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UNDERSTANDING OVER-THE-COUNTER MEDICATION USE AND DECISION-MAKING AMONG COMMUNITY-DWELLING US OLDER ADULTS: A MIXED-METHODS APPROACH

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

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Dedication

I dedicate this work to my son ‘Abhyudit’.

I love you to the moon and back!

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List of Abbreviations

ADR	Adverse Drug Reaction
ADE	Adverse Drug Events
CI	Confidence Interval
FDA	Food and Drug Administration
NDA	New Drug Application
NHWS	National Health and Wellness Survey
NCPIE	National Council on Patient Information and Education
NSHAP	National Social life, Health and Aging Project
OR	Odds Ratio
OTC	Over-The-Counter
WHO	World Health Organization
VIF	Variation Inflation Factor

List of Terms and Definitions

Abuse	Persistent or sporadic excessive drug use inconsistent with or unrelated to acceptable medical practice. ¹
Adverse drug event	Any incident in which the use of a medication (drug or biologic) at any dose, a medical device, or a special nutritional product (e.g., dietary supplement, infant formula, medical food) may have resulted in an adverse outcome in a patient. ³
Addiction	A chronic, relapsing disease characterized by compulsive drug seeking and use despite negative consequences and by long-lasting changes in the brain. ²
Chronic disease	A chronic disease is a sickness that is long-lasting or recurrent. Examples include diabetes, asthma, heart disease, kidney disease and chronic lung disease. ³
Co-morbidity	When two disorders or illnesses occur in the same person, they are called comorbid. Drug addiction and other mental illnesses are often comorbid. Also referred to as co-occurring disorders. ²
Dependence	A physiological state that can occur with regular drug use and results in withdrawal symptoms when drug use is abruptly discontinued. ²
Long-term care	Services that include medical and non-medical care provided to people who are unable to perform basic activities of daily living such as dressing or bathing. Long-term supports and services can be provided at home, in the community, in assisted living or in nursing homes. Individuals may need long-term supports and services at any age. Medicare and most health insurance plans don't pay for long-term care. ³
Medical error	An adverse event or near miss that is preventable with the current state of medical knowledge. Adverse drug events, hospital-acquired infections and wrong-site surgeries are examples of preventable medical errors. ³
Misuse	Use of a substance for a purpose not consistent with legal or medical guidelines, as in the nonmedical use of prescription medications. ¹
New Drug Application (NDA)	The New Drug Application (NDA) is the vehicle through which drug sponsors formally propose that the Food and Drug Administration (FDA) approve a new pharmaceutical for sale and marketing. ⁴
OTC Monograph System	The OTC monographs represent regulatory standards for the marketing of non-prescription drug products not covered by new drug applications. These standards provide the marketing conditions for some OTC drug products including the active ingredients, labeling, and other general requirements. ⁴
Outcomes	Measures of the effectiveness of particular kinds of medical treatment. This refers to what is quantified to determine if a specific treatment or type of service works. Bad outcome: Failure to achieve a desired outcome of care. ³

Risk	The likelihood, high or low, that somebody or something will be harmed by a hazard, multiplied by the severity of the potential harm. ³
Self-selection	Self-selection is the decision a consumer makes to use or not to use a drug product based on reading the information on the drug product label and applying knowledge of his or her personal medical history. ⁴
Labeling	Labeling includes all written, printed, or graphic matter accompanying an article at any time while such article is in interstate commerce or held for sale after shipment or delivery in interstate commerce. ⁴
<ol style="list-style-type: none"> 1. World Health Organization 2. National Institute on Drug Abuse 3. Tufts Health Care Institute 4. Food and Drug Administration 	

Abstract

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

By

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Advisor: Patricia W. Slattum, Pharm.D., Ph.D.,
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Introduction

Older adults are regular consumers of over-the-counter (OTC) medications. OTC medications are generally considered safe, and convenient to use without requiring a prescription. However, the safety of an OTC medication and the final health outcome depends in part upon consumers' perceptions, beliefs, and their decision-making about OTC medication use. The main objectives of this study were: 1) to examine the prevalence and characteristics of OTC medication use among community-dwelling US older adults (65 years and older), 2) to explore older adults' knowledge, attitudes, beliefs and experiences about OTC medications, and 3) to elicit the OTC medication decision-making process in this population.

Methods

Data from the National Social Life, Health, and Aging Project (NSHAP) wave 2 was utilized to examine the prevalence and characteristics of OTC medication use in a nationally representative sample (N=2,637) of community-dwelling US older adults (65 years and older). OTC medication

use was characterized based on sociodemographic, intrapersonal, interpersonal, organizational, and community-level factors. Further, a mixed-methods study was conducted in two senior-living communities in Richmond, VA. The qualitative phase of this mixed-methods study used focus group methodology to explore the knowledge, attitude, beliefs, and experiences about OTC medications, and the OTC medication decision-making process in a sample (N=80) of older adults using the criterion sampling strategy of purposeful sampling. Results from the qualitative phase informed the development of a semi-structured questionnaire, which was used to collect data in the quantitative phase of the mixed-methods study. The quantitative phase used in-person interviews to quantify attitudes, beliefs, preferences, and practices associated with the OTC medication use and decision-making process in a different convenient sample (N=88) of older adults within the same settings.

Results

NSHAP Study: The majority of participants were women (54%), whites (82%), and with an education greater than high school (57%). Study findings indicate a high weighted prevalence (76%) of OTC medication use in a nationally representative sample of older adults. Among older adult men, education (p value=0.0038), race (p value=0.0003) and comorbidity (p value ≤ 0.0001) significantly and independently predicted the OTC medication use. Older adult men who were whites had greater odds of using OTC medication than other races. Older adult men with higher than high school education were 1.54 times more likely (95% CI: 1.15-2.06) to use OTC medications than their counterparts. It was observed that with every unit increase in the number of co-morbid conditions, OTC medication use decreases by 26% (OR: 0.74, 95% CI: 0.65-0.84) among older adult men. Among older adult women, education (p value=0.0244), race

(p value=0.0048), smoking (p value=0.0494), and social participation (p value=0.0341) showed a significant and independent association with OTC medication use. Older adult women who were whites and non-smokers had greater odds of using OTC medication than their counterparts.

Older adult women with higher than high school education were 1.36 times more likely (95% CI: 1.04-1.79) to use OTC medications than their counterparts. It was observed that with every unit increase in the social participation, OTC medication use increases by 15% (OR: 1.15, 95% CI: 1.01-1.31) among older adult women.

Qualitative Study: The majority of the sample were women (63%), whites (54%), and with an education greater than high school (60%). The study indicated that the OTC medications are generally considered very safe and effective for treating minor/routine symptoms by older adults. Brand version OTC medications were generally favored over generics by this sample of US older adults. There were found two types of decision-making scenarios following after the older adults make sense of their symptoms: 1) treatment decision-making and 2) purchase decision-making. The treatment decision-making comes with two approaches: 1) a decision to treat their symptoms by themselves (self-recommended) or 2) a decision to ask and/or follow physician's recommendation (physician-recommended). Each of these treatment approaches may lead to the other depending on the person's financial and healthcare resources, severity of the symptoms, experiences with the medication (past or current), and relationship with the physician. While purchasing OTC medication from the store, the majority of consumers first explore information on the drug-label, ask a pharmacist, compare various options (generic or brand), compare prices/deals, and make a final purchase decision favoring the maximum and fast relief, followed by the lower cost, and easy to swallow dosage forms.

Quantitative study: The majority of the sample was women (55%), blacks (61%), and with an education less than or equal to high school (55%). Analgesics were the most (76%) prevalent OTC therapeutic category, and aspirin was the most (65%) prevalent OTC medication. A greater (82%) proportion of the participants reported self-recommended OTC medication use (self-medication with OTC medications) rather than physician-recommended use. A high (41%) prevalence of inappropriate use of OTC medications was observed in this sample of older adults. Most participants considered OTC medications very safe or safe (80%) and very effective or effective (80%) to use. The majority (79%) of participants felt very satisfied, and 16% felt satisfied with their OTC medication use. Brand name OTC medications were considered more safe and effective compared to generic versions. The pharmacy was the most (93%) commonly reported purchase location to buy an OTC medication. Physicians were the most (90%) commonly reported information source about OTC medications.

Conclusions

Older adults feel positive and satisfied with their OTC medication use, in general. Considering the self-reported high use, inappropriate use, and experiences of facing side effects, education focused toward older adults should be encouraged to aid in safe and responsible OTC decision-making.

Chapter 1: Introduction

1.1 Over-The-Counter Medications

Over-the-counter (OTC) medications are those medicinal products that can be bought directly without a physician's prescription. OTC medications are generally considered safe and effective to use without the guidance of a healthcare practitioner.¹ OTC medications are also known as 'OTC drugs' or 'non-prescription medications'. OTC drugs are easy to obtain, and the Food and Drug Administration (FDA) ensures that they are safe, appropriate, and convenient to use for the general population.

OTC medications follow a different path to FDA approval than prescription medications.

Usually, OTC drug is approved by the FDA through the OTC monograph process. An OTC monograph contains all the information about the strength, ingredients, and instructions to use the medication to treat an indication without a prescription from the doctor. An OTC medication can be approved if it meets all the monograph requirements. Sometimes, an already approved prescription medication can be switched to OTC status if the post-marketing information about the safety and efficacy of that medication is sufficiently positive, self-diagnosis is possible and sufficient instructions for use without the advice of a prescriber can be developed. In some cases, an OTC medication approved in foreign countries may get direct approval because there is enough post-marketing evidence on the safety and efficacy for OTC use. In both cases, the FDA carefully reviews all the information and evidence available for that medication and approves it as an OTC in the US market.²

OTC medications differ from other nonprescription products such as dietary or herbal supplements that are regulated differently by the FDA compared to OTC medications. Dietary supplements are considered as nutritional supplements, which contain ingredients such as herbs, amino acids, vitamins, proteins, and minerals. The FDA does not review dietary supplements for safety and effectiveness before they are available in the market. However, the FDA does review and ensure the safety and efficacy of OTC drugs before they reach the public.³

1.2 Therapeutic Use and Categories of OTC Medications

OTC medications are used to treat a variety of mild to moderate symptoms such as pain, inflammation, allergies, cold, diarrhea, constipation, sleep, and skin issues. There are over 80 categories of medications which are available OTC in the US healthcare system.⁴ These can be classified into the following broad classes:⁴

- Analgesics and antipyretics (e.g. acetaminophen, ibuprofen, naproxen)
- Cold, cough and allergy medications (e.g. dextromethorphan, pseudoephedrine, diphenhydramine)
- Gastrointestinal medications (e.g. proton pump inhibitors, H2-antagonists)
- Dermatological products (e.g. corticosteroids, coal tar)
- Nighttime sleep aids (e.g. diphenhydramine, doxylamine)
- Other topical products (e.g. antifungals, antibacterials, otics)
- Ophthalmic products (e.g. lubricant eye drops)
- Oral healthcare products (e.g. toothpastes, mouth washes)
- Nicotine replacement products (e.g. nicotine gums and patches)

