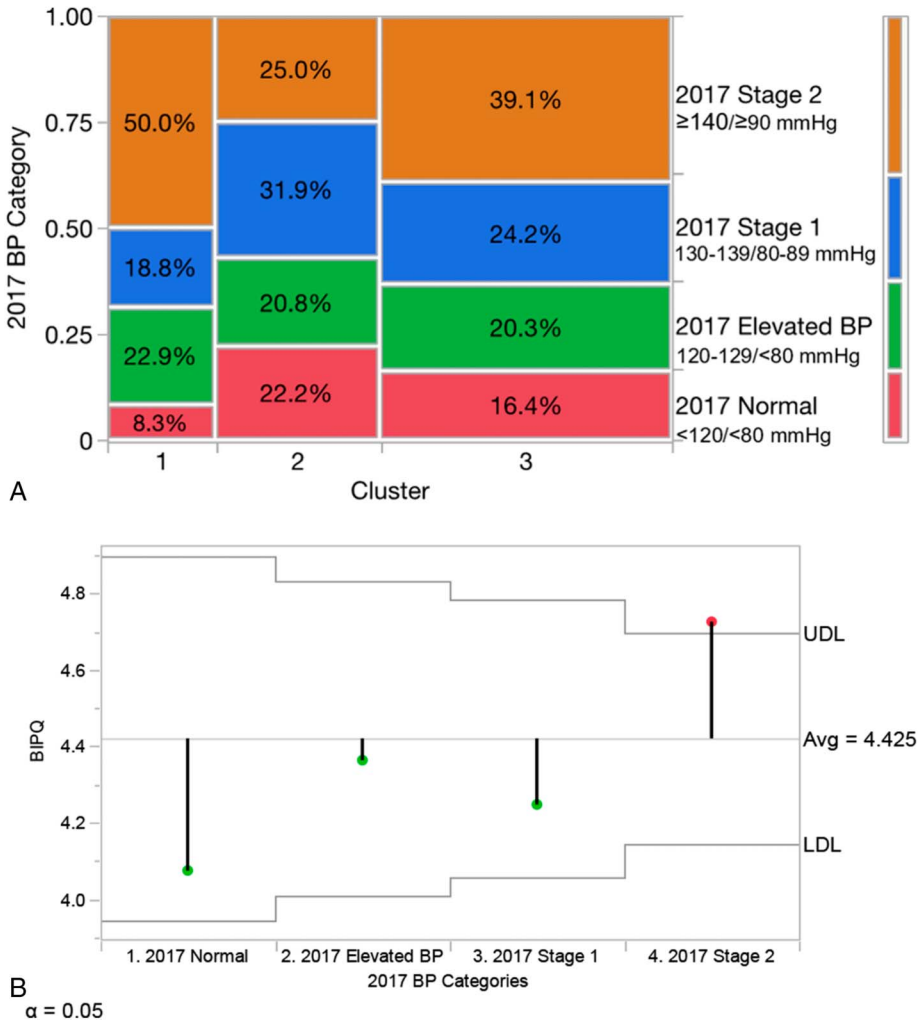

Figure 3. A, On the *y* axis, the labels of the 2017 BP category are located on the right side of the bar chart. The numbers beside 2017 BP category refer to the percentage scale ranging from 0 to 1. B, Normal = (4.08, SD = 1.68); elevated BP = (4.37, SD = 1.61); stage 1= (4.25, SD = 1.28); stage 2 = (4.73, SD = 1.09). BP = blood pressure.

sharing the CSM schema of cluster 3. Except for marital status (p = .001), no significant differences existed among the three clusters.

Clinical characteristics. The participants have had HBP for a mean of 13.03 years (SD = 10.60). Overall, the total sample mean BMI of 26.73 (SD = 4.32) exceeded the cutoff point of the normal BMI of 18.5–22.9 for Asians and Asian Americans (Joslin Diabetes, 2021). The female participants registered a mean waist circumference of 89.25 cm (SD = 10.35), whereas the men revealed 95.86 cm (SD = 10.04), both surpassing the cutoff point of waist circumference for Asians and Asian Americans at 80 cm for women and 90 cm for men (Joslin Diabetes, 2021). The majority of the participants revealed a family history of HBP. No significant differences in these clinical characteristics existed among the three clusters.

The participants showed an overall medication adherence mean score of 6.14 (SD = 1.66) on a scale of 0–7. The participants in cluster 2 showed the highest mean adherence score of 6.52 (SD = 1.16); for those in cluster 1, the lowest score was 5.49 (SD = 2.23), and those in cluster 3 showed an in-between score of 6.17 (SD = 1.60). The study participants in each cluster revealed the same pattern in each of the items of the medication adherence subscale. ANOVA revealed that there was a significant difference in the overall medication adherence score (p = .0037) among the three clusters in terms of how many pills were taken in the past 7 days (p = .0010) and taking recommended number of BP pills (p = .0113). There was no difference among the three clusters in taking BP pills at the same time each day (p = .0691). Tukey test—a post hoc test to ANOVA—showed no significant difference in the adherence scores of clusters 2 and 3, but significant differences existed between clusters 1 and 2 and clusters 1 and 3 regarding medication adherence.

Acculturation. The participants in the three clusters indicated that they are bicultural, with a mean acculturation score of 2.68 (SD = 0.69). They have incorporated features of both Filipino culture and the American culture.

Overall illness perceptions of entire sample

Figure 1 depicts the participants' overall illness perceptions—their CSM of HBP—based on their responses to the BIPQ's dimensions. On a 0–10 scale, the participants indicated their highest mean scores on emotional concern and time line; these were followed by moderate mean scores on emotional effect, consequences, and identity (label and symptoms). These dimensions indicated threatening (negative) perceptions about HBP. By contrast, the low mean scores on coherence (understanding about the illness), treatment control, and personal control showed their less-threatening or benign (positive) views about the illness. The total overall mean score of the sample's illness perceptions is 4.425 (SD = 1.358), indicative of the participants' moderately threatening (negative) views of HBP through their emotional perceptions about the illness and its chronic time line, consequences, and identity. Their positive views centered on their cognitive beliefs about understanding HBP (coherence) and its controllability with medical treatment and personal control.

Classification of illness perceptions into clusters

Through K-means cluster analysis, three groups or clusters emerged to represent the variety of illness CSM profiles. The parallel coordinate plots in **Figure 2** graphically display these illness perception clusters, along with their BIPQ dimensional mean scores. The biomedical model of HBP served as the basis for the comparison of the differences in the CSMs of the three illness perception clusters.

Cluster 1 participants registered the highest but moderate mean scores on personal control, treatment control, coherence, time line, and emotional concern, indicative of moderately threatening or negative views of HBP. The lowest mean scores were recorded under consequences, identity, and emotional effect, indicating less-threatening or benign (positive) beliefs about HBP. Thus, cluster 1 participants' CSM moderately refutes (a) the role of personal responsibility, treatment, and understanding of the illness in HBP control, (b) its chronicity, and (c) their emotional concern; however, it accepts the low probability of predicting HBP from experiencing symptoms (identity) and disavows the consequences, and emotional effect of HBP. The overall mean BIPQ score in cluster 1 registered at 4.28 (SD = 0.86), denoting a moderately threatening or negative view of HBP.

Conversely, illness profile mean scores for cluster 2 and cluster 3 participants run along parallel tracks. Both groups registered the highest mean scores on emotional concern and time line (with cluster 3 showing the highest levels), indicative of threatening (negative) views of HBP. Both showed the lowest mean scores on treatment control, personal control, and understanding of the illness (coherence), suggesting less-threatening or benign (positive) views of the illness. However, the illness representations of cluster 2 members deviated from cluster 3's with low mean scores in consequences, identity, and emotional effect, indicating less-threatening (positive) views of HBP. The overall mean score of cluster 2 was 2.89 (SD = 1.05), signifying a benign or less-threating (positive) view of HBP.

Cluster 3 participants showed the highest mean scores on emotional concern, time line, and emotional effect, as well as moderately high mean scores on consequences and on identity—the presence of symptoms—when their BP is high. Cluster 3's overall mean score (5.35, SD = 0.70) denoted the most-threatening (negative) views about HBP among the three clusters.

In sum, clusters 1 and 3 participants' CSMs held HBP as a moderately threatening illness. By contrast, cluster 2's CSM presented HBP as a benign or less-threatening illness.

Association of illness perceptions and blood pressure

To visualize the association between illness perceptions and BP control, we created a mosaic plot and an ANOM chart. **Figure 3A** depicts a mosaic plot of the percentage distribution of the three clusters corresponding to the 2017 ACC/AHA BP categories. The mosaic plot reveals that (a) cluster 1 participants had the least percentage (8.3%) of normal BP and the highest percentage (50%) of stage 2 HBP, (b) cluster 2 participants had the highest proportion (22.2%) of normal BP and the least percentage (25%) of stage 2 HBP but the highest percentage (31.9%) in stage 1, and (c) the BPs of the group in cluster 3 were in between the percentage distributions of cluster 1 and cluster 2. Altogether, the majority of the study participants have uncontrolled HBP at either stage 1 or stage 2.

Figure 3B presents the ANOM chart that links the total sample's overall BIPQ illness perceptions mean scores with the four ACC/AHA BP categories. The overall BIPQ mean of the total sample was 4.425 (SD = 1.358). The BIPQ mean scores in the normal to stage 1 categories were below the average mean (4.425). However, the BIPQ mean in stage 2, as indicated by the red dot is beyond the UDL, implying that this BIPQ mean is significantly higher (alpha = 0.05) than the rest of the BP categories (normal, elevated, and stage 1). The higher BP stage, the higher the BIPQ mean score. Thus, BIPQ mean score and BP category have a positive association, as illustrated in this data visualization chart that shows the pattern and trends of the data.