- Weight loss products (e.g. orlistat)
- Menstrual products (e.g. acetaminophen-cafeine-pyrimidine)
- Contraceptives (e.g. contraceptive sponge, spermicides)

1.3 Benefits and Risks Associated with OTC Medication Use

Using OTC medications provides many benefits to consumers.⁴ OTC medications are directly available for consumers to buy and use without getting a prescription from a provider.⁴² These medications are widely available to the consumers via many different venues including retail stores, grocery markets, and pharmacies.⁴² Compared to prescription medications, OTC medications are less expensive and are easy to use. In addition, OTC medications are available with a variety of brand and generic options and dosage forms. While purchasing OTC medications, patients have a choice to select what suits them best, in terms of dose, dosage form, and ease of handling.⁴² Using OTC medications can be time-efficient and less burdensome for patients as they do not have to make an appointment or visit the prescriber for routine or minor symptoms.⁴² Using OTC medications empowers patients.⁵ Self-treatment with OTC medication could be beneficial for people with chronic health conditions as many chronic health conditions have minor symptoms associated with them (such as mild to moderate pain symptoms, fever, sleeplessness etc.), which need regular care and management.⁴⁻⁶

There could also be some potential risks associated with using OTC medications.^{5,6} Patients may diagnose themselves incorrectly, which may lead to incorrect or insufficient treatment of the disease symptoms, and potentially worsen the problem.^{5,6} Patients may also underestimate treating symptoms associated with a serious illness while using OTC medications.⁶ There could be side effects of using certain OTC medications. OTC medications are generally considered

benign and safe compared to prescription medications. Patients may tend to use OTC medications at a higher dose than recommended or more frequently than recommended. Using medications for a longer period of time than recommended may lead to dependence or tolerance.^{42,43} All these situations may contribute to mild to severe side effects, adverse drug events, and potential harm to patients.^{43,44} Further, many OTC drugs interact with other drugs and foods, and some drugs are not appropriate for use in certain age groups. When making a decision to self-treat, not understanding the drug label information properly, or underestimating the potential for adverse events may be a risk factor for experiencing drug-related harmful events.

1.4 OTC Medication Use in the General Adult Population

Self-treatment with OTC medications is highly prevalent in all age groups, and across different geographic locations.^{7,10} The US ranked second highest in terms of the overall prevalence of OTC medication use in the world.⁷ A report published by the Consumer Healthcare Products Association informs that OTC medications are the most popular therapies especially for treating pain, cold/flu, skin issues, and heartburn among Americans.⁸ This report also states that women compared to men, and the age group of 64 or younger compared to the age group of 65 years and older use more OTC medications.⁸ Pain medications are the most prevalent OTC medications, with acetaminophen and ibuprofen being the most commonly used pain medications among the general population according to a report based on the findings from the Slone Survey of Medication Use in the US.⁹ The National Health and Wellness Survey (NHWS) reports OTC use for different chronic health conditions, and among different age groups.¹⁰ According to a recently published report by this survey, it was observed that 47% of the US population-based

sample used OTC medication. The survey also reported that 47% used OTC for pain conditions, 40% for gastro-intestinal ailments, 40% for musculoskeletal conditions, 39% for respiratory conditions, 35% for neurological conditions, 28% for ophthalmic conditions, 18% for auto-immune disorders, 9% for psychiatric conditions, 6% for cardiovascular conditions, 4% for metabolic conditions, and 4% for urologic conditions.¹⁰

1.5 OTC Medication Use in Older Adult Population

The older adult population is one of the largest groups of OTC medication consumers. Several studies report the high prevalence of OTC medication use in the older population with different health conditions.^{11–15} A review published in 2001 summarized the epidemiology of OTC medication use in older adults for two decades.¹¹ This study reports the increasing use of OTC medications over time (65% to 87%), and higher OTC medication use among women compared to men, and among whites compared to other races. The study also identified analgesics, laxatives, and nutritional supplements as the most commonly used OTC medications in the older population.¹¹ A survey study by the National Council on Patient Information and Education (NCPIE) reports that older adults are responsible for 30% of total OTC medications use in US.¹⁶ Data from the 2014 NHWS survey supports these findings by reporting the high percentage of OTC medication users who prefer to treat themselves with an OTC product rather than seeking a prescription from the doctor, for several chronic ailments.¹⁰ According to the report, 42% of the sample used OTC products for musculoskeletal conditions, 39% for pain conditions, 37% for gastrointestinal conditions, 30% for respiratory conditions, 21% for ophthalmic conditions, 16% for auto-immune disorders, 16% for neurological conditions, 5% for psychiatric conditions, 3% for cardiovascular conditions, 3% for metabolic conditions, and 3% for urologic conditions.¹⁰

1.6 Medication-Related Problems in Older Adults and OTC Medication Use

The high prevalence of OTC medication use in the older adult population is an important health issue. Older adults often suffer from one or more chronic illnesses, have more than one prescriber, and use multiple prescription and OTC medications at the same time.¹⁶ While medications are important to treat and manage chronic illnesses and associated symptoms in this population, older adults are considered vulnerable to medication related problems for several reasons.¹⁶⁻¹⁸ One important reason is age-related changes in physiology that can affect how a drug acts in the body.¹⁶⁻¹⁸ These age-related changes may include altered pharmacokinetics and pharmacodynamics, reduced renal function, reduced hepatic metabolism, decreased lean body mass, increased body fat, and increased sensitivity to certain drugs such as CNS-acting drugs.¹⁶⁻¹⁸ The Beer's criteria classifies a number of prescription and OTC medications that are potentially inappropriate for use in the older population because the risk associated with their use generally outweighs their benefits in an older population.¹⁹ In addition to age-related physiologic changes, some other factors may also be responsible for harmful effects of OTC medications such as polypharmacy, which may increase the risk of experiencing drug-drug interactions, and adverse drug events (ADEs). Older adults often suffer from one or more comorbid conditions,⁴⁵ and follow a complex drug regimen.⁴⁶ Having multiple prescriptions from different providers may lead to duplicate therapies, inappropriate prescribing and drug monitoring, and poor adherence.^{17,20} Lower health literacy and poor communication between patients and providers may further complicate this issue.^{21,22} In addition, age-related sensory changes such as impaired vision and hearing loss may contribute to the poor understanding of drug label instructions, and thus poor decision making about OTC medications.¹⁶ While the FDA is responsible for ensuring the safety and efficacy of OTC medications before approving them into the market, consumers

play a major role in determining the final health outcome of using an OTC product. This decision making about self-medication with OTC medication might be a complex process for older adults as they often experience multiple symptoms due to multiple chronic health conditions and take multiple medications for those conditions.^{45,46} The process of diagnosing themselves correctly, processing the drug-label information accurately, and using the medication appropriately may be cumbersome for some older adults. A poor self-care decision may potentially lead to a number of mild to severe negative health outcomes such as confusion, dizziness, fall, ADEs, emergency department utilization, and hospitalization.²³⁻²⁵

1.7 High Risk OTC Medication Use, Abuse, and Adverse Effects

In a recent survey, it was observed that approximately 38% of older adults were using OTC medications, and 15% of them were at risk of experiencing major drug-drug interaction.¹⁵ Data from the National Health and Wellness Survey (NHWS) 2013 reported high use (70%) OTC products for sleep in the older population. Also, it was reported that nearly 18% of older adults were using these sleep OTC products with some kind of prescription sleep aid, and 3% were using them with some herbal product. Among this sample, it was identified that 40% of older adults were taking one or more anticholinergic medications which are considered potentially inappropriate to use in this population.²⁶ Diphenhydramine is the most common ingredient in sleep as well as anti-allergy OTC medications, and it has been found to be associated with many side effects such as dizziness, cognitive impairments, blurred vision, and dry mouth due to its anticholinergic properties. The Beer's criteria classified diphenhydramine as potentially inappropriate for use in older adults because its use may lead to falls due to these side effects.¹⁹

While OTC analgesics are the most commonly used OTC medications, there are several studies that document mild to severe negative health outcomes associated with the short and long-term use of commonly available OTC analgesics such as acetaminophen, ibuprofen, naproxen, and aspirin.²⁷⁻²⁹ For example, aspirin that is the most prevalent among all OTC analgesics, has been found to be associated with nausea, heartburn, and the increased risk of bleeding. Ibuprofen is another commonly used OTC pain reliever, which has been reportedly associated with upset stomach, dizziness, and tinnitus.³⁷⁻³⁹ All these pain medications should be avoided in the case of health issues related to the kidney or liver.³⁹

There is a growing trend of self-care with OTC medications in general, and especially in older adults.³⁰⁻³² While self-treating with OTC medications is convenient for this population, there is always a possibility of using those drugs inappropriately or incorrectly. Several studies document the abuse or misuse of OTC medications (such as analgesics, cough products, antihistamines, laxatives) which may lead to adverse drug events.³³⁻³⁶

1.8 Defining the Older Adult Population

In the literature, the age range of 60 to 65 years is generally considered as the starting point of old age.⁴⁰ Based on longevity patterns and resources among different cultural and geographical settings, previous literature defines older adults in terms of chronologic age using a variety of age ranges.⁴⁰ In the US, the age of 65 is considered as eligibility criteria for several social and federal healthcare benefits such as Medicare and Social Security and therefore has been used most often as the starting point to define an older adult population.⁴¹ As longevity increases, the definition of the older adult as 65 years and older has been challenged, but there remains a

general consensus to use this definition for the older adult population. Thus, this definition – older adults are those 65 years of age and older – was applied to this project to facilitate comparisons across studies within the project. However, previously published studies have used varying definitions of the older adult which makes direct comparisons with literature challenging.

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Chapter 2: Literature Review

2.1 Overview

This chapter describes the findings from a comprehensive literature review, which was conducted to examine the gaps in knowledge about OTC medication use and decision-making in the US older adult population. Being comprehensive in nature, a broader definition of older adults was considered that included different age ranges from 57 years and above to define the old age population using terms such as elderly, older age, elderly adults and geriatric population. This chapter includes the literature review objectives, design, methodology, and findings. Findings from all the relevant articles are summarized in the table 2.1. Further, findings are summarized in various themes as appropriate. As this research considers older adults as 65 years and older, a conclusion is made on the knowledge gaps in this particular population subgroup, which is followed by the study rationale, study significance, and the proposed research design including study specific aims and theoretical framework.

2.2 Literature Review Objectives

This literature review aims to explore, critique, and summarize the existing literature on OTC medication use and decision-making in the US older adults using a broader definition of older adults (with different age ranges). Further, the study aims to identify knowledge gaps in this subject area using the specific definition of older adults being those aged 65 years and older to inform the research design and specific aims for this research.