Discussion

Key findings

This cross-sectional study aimed to identify the illness perceptions or CSM of hypertensive FAs about HBP, to classify these perceptions into clusters (profiles, patterns, or schemas) or groups having similar illness perceptions and to determine the association between illness perceptions and BP control. The study's key findings are as follows:

1. In their overall CSM, FAs with HBP view it as a moderately threatening illness—determined by their negative beliefs of HBP—as evidenced by their emotional concern, their views on its chronic time line, emotional effect, consequences, and identity. At the same time, they hold less-threatening cognitive views about understanding HBP and its controllability.
2. Illness perceptions of FAs—their CSMs about HBP—fall into three definite clusters or groups sharing similar illness perceptions. Clusters 1 and 3 participants perceive HBP as a moderately threatening illness, whereas cluster 2 participants view HBP as a benign or less-threatening illness.
3. The majority of the study participants have uncontrolled HBP. The overall threatening HBP illness perceptions of the study participants are associated with stage 2 HBP.

Overall illness perceptions. In addition to the high negative emotional concern about HBP and the moderately elevated negative view of its time line, hypertensive FAs possess moderate views of its emotional effect, consequences, and identity—they believe that they can predict when their BP is high with signs and symptoms. In general, participants' CSM of HBP aligns with the biomedical model's cognitive concepts about the illness: its chronicity, consequences, and controllability but contradicts the scientific view by relying on the belief in signs and symptoms (identity) to herald HBP. This contradiction has also been noted in studies of patients with HBP in England (Goodhart, 2016), in Spain (Granados-Gamez et al., 2015), and in the Philippines (Lasco et al., 2022).

The overall CSM of FAs closely replicated the results of a study on the illness perceptions of Portuguese patients with HBP (Figueiras et al., 2010). Furthermore, our study findings on the overall CSM of HBP reinforce the results of similar studies of varied ethnic groups, such as the Taiwanese (Hsiao et al., 2012), Indonesians (Alfian et al., 2022), Nepalese (Shakya et al., 2020), and Iranians (Baharvand et al., 2023).

Clusters of illness perceptions. The pattern of HBP illness perceptions in cluster 1 is at odds with the key cognitive biomedical concepts about HBP—its consequences, controllability, and coherence. The lower BIPQ scores of cluster 1 on consequences of HBP suggest limited recognition of the serious consequences of uncontrolled HBP—heart attack, heart failure, kidney disease, stroke, vision loss, and sexual dysfunction (AHA, 2022). The moderately negative views in cluster 1 about personal and treatment control and comprehension of HBP prompts the possibility that cluster members who take medications experience annoying side effects, such as frequent urination, stomach problems, diarrhea, and decreased sexual drive (dela Cruz & Galang, 2008), with no reduction in their HBP. Thus, they may subscribe to alternative cultural approaches, such as use of herbal teas, garlic, massage, and acupuncture (dela Cruz & Galang, 2008), consonant with a previous study's report that a lack of knowledge about HBP was associated with strong beliefs in herbal and traditional medicines in the community (Chimberengwa et al., 2019). These findings underscore the intersection of illness beliefs and cultural viewpoints and practices. Participants in cluster 1 showed the lowest score on medication adherence, the lowest proportion with controlled HBP and the highest

proportion with stage 2 uncontrolled HBP, reinforcing a study showing that patients with poor disease understanding have poorly controlled HBP (Pickett et al., 2014).

However, the lower scores on identity indicate acknowledgement of the asymptomatic attribute of HBP. The absence of signs and symptoms to indicate HBP can trigger denial of its presence because definitive signs and symptoms usually signal emergence of a disease. Hence, the diagnosis of HBP becomes a paradox because there are no overt symptoms that indicate something is amiss. Finally, because HBP lacks symptoms, it becomes a "silent killer," as cluster members take their chances that any disastrous consequence will not likely occur.

On the contrary, cluster 2 held less-threatening (positive) illness perceptions because the group believed in the controllability of the illness through personal control and treatment control, along with comprehending the nature of HBP. These illness perceptions are substantiated by their having the highest medication adherence scores and the highest proportion of controlled HBP. Their beliefs about the controllability of HBP may also account for their less-threatening views of its consequences and emotional aspects. These findings align with studies that show less-threatening views on illness consequences and emotional aspects of the illness have better health care outcomes (Rivera et al., 2020).

The profile of cluster 3's illness perceptions reflects the members' cognitive concurrence with the biomedical information about HBP, but it also makes them the most concerned among the schemas. Despite their positive views about the role of treatment and their personal control in the treatment and management of the illness, they revealed their threatening views of HBP with their high level of emotional concern and emotional effect of the illness and moderately elevated view of symptoms heralding HBP. The high level of emotional perceptions raises the question as to how cluster 3 members cope with the threats of the illness. Furthermore, despite the general agreement with the biomedical model, the moderate score on identity raises the issue that their perception of the change in their BP arises from experiencing certain signs and symptoms that may account for their suboptimal medication adherence. Thus, signs and symptoms perceived as indicators of HBP may influence their medication adherence if they take their medications only when they experience signs and symptoms they think arise from HBP.

Both clusters 2 and 3, despite their strong beliefs in the controllability of HBP, experienced moderate to high levels of emotional concern about the illness. These findings concur with a systematic and meta-analysis, which revealed that patients with HBP awareness have an increased risk of anxiety, delaying, or hindering lifestyle modifications (Pan et al., 2015).

All three clusters have a high proportion of uncontrolled HBP. These results confirm previous studies reporting the high prevalence rate of HBP among FAs (Ghimire et al., 2018; Lapiz-Blum et al., 2022; Ma et al., 2017; Ursua et al., 2013; Zhao et al., 2015).

Our detection of three HBP belief clusters concurs with the findings of the study on HBP among Portuguese (Figueiras et al., 2010) and Taiwanese (Hsiao et al., 2012) patients. The presence of three CSMs or illness perception schemas also supports the findings of a systematic review of health perceptions about a variety of health conditions (Rivera et al., 2020).

Association between illness perceptions and BP control. ANOM revealed that uncontrolled BP was associated with the total sample's negative (threatening) views of the illness as indicated by high emotional illness concern, moderately elevated view of its chronicity, and moderate beliefs on its emotional effect, consequences, and identity, despite the positive (less threatening) perceptions of understanding the illness (coherence) and treatment and personal control of the illness. This CSM's association of threatening illness perceptions with stage 2 HBP substantiates previous research, which indicated that negative emotional and negative cognitive illness perceptions predict unhealthy outcomes (Frostholm et al., 2007; Jabarian et al., 2021; Rivera et al., 2020).

Strengths and limitations

This study has several strengths. It is presumptively the first to quantitatively examine and classify the illness perceptions or CSMs about HBP among FAs—an ethnic group that disproportionately experiences hypertension. The study also assessed the association between their illness perceptions and BP control. The almost equal representation of male and female study participants decreases any potential gender bias in the study. This study's findings align with previous study results on the influence of illness perceptions on health outcomes. Finally, post hoc power analysis showed that given an effect size of 0.2, our sample size of 248 had a power of 0.80 with 0.05 as the level of significance, supporting the validity of the study findings.

The study has several limitations. The first limitation is concerned with the research design. As a cross-sectional study with a relatively small sample size, this study cannot affirm any causal inferences. Second, the findings from the study's convenience sample may not be generalizable beyond this sample. Third, except for the BP and anthropometric measurements, all measures used self-reporting that can foster social desirability bias. Fourth, the BP of the participants was obtained on only one occasion (the average of two readings), in negation of the AHA (2018) recommendation to use an average of two readings obtained on two occasions to estimate the individual's BP level. As a cross-sectional study, it cannot track BP changes.

Nonetheless, the BP findings substantiate previous study results on the HBP status of FAs (Ghimire et al., 2018; Lapiz-Bluhm et al., 2022; Ma et al., 2017; Ursua et al., 2013; Zhao et al., 2015). Finally, the study only assessed the association of illness beliefs and BP control, excluding other possible factors associated with BP control.

Nurse practitioner practice implications

The high proportion of study participants with uncontrolled HBP introduces the issue of intensifying treatment plans based on the 2017 guidelines. A study of veterans showed that patient adherence to therapy plays a role, but vigorous clinician management is a more important contributor to BP control (Rose et al., 2007). A recent study revealed that the proportion of US adults with controlled BP has declined (Munter et al., 2022); reports on the adherence of physicians to the 2017 HBP guidelines indicated a suboptimal treatment level for hypertensive older adults in the United States (Chiu et al., 2023; McEvoy, 2023)—highly indicative of clinical inertia. Also known as "therapeutic inertia," the term refers to the failure of health care providers to initiate or intensify therapy as indicated by guidelines (Milman et al., 2018).

Because illness perceptions influence health behaviors and outcomes, NPs need to elicit, listen, discern, and understand the illness perceptions or CSMs of hypertensive FAs to provide patient-centered care. The use of the short and practical BIPQ can start the process. Current clinic intake technology allows the patient to preregister and answer the questionnaire online before a clinic follow-up visit. During follow-up visits, the results of the CSM assessment serve as the springboard to a shared decision-making process about the management of HBP through tailored and culturally grounded health teaching and counseling. After each follow-up visit, both NP and patient can review the mutually agreed-upon HBP management decisions.