2.3 Methods

Study Design

This study follows an integrative literature review methodology. The data collection and analyses were conducted based on the principles and guidelines for conducting integrative literature reviews.¹⁷

Inclusion/Exclusion Criteria

The following inclusion and exclusion criteria were used to perform the literature search.

Inclusion Criteria

- Research studies that explored or examined the OTC medication use in community-dwelling US older adults (who live independently and are non-institutionalized) using broader definition of older adult (with different age starting points).
- Research studies published in English, and in peer-reviewed journals from January 1st, 1986 to May 31st 2017.

Exclusion Criteria

- Research studies that focused on only one therapeutic category or class of OTC medications (such as analgesics), and/or studied OTC medications use in US older adults with a specific health condition.
- Research studies that explored or evaluated OTC medication use and decision making in a non-naturalistic or simulated environment.
- Research studies that were case studies/reports, newsletters or reviews.

Literature Sources

A comprehensive literature review was conducted using the PubMed, CINAHL, PsycINFO and AgeLine databases to identify research literature on nonprescription or OTC medication use among the US older adult population. A number of search terms and MeSH terms were used to retrieve the literature based on the objectives of this review. Searching via PubMed, the MeSH search terms included "Nonprescription Drugs", "Nonprescription Drugs" AND "Decision Making", "Nonprescription Drugs" AND "Knowledge" OR "Patient Medication Knowledge", "Nonprescription Drugs" AND "Attitude", "Nonprescription Drugs" AND "Culture", "Nonprescription Drugs" AND "Perception", "Nonprescription Drugs" AND "Consumer Behavior", "Nonprescription Drugs" AND "Epidemiologic Factors", "Nonprescription Drugs" AND "Behavior", "Nonprescription Drugs" AND "Information Seeking Behavior", "Nonprescription Drugs" AND "Health Behavior", and "Nonprescription Drugs" AND "Self Medication". Similar words were searched in CINAHL, PsycINFO and AgeLine databases. Additionally, a manual bibliographic review was performed to identify other relevant articles from the retrieved literature.

Search Strategy

The search was performed for all relevant years in each database. A total of 1,170 articles were retrieved in the initial search process, and after excluding 269 duplicates, in total 901 articles were considered for the review of titles and abstracts. Subsequently, 743 articles were excluded as they were not relevant to the study objectives, or were not based on the US older adult population. Thus, 158 were assessed via full text review and another 144 were excluded as being restricted to only one therapeutic category or class of OTC medication, and/or being studied in US older adults with a specific health condition, or being studied in institutionalized US older

adults, or being conducted in a non-naturalistic or simulated environment, or were case-studies/reports, newsletters or reviews, or not being peer-reviewed.

Finally, 14 articles were identified for review in this literature review study, which met all the eligibility criteria, were based on the US older population, and were relevant to study objectives. These 14 articles were carefully reviewed and summarized into major themes identified through the literature review related to nonprescription medication use in US older adults. Figure 2.1 shows the integrative review search process that was followed while conducting the review.

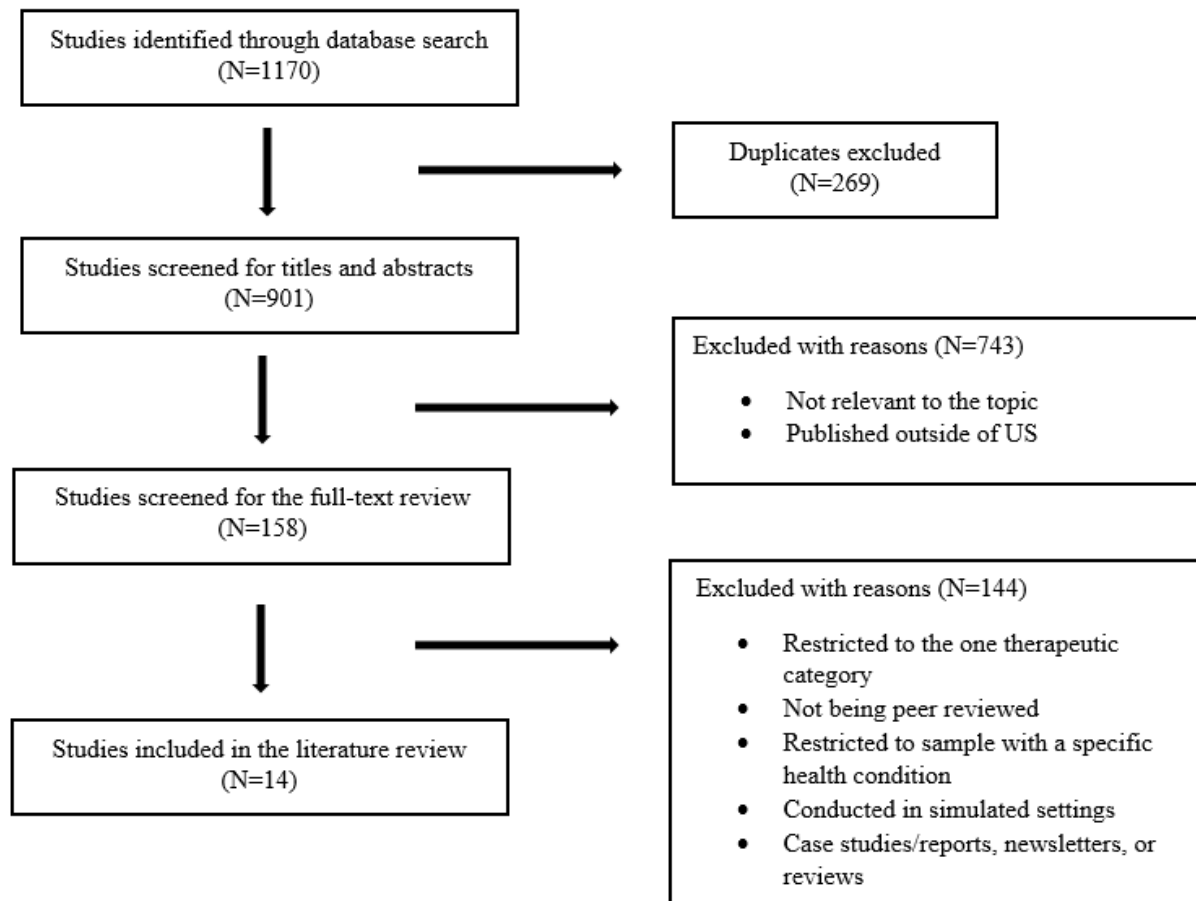


Figure 2.1: Flow Diagram for Literature Search Strategy

Data Evaluation Process

Integrative literature review identifies four approaches to data synthesis in an integrative literature review process¹⁷: A research agenda, a taxonomy, alternative models and metatheory. This study synthesizes data in order to develop a ‘research agenda’ based on critical analysis of the literature. The retained 14 studies were read thoroughly and the captured knowledge content was categorized into major themes. Studies were critically evaluated with respect to study design and methodology to identify the research need and to establish a research agenda to address that need, in US older adult population aged 65 years and older. Table 2.1 presents the summary of literature on OTC medications use among community-dwelling US. older adults using broad definition (with different age strating points).

Table 2.1: Summary of literature on OTC medication use among community-dwelling USolder adults using broad definition (with different starting points).

Study (Year)	Objectives	Sample Population	Design and Methodology	Major Findings	Limitations
Ries et al. (1986)¹	To explore self-medication with OTC medications and to identify problems associated with OTC medication use.	Convenience sample of community-dwelling older adults (age not specified) (N=110)	Exploratory study design. In-person interviews to gather data on OTC medication use, experiences, storage, and disposal.	Caucasians used more OTC medications compared to other races. 55% were unable to read the test package. OTC medication use, storage, and disposal was not found to be appropriate and safe in most of the sample.	A small non-representative sample was studied, so results may not be generalizable to a larger population. Only a few OTC medication-related practices were explored.
Hanlon et al. (1992)²	To describe and compare drug-use patterns among black and non-black older adult populations.	Stratified probability sample of community-dwelling US older adults aged 65 or older (n=4164)	Cross-sectional study. In-home interviews to gather information on health status and behaviors, cognitive and functional status, social stressors and resources, and health-services use.	Compared to blacks (66%), nonblacks used more OTC medications (76 %). Blacks were more likely to report problems in managing their medications than nonblacks.	Study was limited to southeastern US, so the sample was not nationally representative. Only prevalence and race, age, and gender characteristics were evaluated.
Fillenbaum et al. (1993)³	To examine and compare predictors of prescription and OTC medication use.	Probability-based sample of community-dwelling older adults 65 or older (N=3973)	Cross-sectional study. In-person interview was used to capture information on demographics, health conditions self-assessed health, physical health functioning, health care services, income, and health insurance.	Only 67% of Blacks compared with 76% of Whites reported taking OTC medications. The OTC use was significantly associated with demographic characteristics and self-assessed health. Study reported that being a female, having higher education, having poor health status, and having a greater number of physician visits were significant predictors of OTC medication use.	The study was limited to a sample of whites and blacks from the southeastern US, so results may not be generalizable to other groups. Few predictors were assessed, so there may be confounding due to unobserved factors.
Sansgiry and Cady (1996)⁴	To compare the OTC medication purchase decision-making process between older and younger adults.	Randomized sample of younger (18-27) and older adults (60 and above) (N=96)	Cross-sectional study. Personal interviews were conducted to study consumer involvement, purchase behavior, beliefs in regards of OTC medications.	Older adults were more involved in OTC purchase than younger adults (p<0.0001). Older consumers make more informed and rational decisions compared to their younger consumers. They spend more time and money when buying OTC medications than younger group. Older adults also experience issues with child-resistant	The study was conducted in small sample size. Few aspects were measured quantitatively with respect to OTC medication decision-making, and there may be other unobserved aspects and mediating factors influencing the OTC medication purchase decision-making.

				packaging and the print size on the drug-label.	
Reisenwitz and Wimbish (1997)⁵	To examine the level of involvement in and the OTC medication purchase decision-making process.	Quota sample of community-dwelling older adults 65 years of age and over (N=165)	Cross-sectional study. Survey using questionnaire to address five stages of the purchase decision-making process (need recognition, information search, alternative evaluation, purchase decision, post-purchase behavior).	Highest purchase frequency were reported for anacids (9.1%) followed by analgesics (4.8%). The analgesics were considered as most important OTC (9.1%) followed by anacids (8.4%). The previous experience was considered the most approached (17.9%) information source on OTC followed by the physician (99.5%). Feeling secure was the most common feeling post purchase (37.9%).	OTC medication purchase decision behaviors and the level of involvement were studied using quantitative methods. Hence, study findings are limited to only a few practices and attributes related to OTC medication decision-making. There may be other unobserved aspects and intervening factors.
Stoehr et al. (1997)⁶	To determine the self-reported use of OTC medications and factors associated with OTC medication use.	Age-stratified random sample of community-dwelling US older adults aged 65 and older (N=1059)	Cross-sectional study. In-person interviews to collect data on demographics, health services utilization, and medications use.	87% used at least one OTC drug, and 6% used 5 or more. Women consumed significantly more OTC medications than men ($P < .001$), people with higher education consumed more OTCs than lower education group ($P = .018$). The most common OTC category was analgesics (66.3%), antacids (27.9%), and laxatives (9.7%). There were observed no significant associations between OTC use with age or health services.	The study sample was limited to a small rural region, so the findings may not be representative of all US older adults. Only limited predictors were assessed against OTC medication use, so there may be other important factors which may potentially confound the relationship between the studied predictors and OTC medication use.
Espino et al. (1998)⁷	To examine the prevalence of prescription and OTC medication use.	Regional probability sample of community-dwelling US older adults of the Hispanic origin, 65 years and over (N=2899)	Cross-sectional study. In-home medication review and interview was conducted to obtain information on socio-demographic, functional status, alcohol and smoking variables, and co-morbid illnesses.	31% used at least one OTC drug. Participants with lower perceived health were more likely to self-medicate with OTCs than their counterparts (OR: 1.5, 95% CI: 1.1-1.2). People with low structural assimilation used less OTC medications than their counterparts (OR: 0.60, 95% CI: 0.5-0.8). Women used more OTC medications than men (OR: 1.23, 95% CI: 1.002-1.5).	This study was limited to Hispanic Americans, hence findings may not be representative of all US older adults. Various socio-demographic and health-related variables were measured yet there may be other predictors which may potentially influence OTC medication use.
Shufeldt et al. (1998)⁸	To examine the association between lifestyle and OTC medication purchasing behavior.	Convenience sample of community-dwelling US older	Cross-sectional study. Self-administered questionnaire was used to gather data on demographics,	Lifestyle was found to play a major role in purchase decision-making. Pricing influenced decision-making of the introvert group unlike the family oriented group who were more	The study was limited to a specific region, and hence the results are not generalizable to all US older adults. Only lifestyle and demographic characteristics were studied for an

		adults 65 years or older (N=386)	lifestyle characteristics and factors affecting purchase behavior relative to pharmaceuticals.	influenced by store/brand reputation, previous experiences or recommendation by health care providers.	association with OTC medication use were observed in the study.
Amoako et al. (2003)⁹	To assess the self-medication practices with OTC medications among older adults.	Convenience sample of community-dwelling US older adults 59 to 91 years old (N=39)	Cross-sectional study. Conn's Self-Medication Practice Tool was used to collect data on medical diagnosis, symptoms experienced, choice of OTC medications, effectiveness and side effects of the OTC medications, factors that influence the participant's choice of OTC medications.	97% used at least one OTC medication. 90% used analgesics and 59% used caffeine on a daily basis. OTC medication use was positively correlated with chronic conditions and living alone while negatively correlated with perceived health. Healthcare providers were reported as the primary source of information.	Study used a small sample size, so results may not be extrapolated to the US older adult population. The study examined few demographic and health-related variables, so there may be an unobserved confounding effect.
Qato et al. (2008)¹⁰	To examine the prevalence and patterns of medications use and concurrent use of medications among older adults.	Nationally representative probability sample of community-dwelling US older adults aged 57 through 85 years (N=3005)	Cross-sectional study. In-home interviews, including medication logs were administered.	42% used at least one OTC medication, and among prescription users, 46% also used OTC medications, 2% of all users were found to be at risk of experiencing drug-drug interaction because of using OTC medications. The weighted prevalence of OTC medication use was similar among women (42%) and men (43%), and higher among whites (44%) then compared to other races-blacks (36%), hispanics (31%), and others (37%). Higher weighted prevalence was observed among age group 75-85 years (47%) then 65-74 years (46%), and 57-64 years (36%).	The study used a nationally representative dataset yet only the most common OTC medications were included in the study which may underestimate the total weighted prevalence of OTC medication use. Also, they did not specifically assess the predictors associated with OTC medication use.
Sansgiry et al. (2010)¹¹	To examine the prevalence of OTC medication misuse among community-dwelling older adults	Convenience sample of community-dwelling US older adults above 65	Cross-sectional study. A combination of self-administered questionnaire and a series of open-ended questions was used to	67% used at least one OTC medication. 18% misused OTC medications. Those who misused OTCs had more ADEs than those who did not. Among misuses, 57% were condition misuse, 39% were	The study assessed the prevalence of OTC medication misuse and its association with ADEs in a specific US region, hence results may not be generalizable to the US older adult population.

	and associated adverse drug events.	years of age (N=157)	collect information regarding the use of OTC medications, conditions for which the OTC medication was used, ADEs and demographics.	length misuse and 18% were strength and frequency misuse. Approximately 23% of the respondents reported experiencing one or more ADEs after consumption of OTC medication. The most frequent category of ADEs experienced were nausea and vomiting, stomach pain, and diarrhea.	
Altizer et al. (2012)¹²	To describe non-prescription therapy use for health promotion among the older population, and to examine the association between non-prescription therapy and health-related quality of life.	Convenience sample of community-dwelling US older adults aged 65 years and older (N=200)	Prospective cohort study with repeated measures design. Baseline interviews (Cognitive testing) were followed by 6 in-person interviews on the daily use of common non-prescribed therapies.	54.3% used OTC therapy. OTC medication use ranged from 50% to 58% for illness prevention and health promotion. Older adults who used OTC medications had poorer mental health compared to those who did not use OTCs.	The study sample included only whites and blacks in a specific geographical region, so the study has limited generalizability. Due to the prospective study design, there were significant numbers lost to follow up which might impact the accuracy of the findings. The study specifically assessed the relationship between OTC medication use and health related quality of life adjusting for socio-demographic factors, behavioral factors, and chronic health conditions. There may be other unobserved predictors which may influence OTC medication use.
Nguyen et al. (2012)¹³	To examine the association between cognitive function and non-prescribed therapy.	Convenience sample of community-dwelling US older adults aged 65 years and older (N=200)	Prospective cohort study with repeated measures design. Baseline interviews (Cognitive testing) were followed by 6 in-person interviews on the daily use of common non-prescribed therapies.	OTC medication use ranged from 32% to 37% for the treatment of routine or minor symptoms, and 42% to 55% for the treatment of chronic conditions across 6 interview sessions. OTC medication use was not associated with the cognitive function. Older adults, those who had less than a high school education and had a greater number of comorbidities were more likely to use OTC drugs.	The study was limited to a specific geographical region, hence results may not be generalizable to the US older population. This study specifically examined the relationship between the cognitive function and OTC medication use adjusting for the socio-demographic factors, behavioral factors, and chronic health conditions. There may be other unobserved predictors which may influence OTC medication use.
Qato et al. (2016)¹⁴	To characterize the prevalence of medications use and concurrent use with prescription medications.	Nationally representative probability sample of community-dwelling US older adults 62 to 85 years old (N=2351)	Longitudinal study. In-home interviews with direct medication inspection were conducted in 2005-2006 and again in 2010-2011.	OTC medication use decreased from 44% to 38% over a five years of time period. Concurrent use of medications increased over time as did the risk of experiencing a potential drug-drug interaction. The weighted prevalence of Rx-OTC drug-drug interaction increased from	The study used a nationally representative dataset. Only the most common OTC medications were included in the study, which may underestimate the total weighted prevalence of OTC medication use. Also, they did not specifically assess

				5.7 (2005-06) to 9.4% (2010-11). Weighted prevalence of OTC-OTC drug-drug intercation increased from 0.9 (2005-06) to 2.2% (2010-11).	predictors associated with OTC medication use.
Note. OTC = Over-the-counter medications; Rx = Prescription medications; CHC = Chronic health condition.					

2.4 Literature Review Findings

Study Characteristics

Fourteen articles were included and reviewed fully. Table 2.1 presents a summary of the studies included in this review. All of the studies used a quantitative approach of inquiry. There was one study with an exploratory design, two studies with prospective cohort designs using repeated measures, one longitudinal study, and ten cross sectional studies. The sample size of these studies ranged from 39 to 4,164 participants. Only eight studies were conducted in a sample population of older adults 65 years and older, while others focused on the older adult population with different age ranges (ranging from 57 to 65 years and older). Based on the study purpose and the area of research, four themes were identified with respect to OTC medication use among US older adults: 1) the prevalence of, and reasons for OTC medication use 2) predictors of OTC medication use 3) practices and preferences associated with OTC medications, and 4) types of use and OTC medication decision-making.

Major Themes

Theme 1: The prevalence of, and Reasons for OTC Medication Use

Overall, ten studies examined the prevalence of OTC medication use in US older adult population.^{2, 3, 6, 7, 9, 10, 11, 12, 13, 14} Analgesics/antipyretics and antacids were the most commonly used OTC categories.^{5, 6, 9} A study published in 1997 reported highest purchase frequency for antacids (9.1%) followed by analgesics (4.8%).⁵ The study also reported that the analgesics were considered as most important OTC (9.1%) followed by antacids (8.4%).⁵ Stoehr et al. also reported that the most common OTC category was analgesics (66.3%), followed by antacids

(27.9%), and laxatives (9.7%).⁶ A study by Amoako et al. also reported that 90% of participants used analgesics and 59% used caffeine on a daily basis.⁹ Previous studies reported higher use of OTC medication among women compared to men,^{3,6,7} among those 65-74 years compared to those 75+ years,³ among people with higher education compared to lower education level,⁶ and among whites compared to other races.^{1, 2, 3, 10}

Theme 2: Predictors of OTC Medication Use

Six studies assessed the predictors associated with OTC medication use in community-dwelling US older adults.^{6,7} Espino et al. reported that women were more likely (OR: 1.23, 95% CI: 1.002-1.5) to use OTC medications than men, and .⁷ Stoehr et al. reported that the women consumed significantly more OTC medications than men ($P < .001$) and people with higher education consumed more OTCs than lower education group ($P = .018$).⁶ There are some contradictory findings about the association between OTC use and education. Two studies found that older people with higher education were more likely to use OTC medication^{3,6} while one study reported higher OTC medication use among people with lower educational background.¹³ A study by Fillenbaum et al. examined the association between OTC medication use and the type of residence and physician visits.³ Higher likelihoods of using OTC medication were observed among older adults with an urban residence and who had more physician visits.³ Four studies reported the association between health status and OTC medication use, and findings were consistent across these four studies.^{3,7,9,12} Fillenbaum et al.³ found a positive association between OTC medication use and poor health status. A similar association was reported by Altizer et al.¹² with regards to mental health status. Amoako et al.⁹ reported a negative correlation between perceived health and OTC medication use, and similarly Espino et al.⁷ reported that participants with lower perceived health were more likely to use OTC medications (OR: 1.5, 95% CI: 1.1-