For patients whose illness perceptions agree with the biomedical model of HBP but are beset with high emotional concern and effects, NPs can reinforce the patients' understanding of the controllability of the illness. NPs should fortify the patients' belief that they can avoid or minimize the occurrence of serious consequences of HBP as long as they adhere to their medication regimen and sustain lifestyle habits that enhance HBP control. They can also encourage and instruct these patients to learn how to use strategies to lessen their anxiety about the illness. NPs can advise them to seek emotional support from family and friends in their effort to control HBP, in keeping with the FA collective spirit of helping each other.

To deal with patients' misperceived HBP beliefs, NPs have to draw on their communication skills to engage these patients in an effective dialogue about the nature of HBP—its asymptomatic nature, the consequences of uncontrolled HBP, the modifiable and unmodifiable risk factors for HBP, the importance of taking antihypertensive medication, and the patients' role in the control of HBP. Thus, NPs empower FAs to control their HBP, giving them not only knowledge about HBP but also cultural tailoring to build skills for them to apply the information received. For example, although FAs have become bicultural, most prefer Filipino dishes that are high in salt and fat (dela Cruz et al., 2013; Vargas & Jurado, 2016). To minimize the use of salt and fat, the cultural tailoring for dietary preparation includes the substitution of spices and flavorings, such as garlic, ginger, onion, and herbs. In other words, health promotion teaching and counseling must integrate and build culturally appropriate skills contributing to lowering of HBP. This approach becomes more compelling given the presence of concomitant risk factors for HBP in this ethnic group: high BMI, wider waist circumference, aging, and family history of HBP. Additional areas to increase their self-efficacy in the control of HBP include imparting knowledge and skills in engaging in physical activity, maintaining healthy weight, and using effective coping strategies to counteract stress in their daily life.

Conclusions and future research

The study findings underscore the necessity for NPs to learn how to elicit, listen, discern, and understand illness beliefs about HBP among hypertensive patients, especially those experiencing disproportionate high prevalence and low control rates. This information can become the springboard for improved communication between the NPs and team clinicians and the patient to improve BP reduction and control. The success of this approach requires NPs and clinicians to understand differences between patient and health care providers' illness perceptions. This acknowledgement can lead to a shared understanding of the scientific information about HBP for the patient to comprehend its features and treatment and management. At the same time, NPs need to become aware of cultural health practices in illness perceptions, especially among ethnic groups. Hence, health promotion information given along with the training to build skills for lifestyle changes to manage the control of HBP involves approaches that are culturally appropriate and targeted to the knowledge gaps reflected by their illness perceptions.

Future research includes studies to determine the alignment of current antihypertension treatment plans among NPs and the 2017 BP guidelines; these studies should incorporate the experiences of NPs, team clinicians, and patients to the intensification of treatment and its clinical outcomes. Studies on the psychosocial, medical, health care system, and fiscal factors associated with illness representations and HBP control among FAs are needed. The results of these studies then can provide the basis for crafting multifocal, culturally grounded interventions to clarify misinformation, bridge differing illness perceptions, and develop effective strategies to control

HBP among FAs. These interventions must document the processes involved in reporting their feasibility, acceptability, and appropriateness in changing misperceived illness beliefs into ones that enhance the reduction and control of HBP. These outcomes can improve the quality of life, reduce HBP mortality and morbidity, and reduce fiscal expenditures for HBP control. The findings of these studies can inform clinicians in designing effective culturally tailored interventions for the control of HBP in this ethnic group, not only in the United States but also in Europe and the Middle East as well as other countries with many Filipino immigrants. If appropriate, these studies can also be adapted to improve HBP reduction and control in other ethnic groups of immigrants disproportionately experiencing uncontrolled HBP.

Acknowledgements: *The authors thank their previous student research assistants, Bethrese Elane Padini, OTD, OTR/L, for her assistance in data collection and data entry; Jenna Stewart, BS (Biology), PA-S, and Anthony Yung, MS (MFT) for their assistance in searching, retrieving, and compiling the literature; and Barbara Araujo, formerly Program Coordinator of the Office of Assessment and Evaluation at the School of Nursing, for her administrative support. The authors are grateful to the venues used in this study and to the professional and personal network for their assistance in the recruitment of study participants. Most importantly. the authors deeply appreciate the study participants' time and effort in making this study possible.*

Ethical conduct of research: *The study was conducted following its approval by the institutional review board of the university. Patients individually signed an informed consent form.*

Authors' contributions: *Concept/design: F.A. dela Cruz and B.T. Lao. Data collection: F.A. dela Cruz and B.T. Lao. Data analysis and visualization: C.-H.A. Yu. Interpretation of data: All authors. Draft of initial manuscript: F.A. dela Cruz. Critical revision of article: All authors. Approval of article: All authors.*