1.2). Espirino et al.⁷ reported that those with low structural assimilation used less OTC medications than their counterparts (OR: 0.60, 95% CI: 0.5-0.8). The low structural assimilation was defined as the degree to which English language skills and use have been acquired to interact with the broader society.⁷ Several studies assessed the association between comorbidities and OTC medication use, and a positive relationship was observed between OTC medication use and chronic health conditions.^{7,9,13}

Theme 3: Practices and Preferences Associated with OTC Medication Use

Four studies explored OTC medication use in community-dwelling US older adults.^{1,4,5,10} A study conducted by Ries et al.¹ explored OTC medication use and practices among four cultural groups-whites, blacks, hispanics, and haitians. The study concluded that the use, storage, and disposal was not as appropriate as it should be among the sample population.¹ Such as OTC medication were stored in different inappropriate places throughout the house, and disposal was not done by directly throwing into the trash.¹ Sansgiry and Cady compared preferences and practices associated with OTC purchase process among two age groups-age group of 18-27 years and age group of 60 years and above.⁴ The study reported that people from age group of 60 and above were more involved in OTC purchase than people from age group of 18-27 years ($p < 0.0001$).⁴ Older consumers make more informed and rational decisions, spend more time and money when buying OTC medications, and prefer non child-resistant packaging compared with their younger counterparts.⁴ Reisenwitz and Wimbish⁵ reported that the analgesics were the most important OTC (9.1%) followed by antacids (8.4%) in their study. The previous experience was considered the most approached (17.9%) information source on OTC followed by the physician (99.5%). Feeling secure was the most common feeling post purchase (37.9%).⁵ Sansgiri et al.¹⁰ reported misuse of OTC medications and associated adverse drug events (ADEs) in older adult

population. The study reported that 18% misused OTC medications. Those who misused OTCs had more ADEs than those who did not. Among misuses, 57% were condition misuse, 39% were length misuse and 18% were strength and frequency misuse.¹⁰ Approximately 23% of the respondents reported experiencing one or more ADEs after consumption of OTC medication.¹⁰ The most frequent category of ADEs experienced were nausea and vomiting, stomach pain, and diarrhea.¹⁰

Theme 4: Types of Use and OTC Medication Decision-Making

Only two studies explored the OTC medication decision-making process among community-dwelling US older adults in a naturalistic setting.^{4,8} Sansgiry and Cady⁴ explored the difference between OTC medication purchase decision making and needs between young (18-27) and older adults (60 and above). It was observed that older age group of 60 years and above make more informed and rational decisions compared to their younger counterparts. Bimodal behavior was observed in older age group of 60 years and above when buying OTC medication.⁴ Either they make a decision very fast or take time to explore the information before making a final purchase decision. The study also reported that people from older age group of 60 and above in comparison with their younger counterparts (18-27) spend more time and money while buying OTC medications and face issues with packaging and labeling.⁴ Shufeldt et. al⁸ observed that lifestyle plays a major role in purchase decision-making. Pricing influences decision-making of an introvert group unlike the family-oriented group who were more influenced by store/brand reputation, previous experiences or recommendation by healthcare providers.⁸

2.5 Gaps in the Literature Using Definition of Older Adults as 65 Years and Older

Out of 14 studies reviewed in details, eight studies exclusively addressed the OTC medication use among older adults 65 years and older.^{2,3,5,6,7,8,12,13} While most studies reported prevalence and patterns of OTC medication use, and assessed socio-demographic factors, very few^{3,7,12,13} examined health-related characteristics of OTC medication users aged 65 years and older. Only two studies addressed attributes and preferences associated with the OTC purchase decision-making and behavior.^{5,8} None of these studies examined social factors (such as social participation, social support, or life satisfaction), behavioral factors (such as physical activity or self-care), or community-level factors (such as neighborhood characteristics).

Further, most of these studies were quantitative in nature. While a few studies quantified some preferences and information resources related to the OTC medication decision making in the older adult population,^{5,8} none explored the overall decision-making process including the decision to treat, the decision to buy and then the decision to use an OTC medication using an exploratory qualitative design. More research is needed using qualitative or mixed-methods approaches to broadly explore and understand the OTC medication use and decision-making process in this population. Overall, we found that most studies of OTC medication use among the US older adults 65 years and older were descriptive and focused primarily on the prevalence and patterns of OTC medication use. A gap in knowledge exists regarding multi-level predictors of OTC medication use and decision making among the US older adults aged 65 years and older. Hence, further investigation with stronger study designs and methodology is required using larger nationally representative sample, and mixed-modes of inquiries. Further, understanding OTC use in different groups and settings will be important to understand and compare, and infer more about the OTC users and characteristics associated with them. These findings may be

applicable in healthcare settings to promote safe and effective OTC medication use and to reduce associated negative health outcomes.

2.6 Study Rationale and Significance

OTC medication decision making might be a complex process for older adults because of their age-related functional limitations as well as the amount and quality of information available to them in the current scenario from various resources such as media, healthcare professionals, and the internet. Other factors such as social influences, health-related factors, or community-level factors might also affect their decisions in addition to their knowledge, attitudes, and perceptions about OTC medication use. While the FDA is responsible for ensuring that risks and benefits are communicated to consumer through the product label,^{1,2} safety and effectiveness may partially depend on how consumers select and use OTC medications.^{1,2} Considering the aging US population, and older adults being one major group of OTC medication consumers, it is important to understand how safely and appropriately they use OTC medications, what their knowledge, attitudes, beliefs, and practices of OTC medication use are, and how they make the decision of selecting and using OTC medications. Further, to promote safe and responsible OTC medication taking behavior, it would be important to identify various factors or influences associated with OTC medication use in this population. This information may further be used to develop and implement educational interventions, self-care models, shared medical decision making models, and also policy initiatives for promoting safe and responsible use of OTC medications in this population.

2.7 Study Design and Theoretical Framework

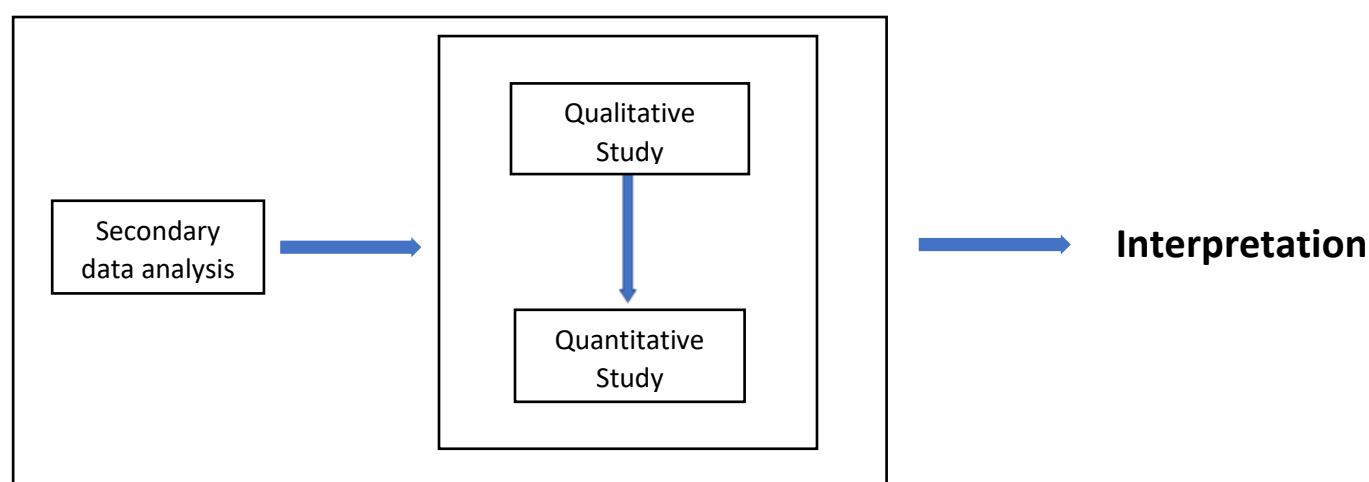
This research project targets community-dwelling US adults aged 65 years and older. A multiphase mixed methods design was used to address the specific aims of this research study. It is a type of design where a number of studies are conducted (qualitative, quantitative or mixed).¹⁵ The data collection and analysis might follow convergent, exploratory sequential or explanatory sequential methods, but the interpretation of findings from all build on each other to address the main objective of the project. Figure 2.2 shows the overall project design and sequence of studies.

In this research project, first a secondary data analysis was conducted using a large nationally representative dataset. This study examined the current weighted prevalence, patterns, and predictors of OTC medication use among community-dwelling US older adults. Next, a mixed methods study was conducted at two senior-living facilities in Richmond, VA. This study had two phases: a qualitative phase, and a quantitative phase. The qualitative phase used focus group methodology, and explored knowledge, attitudes, beliefs, and the OTC medication decision-making process. The quantitative phase of this mixed-methods study used survey methodology, and examined the current prevalence, patterns, predictors, and practices associated with OTC medication use. The survey instrument used in this quantitative phase was informed by the findings from the previous literature, findings from the qualitative phase of the mixed-methods study, and findings from the epidemiological study. Table 2.2 shows the summary of the project design and research strategies.

Table 2.2: Summary of the project design and research strategies.			
Study	Chapter 3: Secondary data analysis	Chapter 4: Mixed-methods Study (Qualitative Phase)	Chapter 5: Mixed-methods Study (Quantitative Phase)

Methodology	Cross-sectional study using large nationally representative database (N=2737)	Focus group methodology using the criterion sampling strategy of purposeful sampling (N=80)	Survey methodology with semi-structured questionnaire using the convenience sampling (N=88)
Theoretical framework	Ecological model of health behavior	Grounded theory approach	Ecological model of health behavior
Analysis	Quantitative analysis using bivariate and multivariable logistic analyses with SAS version 9.4	Qualitative analysis using the Grounded theory approach with NVivo 11 software	Quantitative analysis using bivariate and multivariable logistic analyses with SAS version 9.4
Outcomes	Prevalence, patterns, and predictors of OTC medication use	Knowledge, attitude, beliefs about OTC medications, and OTC medication decision making process	Prevalence, patterns, and practices of OTC medication use, predictors of self-recommended OTC medication use.

Figure 2.2: Multiphase Mixed-Methods Design



This study used a comprehensive approach to broadly understand OTC medication use in this population covering different perspectives, and multiple levels of influence. The theoretical framework guiding this research was an adaptation of the ‘Ecological model of health behavior’ proposed by Mcleory and colleagues in 1988 (Figure 2.3).¹⁶

According to the ecological model, human behavior may be influenced by multi-level factors. These factors may be intrapersonal, interpersonal, organizational, community-level, or policy-level. These factors may also interact with each other to influence human behavior and the final outcome. The ecological model provides a comprehensive understanding of human behavior and

factors influencing that behavior.¹⁶ The ecological model may inform the development of multi-level interventions which are more robust and applicable in terms of changing behavioral patterns.

Figure 2.3: The Ecological Model of Health Behavior



2.8 Specific Aims and Hypotheses

Specific Aim 1

Specific aim 1A: To determine the prevalence and patterns of OTC medication use among community-dwelling US older adults age 65 years and older.

Specific aim 1B: To identify and describe the intrapersonal, inter-personal, organizational, community, and policy-level characteristics associated with OTC medication use in the community-dwelling US older adults.

Specific aim 1C: To examine the association between OTC medication use and intrapersonal, inter-personal, organizational, community, and policy-level characteristics in this population.

Following hypotheses were tested to address this aim:

HA1: There exists a positive relationship between intrapersonal characteristics and OTC medication use among the community-dwelling US older adults.

HA2: There exists a positive relationship between interpersonal characteristics and OTC medication use among the community-dwelling US older adults.

HA3: There exists a positive relationship between organizational characteristics and OTC medication use among the community-dwelling US older adults.

HA4: There exists a positive relationship between community-level characteristics and OTC medication use among the community-dwelling US older adults.

HA5: There exists a positive relationship between policy-level characteristics and OTC medication use among the community-dwelling US older adults.

Specific Aim 2

Specific aim 2A: To explore knowledge, attitudes, beliefs, and practices about OTC medications among older adult residents of senior-living communities.

Specific aim 2B: To elicit the decision-making process which older adult residents of senior-living communities use while self-medicating with OTC medications.

Specific Aim 3

Specific aim 3A: To quantify the knowledge, attitudes, beliefs, and practices about OTC medication use and decision making of older adult residents of senior-living communities.

Specific aim 3B: To identify and describe the reasons, frequency, and patterns of OTC medication use in this sample population.

Specific aim 3C: To identify and describe the interpersonal, intrapersonal, and group-level characteristics associated with the self-recommended OTC medication use in this sample population.

Specific aim 3D: To examine the association between self-recommended OTC medication use and intrapersonal, interpersonal, and group-level characteristics in this sample population.

The following hypotheses were tested to address this aim:

HA1: There exists a positive relationship between intrapersonal characteristics and self-recommended OTC medication use among older adult residents of senior-living communities.

HA2: There exists a positive relationship between interpersonal characteristics and self-recommended OTC medication use among older adult residents of senior-living communities.

HA3: There exists a positive relationship between organizational characteristics and self-recommended OTC medication use among older adult residents of senior-living communities.

HA4: There exists a positive relationship between community-level characteristics and self-recommended OTC medication use among older adult residents of senior-living communities.

HA5: There exists a positive relationship between policy-level characteristics and self-recommended OTC medication use among older adult residents of senior-living communities.

2.9 Introduction to the Next Chapters

Following the knowledge gap identified in this literature review study, the proposed multi-methods project includes three studies. Next chapter (chapter 3) will discuss the design, methods, and findings from secondary data analysis which was conducted on NSHAP wave 2 survey data. This study used most recently available nationally representative data set on OTC medications use, and includes many social and health-related variables. This study addressed the knowledge

gap in literature on multi-level predictors (such as intrapersonal, interpersonal, organizational, and community-level factors) of OTC medication use in this population. Policy-level factors could not be addressed by this study as were not captured by the NSHAP wave 2. Chapter four and five will describe the study design, methods, and findings from the qualitative and quantitative phases of the mixed-methods study respectively, which was conducted in two senior-living facilities in Richmond, VA. The qualitative phase (chapter 4) of this mixed-methods study addressed the knowledge gap in literature about the general thoughts and use, perception of safety and efficacy, attitudes, experiences, preferences, and practices associated with OTC medication use and decision-making in this population. The study applied an exploratory approach using focus groups, and captured multi-level influences on OTC medication use and decision-making process. The quantitative phase (chapter 5) of the mixed-methods study provided quantitative analysis of types of OTC use, perception of safety and efficacy, attitudes, experiences, preferences, and practices associated with OTC medication use and decision-making in US older adult population. This study also described characteristics of OTC users who prefer to use OTC medications by themselves (self-recommended use). However, the mixed-methods study is geographically limited to a specific group of older adults who lives in the senior housings in Richmond, VA. Hence, the study could not address the knowledge gap in literature in regards of other cultures, locations, and living arrangements. The quantitative study also examined the prevalence distribution of self-recommended OTC medication use, however the study could not assessed the predictors for self-recommended OTC medication use due to small sample set. Finally, chapter six integrated findings from the NSHAP study and mixed-methods study, followed by the limitations of this research and future research needs.

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Chapter 3: Specific Aim 1

3.1 Chapter Overview

This chapter addresses specific aim 1, which focuses on understanding the current weighted prevalence, patterns and predictors of OTC medication use in the community-dwelling US older adult population. This is a secondary data analysis study, which uses a cross-sectional design with a large nationally representative sample of US older adults.

3.2 Specific Aim 1

Specific Aim 1A: To determine the prevalence and patterns of OTC medication use among community-dwelling US adults 65 years and older.

Specific Aim 1B: To identify and describe the intrapersonal, interpersonal, organizational, community and policy-level characteristics associated with OTC medication use in community-dwelling US older adults.

Specific Aim 1C: To examine the association between OTC medication use and intrapersonal, interpersonal, organizational, community and policy-level characteristics in this population.

The following hypotheses were tested to address this aim:

HA1: There exists a positive relationship between intrapersonal characteristics and OTC medication use among the community-dwelling US older adults.

HA2: There exists a positive relationship between interpersonal characteristics and OTC medication use among the community-dwelling US older adults.

HA3: There exists a positive relationship between organizational characteristics and OTC medication use among the community-dwelling US older adults.

HA4: There exists a positive relationship between community-level characteristics and OTC medication use among the community-dwelling US older adults.

HA5: There exists a positive relationship between policy-level characteristics and OTC medication use among the community-dwelling US older adults.

3.3 Methods

Study Design

A retrospective, cross-sectional study design was used to address specific aim 1.

Data Source

Recently available data from the National Social Life, Health, and Aging Project (NSHAP) wave 2 was used to conduct this study.¹ NSHAP wave 2 was conducted from August 2010 to May 2011 in a sample of 3,377 people. The overall unconditional response rate for wave 2 was 74%.¹

NSHAP is a longitudinal study which uses a nationally representative probability sample of the non-institutionalized US older adult population aged 57 to 85 years old.¹ This study captures important social, behavioral, and health-related variables to address complex health and age-related issues in the US older population, and conducts extensive medication reviews.¹ Two waves have been conducted. Wave 1 was conducted from July 2005 to March 2006 in a sample of 3,005 people, born between 1920 to 1947. Wave two was conducted from August 2010 to May 2011, in a sample of 3,777 people. Details of the instrument development and implementation,

study design, study measures, and procedures of the NSHAP survey have been described previously.² The data collection instruments for this study have three elements:¹

1. In-person questionnaire
2. Bio-measure collection
3. Supplemental self-administered questionnaire

Additionally, wave 2 also includes a proxy questionnaire for wave 1 participants who were deceased or too disabled to participate at the time of data collection for wave 2. The in-person questionnaire captures information about demographic characteristics, social networks and social network change, social and cultural activity, physical and mental health including cognition, well-being, illness, healthcare utilization and medications, and history of sexual and intimate partnerships.¹ Bio-measure collection captures important clinical and biological information such as cardiovascular function, sensory function, biological samples, and genetic analysis.³

Sample Population

A sample of individuals 65 years and older (n=2,783) was extracted out of the total sample of 3,377 older adults who participated in the NSHAP wave 2.

Study Measures

Response Variables

The main response variable for this study was ‘OTC medication use’. A categorical variable was created based upon the participants’ use of OTC medications. OTC medication use was considered as ‘Yes’ if the person was using at least one OTC medication at the time the questionnaire was administered, else it was considered as ‘No’. OTC medications were identified as those pharmacologically active or medicinal substances, which are available directly for the

purchase by consumers without a prescription from the provider. Other nonprescription products such as herbals, multi-vitamins, or alternative medications were not considered for this categorization. Appendix 'A' shows a list of OTC medications grouped into major therapeutic categories, which were being used by the survey participants. The survey collected data about medication use by direct observation using a computer-based medication log which is a more reliable method compared to the self-reported medication recall.⁴ Participants were asked, "to record all medications that you take on a regular schedule, like every day or every week. This will include prescription and nonprescription medications, over-the-counter medicines, vitamins, and herbal and alternative medicines."¹

Explanatory Variables

Variable selection for this study was informed by the ecological model of health behavior. Based on this model, multiple explanatory variables were identified and categorized into five categories: Intrapersonal, interpersonal, organizational, community and policy-level. Table 3.1, 3.2 and figure 3.1 summarizes the list of variables identified and selected for addressing the specific aim one.

Table 3.1: Selected multi-level variables to assess against OTC medication use	
<i>Socio-demographic composition</i>	Socio-demographic factors: Age, gender, ethnicity, marital status, income, education, and employment
<i>Intrapersonal</i>	Health-related factors: Physical health, mental health, smoking, drinking, and vigorous physical activity
	Biological factors: Comorbidity (hypertension, arthritis, heart and respiratory conditions, stroke, diabetes, neurological conditions, cancer, and osteoporosis)
<i>Interpersonal</i>	Social: Social participation and social network
	Psychosocial: Positive social support and criticism from close relationships
<i>Organizational/Institutional</i>	Source of care, appointment, insurance, doctor visits

<i>Community-level</i>	Neighborhood deprivation
<i>Policy-level</i>	Not identified in NSHAP wave 2 survey dataset