Competing interests: *The authors report no conflicts of interest.*

Funding: *This study was funded by the APU Faculty Research Council.*

References

Alfian, S. D., Annisa, N., Perwitasari, D. A., Coelho, A., & Abdulah, R. (2022). The role of illness perceptions on medication nonadherence among patients with hypertension: A multicenter study in Indonesia. *Frontiers in Pharmacology*, 13, 985293. https://doi.org/10.3389/fphar.2022.985293

American Heart Association (AHA). (2018). *Steps for accurate BP measurement*. AHA toolkit poster. https://AHA_Toolkit_Poster_Final_102618(2).pdf

American Heart Association (AHA). (2022). Health threats from high blood pressure. https://www.heart.org/en/health-topics/high-blood-pressure/health-threats-from-high-blood-pressure

Ayers, C. G., Atkins, R., & Lee, J. H. (2010). Factors related to health practices: Cervical cancer screening among Filipino Women. *Research and Theory for Nursing Practice: An International Journal*, 24(3), 197–209. https://doi.org/10.1891/1541-6577.24.3.197

Baharvand, P., Malekshahi, F., & Babakhani, A. (2023). Perception of hypertension and adherence to hypertension treatment among patients attending a hospital in western Iran: A cross-sectional study. *Health Science Reports*, 6(8), e1501. https://doi.org/10.1002/hsr2.1501

Broadbent, E., Petrie, K. J., Main, J., & Weinman, J. (2006). The Brief illness perception questionnaire. *Journal of Psychosomatic Research*, 60(6), 631–637. https://doi.org/10.1016/j.jpsychores.2005.10.020

Broadbent, E. (n.d.). *The brief illness perception scoring instructions*. https://www.spoergeskemaer.dk/wp-content/uploads/B-IPQ-scoring.docx

Centers for Disease Control and Prevention [CDC]. (2022, June 3). Healthy weight, nutrition, and physical activity: Assessing your weight. https://www.cdc.gov/healthyweight/assessing/index.html

Chimberengwa, P. T., & Naidoo, M., & Cooperative Inquiry Group. (2019). Knowledge, attitudes and practices related to hypertension among residents of a disadvantaged rural community in southern Zimbabwe. *PLoS One*, 14(6), e0215500. https://doi.org/10.1371/journal.pone.0215500

Chiu, N., Chiu, L., Aggarwal, R. L., Raber, I., Bhatt, D. L., & Mukamal, K. J. (2023). Trends in blood pressure treatment intensification in older adults with hypertension in the United States, 2008 to 2018. *Hypertension*, 80(3), 553–562. https://doi.org/10.1161/HYPERTENSIONAHA.122.19882Onlineaheadofprint

dela Cruz, F. A., & Galang, C. (2008). The illness beliefs, perceptions, and practices of Filipino Americans with hypertension. *Journal of the American Association of Nurse Practitioners*, 20(3), 118–127. https://doi.org/10.1111/j.1745-7599.2007.00301.x

dela Cruz, F. A., Lao, B., & Heinlein, C. (2013). Level of acculturation, food intake, dietary changes, and health status of first-generation Filipino Americans in Southern California. *Journal of the American Association of Nurse Practitioners*, 25(11), 619–630. https://doi.org/10.1111/1745-7599.12031

dela Cruz, F. A., Padilla, G., & Butts, E. (1998). Search and research: Validating A short acculturation scale for Filipino-Americans. *Journal of the American Association of Nurse Practitioners*, 10, 453–460. https://doi.org/10.1111/j.1745-7599.1998.tb00470.x

dela Cruz, F. A., Yu, C. H., & Vindua, K. I. (2018). The factor structure of a short acculturation scale for Filipino Americans in an adult U.S.-born sample. *Journal of Community Psychology*, 46(5), 535–550. https://doi.org/10.1002/jcop.21955

Diefenbach, M. A., & Leventhal, H. (1996). The common-sense model of illness representation: Theoretical and practical considerations. *Journal of Social Distress and the Homeless*, 5(1), 11–38. https://doi.org/10.1007/BF02090456

Figueiras, M., Marcelino, D. S., Claudino, A., Cortes, M. A., Maroco, J., & Weinman, J. (2010). Patients' illness schemata of hypertension: The role of beliefs for the choice of treatment. *Psychology & Health*, 25(4), 507–517. https://doi.org/10.1080/08870440802578961

Frostholm, L., Oernboel, E., Christensen, K. S., Toft, T., Olesen, F., Weinman, J., & Fink, P. (2007). Do illness perceptions predict health outcomes in primary car patients? A 2-year follow-up study. *Journal of Psychosomatic Research*, 62, 129–139. https://doi.org/10.1016/j.jpsychores.2006.09.003