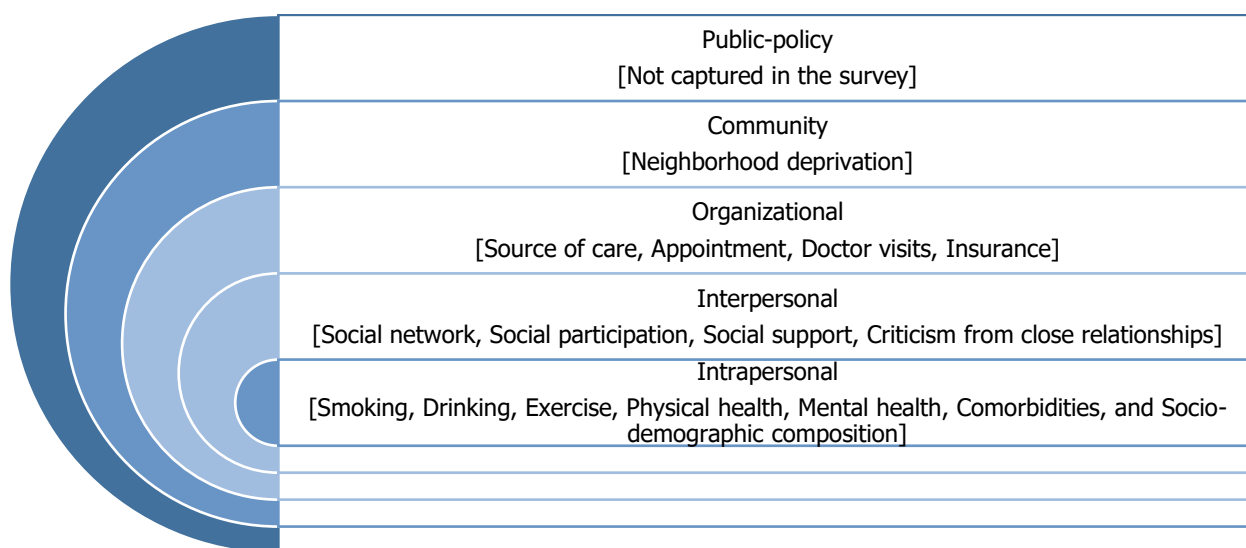


Figure 3.1: Variables Identified in Survey based on the Ecological Model of Health

Behavior

Socio-Demographic Composition

Age, gender, race, marital status, education and employment were included to describe the socio-demographic composition of the sample. Age was categorized into two categories 65-74 and 75+, which was consistent with the previous literature. Comorbidities increase with age and so may the use of OTC medications increase with age.^{5,6} Gender was included and was grouped into men and women. Previous literature suggests that women tend to use more medications than men, so this may be a potential confounding factor in the study.^{6,7} Including race as a potential confounder was based on the findings from previously published studies which report the

differential use of OTC medications by race.^{7,8} Marital status was included. Having a spouse or living-in partner may potentially influence health, healthcare decision-making and healthcare utilization. Education was included and was categorized as “less than or equal to a high school education” and “more than high school education”. This categorization was informed by the previous literature.^{9,10} Income was categorized into three categories of “less than \$50,000”, ‘equal to or more than \$50,000, and a separate category for missing values (due to a high number of missing values for this variable which may be a sensitive piece of information that individuals desire to keep private). This was consistent with the literature based on the same dataset.¹¹ For employment, two categories were created-one for the people who are currently engaged in some kind of work or work-related activity as “employed”, and another category for people who are either retired or unable to work as “unemployed”.

Intrapersonal Factors

Intrapersonal factors included current physical and mental health status, number of comorbid conditions, and health behaviors (smoking, drinking, and vigorous physical activity). For measuring physical health, the participants were asked to rate their physical health by asking “Would you say your health is excellent, very good, good, fair, or poor?”² Physical health status may be an important predictor of the utilization of OTC medications. Those who have better health compared to their counterparts may be less likely to use OTC medications. This was measured by recoding the original variable into two categories-‘Poor/Fair’ and ‘Good/Very Good/Excellent’. To measure mental health, participants were asked to rate their mental health by asking “What about your emotional or mental health? Is it excellent, very good, good, fair, or poor?”² Mental health status may also be an important predictor of the utilization of OTC

medications. This was measured by recoding the original variable into two categories-‘Poor/Fair’ and ‘Good/Very Good/Excellent’.

For measuring comorbidity, participants were asked if a doctor ever told them that they have any of the following common chronic medical conditions: hypertension, arthritis, heart conditions, respiratory conditions, stroke, diabetes, neurological conditions, cancer, and osteoporosis.² A continuous variable was created indicating the number of co-morbid conditions. Greater level of comorbidity may be associated with the increased use of OTC medications to manage routine symptoms.

Smoking was measured as an indicator for health behavior. Participants were asked if they currently smoke cigarettes, cigars or a pipe. This was a dichotomous variable with two response categories ‘yes and no’. Drinking was also included as an indicator for health behavior.

Participants were asked that if they drink alcohol. This was also a dichotomous variable with two response categories ‘yes and no’. Health behaviors such as smoking and drinking may contribute to the poor health status and may lead to higher use of medications. Vigorous physical activity was included and recoded into two categories indicating as ‘yes and no’. It was measured in NSHAP by asking question-“On average over the last 12 months how often have you participated in vigorous physical activity or exercise? By vigorous physical activity, we mean 30 minutes or more of things like sports, exercise classes, heavy housework, or a job that involves physical labor. Older adults who have sedentary lifestyle may have more health-related issues than their counterparts with higher levels of physical activity, which may further influence their OTC medication consumption.

Interpersonal Factors

Various social and psychosocial factors (size of social network, social participation, positive social support, and criticism from close relationships) were considered in this category. The rationale for including these variables was to measure the psychosocial resources/deficits, which may directly/indirectly affect the health status and medication consumption in this population. A variable named 'social network' was created to measure the size of social network by adding the responses to two questions- "How many family members or relatives do you have whom you feel close to?"² and "About how many friends would you say that you have?"² The response scale to each question had 6 categories indicating a response of 'none' to 'more than 20'. Total score was a sum of responses from both questions, and ranges from 0 to 10. A higher value indicates larger size of social network.

A variable named "social participation" was created by taking an average of the responses to four questions- 1) "Thinking about the past 12 months, about how often have you attended religious services?"² 2) "In the past 12 months, how often did you do volunteer work for religious, charitable, political, health-related, or other organizations?"² 3) "In the past 12 months, how often did you attend meetings of any organized group?"² and 4) "In the past 12 months, how often did you get together socially with friends or relatives?"² The responses to each question had seven categories ranging from never to several times a week. An average of responses to the four items indicates the level of social participation.

A variable named 'positive social support' was created by measuring responses to the questions separately asked for the spouse or partner, family, and friends-1) "How often can you rely on <spouse or partner/family/friends> if you have a problem?"² and 2) "How often can you open up to <spouse or partner/family/friends> if you want to talk about your worries?"² The response to

each question had 3 categories. An index was created to measure the positive social support by calculating an average of the responses to these six questions.

A variable named ‘criticism from spouse/family/friends’ was created and measured by asking a question separately for spouse or partner, family, and friends-“How often does <spouse or partner/family/friends> criticize you?”² The response to this question had 3 categories. An index was created to measure the criticism from spouse/family/friends by calculating an average of the responses to these three questions.

Organizational Factors

Four variables were included as organizational factors: Place to go for routine/preventive care, getting an appointment soon enough for routine/preventive care utilization, visits to the doctor in the past one year, the source of healthcare, and having insurance. A variable named ‘source of medical care’ indicated if a participant has a place to go for routine or preventive care. The variable was created by adding responses to two separate questions: “Is there a place that you usually go to when you are sick or need advice about your health?”² and “Is there a place you usually go when you need routine or preventative care, such as a physical examination or check up?”². The variable was recoded into two categories as ‘yes’ and ‘no’. Having or not having a source of medical care may influence medication use. A variable named ‘appointment’ was created to measure how quickly a person can get an appointment. This variable was created by adding responses to two separate questions for preventive and routine care utilization as “How often are you able to get an appointment as quickly as you think you need it?”² The variable was re-coded by collapsing four responses categories to both questions (due to very few observations in some cells) into two categories as ‘never/sometimes’ and ‘usually/always’. A variable named ‘doctor visits’ was created to measure the visits to the doctor in the past 12 months by asking- “During

the past 12 months, how many times you have seen a doctor or other health care professional about your health at a doctor's office, a clinic, hospital, at home or some other place?”² It was recoded into three categories ‘never/once’, ‘few times (12= \leq) a year’, and ‘several times (>12) a year’. A variable named ‘insurance coverage’ was measured by adding responses to the separate questions about different types of insurance coverage.

Community-Level Factors

A variable named ‘neighborhood deprivation’ was created and measured by responses to the five questions asked in the survey indicating neighborhood characteristics--density, litter, noise, traffic, and odor/pollution--with answers on a 5-point response scale. An index of neighborhood deprivation was created by taking an average of scores on these five questions, which ranges from 1 to 5 with higher values indicating higher level of the neighborhood deprivation. Previous literature reports an association between neighborhood characteristics and health status, access to healthcare, and health outcomes which may influence medication utilization directly or indirectly.^{13,14}

Policy-Level Factors

Policy-level factors were not identified in NSHAP wave 2 survey dataset, and hence were not assessed.

Table 3.2: List of explanatory variables with names and indications		
Study measures	Variable names	Indication
Intrapersonal	Age	Indicates the age of respondent
	Gender	Indicates the gender of the respondent
	Ethnicity	Indicates the ethnicity of the respondent
	Education	Indicates the education level of the respondent
	Employment	Indicates the employment status of the respondent

	Income	Indicates annual household income of the respondent
	Marital status	Indicates the marital status of the respondents
	Smoking	Indicates current smoking status of the respondent
	Drinking	Indicates current drinking status of the respondent
	Vigorous physical activity	Indicates vigorous physical activity of the respondent
	Comorbidity	Indicates the level of co-morbidity
	Physical health	Indicates physical health of the respondent
	Mental health	Indicates mental health of the respondent
Interpersonal	Size of social network	Indicates the size of the social network
	Social participation	Indicates the frequency of participation in social gathering
	Positive social support	Indicates the level of positive social support
	Criticism from close relationships	Indicates the level of psychosocial deficits
Organizational	Appointment	Indicates if the person gets an appointment soon enough for the routine/preventive care utilization
	Doctor visits	Indicates how many times a person visited to the doctor past one year
	Source of medical care	Indicates if the person has a place to go for routine/preventive care utilization
	Insurance coverage	Indicates if the person is having or not having an insurance
Community-level	Neighborhood deprivation	Indicates the level of neighborhood deprivation
Policy-level	Not identified in NSHAP wave 2 survey dataset	

Statistical Analyses and Model Building

First, descriptive statistics were calculated to examine the prevalence and distribution estimates of OTC medication use in this nationally representative sample of community-dwelling older

adults 65 years and older. Socio-demographic, intrapersonal, interpersonal, organizational, and community-level characteristics of the participants were identified, described and stratified by OTC medication use using Chi-square/t-tests as appropriate (Table 3.3). SAS version 9.4 was used for all the statistical analyses accounting for the complex survey design. PROCEDURE SURVEYFREQ was used to calculate descriptive statistics using STRATA, CLUSTER, and WEIGHT statements.