Ghimire, S., Cheong, P., Sagadraca, L., Chien, L-C., & Sy, F. (2018). A health needs assessment of the Filipino American community in the Greater Las Vegas area. *Health Equity*, 2(1), 334–348. https://doi.org/10.1089/heq.2018.0042

Goldmann, E., Jacoby, R., Finfer, E., Appleton, N., Parikh, N. S., Roberts, E. T., & Boden-Albala, B. (2020). Positive health beliefs and blood pressure reduction in the DESERVE study. *Journal of American*

Medical Association, 9(9), e014782. https://doi.org/10.1161/JAHA.119.014782

Goodhart, A. K. (2016). Hypertension from the patient's perspective. *The British Journal of General Practice: the Journal of the Royal College of General Practitioners*, 66(652), 570. https://doi.org/10.3399/bjgp16X687757

Granados-Gamez, G., Roales-Nieto, J. G., Gil-Luciano, A., Moreno-San Pedro, E., & Marquez-Hernandez, V. V. (2015). A longitudinal study of symptoms beliefs in hypertension. *International Journal of Clinical and Health Psychology*, 15(3), 200–207. http://dx.doi.org/10.1016/j.ijchp.2015.07.001

Hsiao, C. Y., Chang, C., & Chen, C. D. (2012). An investigation on illness perception and adherence among hypertensive patients. *The Kaohsiung Journal of Medical Sciences*, 28(8), 442–447. https://doi.org/10.1016/j.kjms.2012.02.015

Jabbarian, L. J., Rietjens, J. A., Mols, F., Oude Groeniger, J., van der Heide, A., & Korfage, I. J. (2021). Untangling the relationship between negative illness perceptions and worse quality of life in patients with advanced cancer—a study from the population-based PROFILES registry. *Supportive Care in Cancer: Official Journal of the Multinational Association of Supportive Care in Cancer*, 29(11), 6411–6419. https://doi.org/10.1007/s00520-021-06179-9

Jayalath, K. P., & Turner, J. (2021). Analysis of means (ANOM) Concepts and computations. *Applications and Applied Mathematics: An International Journal (AAM)*, 16(1). https://digitalcommons.pvamu.edu/aam/vol16/iss1/5

JMP Statistical Discovery. (2022). Mosaic plot. https://www.jmp.com/en_us/statistics-knowledge-portal/exploratory-data-analysis/mosaic-plot.html

Joslin Diabetes. (2021). AADI BMI calculator BMI for Asian and Asian American adults. https://www.joslin.org/patient-care/multicultural-programs/asian-american-diabetes-initiative/am-i-risk/aadi-bmi

Lapiz-Bluhm, M. D., Romero, C., El Moudden, I., Clarke, A., & Dodani, S. (2009). Call to action: Community health screening data highlight the need to address hypertension among Filipino Americans. *Journal of Nursing Practice Applications & Reviews of Research*, 12(1), 16–24. https://doi.org/10.13178/jnparr.2022.12.01.1204

Lasco, G., Renedo, A., Mendoza, J., Seguin, M. L., Palafox, B., Palileo-Villanueva, L. M., Balabanova, D., & McKee, M. (2022). Doing' hypertension: Experiential knowledge and practice in the self-management of "high blood" in the Philippines. *Sociology of Health & Illness*, 44(7), 1167–1181. doi. 10.1111/1467-9566.13503

Leventhal, H., Phillips, L. A., & Burns, E. (2016). Modelling management of chronic illness in everyday life: A common-sense approach. *Psychological Topics*, 25(1), 1–18.

Liu, R. (2022, July). Data analysis of educational evaluation using K-means clustering method. *Computational Intelligence and Neuroscience*, 2022, 3762431. https://doi.org/10.1155/2022/3762431

Ma, G. X., Lee, M., Bhimla, A., Tan, Y., Gadegbeku, C. A., Yeh, M. C., & Aczon, H. (2017). Risk assessment and prevention of hypertension in Filipino Americans. *Journal of Community Health*, 42(4), 797–805. doi. 10.1007/s10900-017-0320-0

McEvoy, J. W. (2023, Dec. 10). 2023 top story in Cardiology: Hypertension story of the year—a moment of inertia. *Practice Update*, expert opinion and commentary, Elsevier, Inc.

Migration Information Source. (2023). Filipino immigrants in the United States. https://www.migrationpolicy.org/article/filipino-immigrants-united-states#age-education-employment

Milman, T., Joundi, R. A., Alotaibi, N. M., & Saposnik, G. (2018). Clinical inertia in the pharmacological management of hypertension: A systematic review and meta-analysis. *Medicine*, 97, e11121. http://dx.doi.org/10.1097/MD.0000000000011121

Muntner, P., Miles, M. A., Jaeger, B. C., Hannon III, L., Hardy, S. T., Ostchega, Y., Wozniak, G., & Schwartz, J. E. (2022). Blood pressure control among US Adults, 2009 to 2012 through 2017 to 2020. *Hypertension*, 79(9), 1971–1980. doi. 10.1161/HYPERTENSIONAHA.122.19222

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). McGraw-Hill.

Pan, Y., Cai, W., Cheng, Q., Dong, W., An, T., & Yan, J. (2015). Association between anxiety and hypertension: A systematic review and meta-analysis of epidemiological studies. *Neuropsychiatric Disease and Treatment*, 11, 1121–1130. https://doi.org/10.2147/NDT.S77710

Petrie, K. J., & Weinman, J. (2006). Why illness perceptions matter. *Clinical Medicine*, 6(6), 536–539. https://doi.org/10.7861/clinmedicine.6-6-536

Pew Research Center. (2019). English proficiency of Filipino population in the U.S., 2019. https://www.pewresearch.org/social-trends/fact-sheet/asian-americans-filipinos-in-the-u-s/

Pickett, S., Allen, W., Franklin, M., & Peters, R. M. (2014). Illness beliefs in African Americans with hypertension. *Western Journal of Nursing Research*, 36(2), 152–170. https://doi.org/10.1177/0193945911349183

Rivera, E., Corte, C., DeVon, H. A., Collins, E. G., & Steffen, A. (2020). A systematic review of illness representation clusters in chronic conditions. *Research in Nursing & Health*, 43(3), 241–254. https://doi.org/10.1002/nur.22013

Rose, A. J., Berlowitz, D. R., Orner, M. B., & Kressin, N. R. (2007). Understanding uncontrolled hypertension: Is it the patient or the provider? *Journal of Clinical Hypertension*, 9(12), 937–943. https://doi.org/10.1111/j.1524-6175.2007.07332.x

SAS Institute. (2022). *JMP, Version 17 [Computer Software]*.

Shakya, R., Shrestha, S., Gautam, R., Rai, L., Maharjan, S., Satyal, G. K., Kc, B., & Rai, M. K. (2020). Perceived illness and treatment adherence to hypertension among patients attending a tertiary hospital in Kathmandu, Nepal. *Patient Preference and Adherence*, 14, 2287–2300. https://www.tandfonline.com/loi/dppa20

Ursua, R. A., Aguilar, D., Wyatt, L., Tandon, S. D., Escondo, K., Rey, M., & Trinh-Shevrin, C. (2014). Awareness, treatment and control of hypertension among Filipino immigrants. *Journal of General Internal Medicine*, 29(3), 455–462. https://doi:10.1007/s11606-013-2629-4

Ursua, R. A., Islam, N. S., Aguilar, D. E., Wyatt, L. C., Tandon, S. D., Abesamis-Mendoza, N., Nur, P. R. M. Q., Rago-Adia, J., Ileto, B., Rey, M. J., & Trinh-Shevrin, C. (2013). Predictors of hypertension among Filipino immigrants in the Northeast US. *Journal of Community Health*, 38(5), 847–855. https://doi.org/10.1007/s10900-013-9689-6

Vargas, P., & Jurado, L-F. (2015). Dietary acculturation among Filipino Americans. *International Journal of Environmental Research and Public Health*, 13(1), ijerph13010016. https://doi.org/10.3390/ijerph13010016

Warren-Findlow, J., Basalik, D. W., Dulin, M., Tapp, H., & Kuhn, L. (2013). Preliminary validation of the hypertension self-care activity level effects (H-Scale) and clinical blood pressure among patients with hypertension. *The Journal of Clinical Hypertension*, 15(9), 637–643. doi. 10.1111/jch.12157

Whelton, P. K., Carey, R. M., Aronow, W. S., Casey, D. E., Jr, Collins, K. J., Dennison Himmelfarb, C. D., DePalma, S. M., Gidding, S., Jamerson, K. A., Jones, D. W., MacLaughlin, E. J., Muntner, P., Ovbiagele, B., Smith, S. C., Jr, Spencer, C. C., Stafford, R. S., Taler, S. J., Thomas, R. J., Williams, K. A. Sr., Williamson, J. D., & Wright, J. T., Jr. (2018). 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: A report of the American College of Cardiology/American Heart Association Task Force on clinical practice guidelines. *Journal of the American College of Cardiology*, 71(19), e127–e248. https://doi.org/10.1016/j.jacc.2017.11.006

Zhao, B., Jose, P. O., Pu, J., Chung, S., Ancheta, I. B., Fortmann, S. P., & Palaniappan, L. P. (2015). Racial/ethnic differences in hypertension prevalence, treatment, and control for outpatients in Northern California 2010–2012. *American Journal of Hypertension*, 28(5), 631–639. https://doi:10.1093/ajh/hpu189