Further, a p-value of < 0.2 was used as the standard to choose the variables to include in preliminary (bivariate) analyses. Measuring OTC medication use as the response variable, bivariate associations between OTC medication use and multi-level explanatory variables were established (Table 3.4). Gender was a significant effect modifier (p value = .0437) for the relationship between OTC medication use and comorbidity. Hence, stratified bivariate and multivariable analyses were conducted further by gender. PROCEDURE SURVEYLOGISTIC was used with CLUSTER, STRATA, and WEIGHT statements to conduct inferential bivariate and multivariable analyses. A p-value of < 0.05 was used as the standard to choose the variables to include in multivariable analyses. The correlation was assessed among study measures using PROC CORR and no correlation was observed above the 0.8 cut off. Variation Inflation Factors (VIFs) and Condition Indices (CIs) were also examined and indications of multi-collinearity were not found. Regression diagnostics were performed as appropriate to check the adequacy and goodness of fit for the multivariable model.

3.4 Results

Sample Characteristics

Of the 2,637 older adults analyzed in this study, 76% were using at least one OTC medication at the time of the interview. The prevalence of using analgesics/antipyretics was the highest (66%) followed by gastrointestinal medications (30%) and cold/allergy products (8%). Aspirin (41%) was the most the prevalent OTC medication used followed by omeprazole (11%) and acetaminophen (6%) in this sample of older adults. Women accounted for 54% of the sample population. Overall, 56% of the sample was between 65 to 74 years old and 44% was 75 years and older. The majority of the sample was white (82%), followed by black (9%), Hispanic (7%), and other (2%). 62% were either married or living with a partner and 39% were single or unmarried. A majority of the sample were unemployed (81%). 57% of the study population had an education greater than high school education.

Descriptive findings from the study reports higher weighted prevalence of OTC medication use among women (80%) compared to men (71%), among age group 75+ (77%) compared to the age group 65-74 (75%), among higher education group (79%) compared to the lower education group (72%), and among whites (78%) compared to other races-blacks (67%), Hispanics (69%), and others (59%). There were significant proportional differences in OTC medication use by gender ($p=0.0010$), race ($p<0.0001$), education ($p<0.0001$), smoking status ($p=0.0089$), comorbidity ($p<0.0001$), social participation ($p=0.0010$), positive social support ($p=0.0192$), physician visits ($p=0.0030$), and insurance ($p=0.0026$). Most OTC medication users were female, white, and had an education more than high school. In addition, most OTC medication users were non-smokers, showed higher levels of social participation, had greater levels of positive social support, visited their physician several times in the past year, and had insurance coverage.

Table 3.3 shows a summary of the socio-demographic, intrapersonal, interpersonal, organizational, and community-level characteristics of older adult participants.

Table 3.3: Weighted distribution of sample characteristics by OTC medication use, NSHAP Wave 2 (N=2637)				
Characteristics	Overall sample N (%)	OTC Users Mean (SD)/ N (Weighted %)	OTC Non-users Mean (SD)/ N (Weighted %)	Chi-square/t- static p-value
Socio-demographic factors				
<i>Age</i>				0.0959
65-74	1381 (56.0%)	1019 (74.5%)	362 (25.5%)	
75+	1256 (44.0%)	986 (77.4%)	270 (22.6%)	
<i>Gender</i>				0.0010*
Male	1241 (46.5%)	889 (71.0%)	352 (29.0%)	
Female	1396 (53.5%)	1116 (80.0%)	280 (20.0%)	
<i>Race</i>				<0.0001*
Whites	1904 (82.0%)	1506 (77.8%)	398 (22.2%)	
Blacks	394 (9.2%)	275 (67.3%)	119 (32.7%)	
Hispanics	272 (6.6%)	181 (68.7%)	91 (31.3%)	
Others	57 (2.2%)	37 (58.7%)	20 (41.3%)	
<i>Marital Status</i>				0.5813
Married/Living-in	1698 (61.5%)	1291 (75.1%)	407 (24.9%)	
Unmarried/Single	882 (38.5%)	675 (77.2%)	207 (22.8%)	
<i>Employment</i>				0.1789
Employed	451 (18.8%)	321 (72.7%)	130 (27.3%)	
Unemployed	2183 (81.2%)	1683 (76.5%)	500 (23.5%)	
<i>Education</i>				<0.0001*
≤High school education	1222 (43.5%)	896 (72.3%)	326 (27.7%)	
>High school education	1415 (56.5%)	1109 (78.5%)	306 (21.5%)	
<i>Household Income</i>				0.7676
<\$50,000/Year	377 (14.1%)	300 (77.4%)	77 (22.6%)	
≥\$50,000/Year	175 (6.9%)	132 (76.3%)	43 (23.7%)	
Missing	2085 (79.0%)	1573 (75.5%)	512 (24.5%)	
Intrapersonal factors				
<i>Smoking</i>				0.0089*
Yes	301 (11.5%)	211 (66.9%)	90 (33.0%)	
No	2336 (88.5%)	1794 (76.9%)	542 (23.1%)	
<i>Drinking</i>				0.4960
Yes	1365 (53.3%)	1042 (76.6%)	323 (23.4%)	
No	1272 (46.7%)	963 (74.8%)	309 (25.2%)	
<i>Rigorous exercise</i>				0.3041
Yes	950 (33.8%)	721 (75.0%)	229 (25.0%)	
No	1683 (66.2%)	1281 (76.3%)	402 (23.7%)	
<i>Comorbidity</i>	2547 (96.5%)	1936 (14.7)	611 (0.1)	<0.0001*
<i>Physical health</i>				0.4722
Poor/fair	728 (25.9%)	565 (77.3%)	163 (22.7%)	
Good/very good/excellent	1904 (74.1%)	1438 (75.3%)	466 (24.7%)	
<i>Mental health</i>				0.7658
Poor/fair	341 (11.3%)	265 (76.7%)	76 (23.3%)	
Good/very good/excellent	2294 (88.7%)	1740 (75.7%)	554 (24.3%)	
Interpersonal factors				
<i>Size of social network</i>	2556 (96.9%)	6.43 (0.06)	6.26 (0.10)	0.1114
<i>Social participation</i>	2243 (85.0%)	3.25 (0.04)	3.00 (0.07)	0.0010*
<i>Positive social support</i>	1787 (67.7%)	2.41 (0.02)	2.34 (0.04)	0.0192*
<i>Criticism from close relationships</i>	1394 (52.8%)	0.82 (0.01)	0.81 (0.02)	0.6557
Organizational/Institutional factors				

<i>Doctor visits</i>				0.0030*
Never	238 (9.0%)	171 (74.1%)	67 (25.9%)	
Few times a year	1997 (76.2%)	1499 (74.6%)	498 (25.4%)	
Several times a year	395 (14.8%)	330 (82.7%)	65 (17.3%)	
<i>Appointment</i>				0.0878
Never/Sometimes	190 (6.8%)	136 (70.2%)	54 (29.8%)	
Usually/Always	2387 (93.2%)	1824 (76.3%)	563 (23.7%)	
<i>Source of medical care</i>				0.7206
Yes	2504 (94.5%)	1904 (75.7%)	600 (24.3%)	
No	132 (5.5%)	100 (77.3%)	32 (22.7%)	
<i>Insurance coverage</i>				0.0026*
Yes	2044 (78.8%)	1584 (77.3%)	460 (22.7%)	
No	593 (21.2%)	421 (70.3%)	172 (29.7%)	
Community-level factors				
<i>Neighborhood deprivation</i>	2548 (96.6%)	1.86 (0.03)	1.94 (0.04)	0.0651
Note. *p<.05.				

Characteristics Associated with OTC Medication Use

Preliminary Analyses

Bivariate analyses predicted the independent associations between socio-demographic, intrapersonal, interpersonal, organizational, and community-level characteristics and OTC medication use. Weighted estimates were reported as unadjusted odds ratios with 95% confidence intervals in Table 3.4.

OTC medication use was significantly associated with gender, race, education, smoking, comorbidity, positive social support, social participation, doctor visits, and insurance (table 3.4). Women were significantly more likely (OR: 1.63, 95% CI: 1.24-2.14) to use OTC medications than men. Whites had greater odds of using OTC medication than other races. Older adults with higher than high school education were 1.40 times more likely (95% CI: 1.19-1.65) to use OTC medications than their counterparts. Among intrapersonal characteristics, nonsmokers showed greater odds (OR: 1.65, 95% CI: 1.12-2.42) of using OTC medication than smokers. In addition, comorbidity showed negative significant correlation with OTC medication use in this study sample. It was observed that with every unit increase in the number of co-morbid conditions,

OTC medication use decreases by approximately 17% (OR: 0.83, 95% CI: 0.77-0.90). Social participation and positive social support were two interpersonal factors, which were observed as having an independent positive association with OTC medication use in this study sample. It was observed that OTC medication use increases 1.13 times (95% CI: 1.06-1.21) with every single unit increase in the level of social participation, and this was significant. Also, it was observed that every single unit increase in the level of positive support from spouse, friends or family, OTC medication use increases 1.42 times (95% CI: 1.07-1.88), and this was significant. Among organizational characteristics, having insurance and visits to the doctor during the past one year were found significantly associated with OTC medication use. Older adults with insurance were more likely (OR: 1.44, 95% CI: 1.13-1.83) to use OTC medication than older adults without insurance. People who visited the doctor few (≤ 12) or several (>12) times a year were more likely to use OTC medication than people who never visited the doctor, and this was statistically significant. Marginal significance was observed for the negative association between neighborhood deprivation and OTC medication use (0.0545).

Table 3.4: Multi-level characteristics odds associated with the OTC medication use among older adults: Bivariate/Preliminary analyses

Characteristics	Bivariate analyses OR (95% CI)	p-value
Socio-demographic factors		
<i>Gender</i>		0.0004*
Male	1 (Reference)	
Female	1.63 (1.24-2.14)	
<i>Race</i>		<0.0001*
Whites	1 (Reference)	
Blacks	0.59 (0.46-0.76)	
Hispanics	0.63 (0.44-0.90)	
Others	0.41 (0.21-0.80)	
<i>Education</i>		<0.0001*
\leq High school education	1 (Reference)	
$>$ High school education	1.40 (1.19-1.65)	
Intrapersonal factors		
<i>Smoking</i>		0.0107*
Yes	1 (Reference)	
No	1.65 (1.12-2.42)	
<i>Comorbidity</i>	0.83 (0.77-0.90)	<0.0001*

Interpersonal factors		
<i>Social participation</i>	1.13 (1.06-1.21)	0.0004*
<i>Positive social support</i>	1.42 (1.07-1.88)	0.0144*
Organizational/Institutional factors		
<i>Doctor visits</i>		0.0013*
Never	1 (Reference)	
Few times a year	1.10 (0.80-1.47)	
Several times a year	1.80 (1.22-2.45)	
<i>Insurance coverage</i>		0.0028*
No	1 (Reference)	
Yes	1.44 (1.13-1.83)	
Community-level factors		
<i>Neighborhood deprivation</i>	0.83 (0.68-1.00)	0.0545
Note. *p<.05.		

Stratified Bivariate and Multivariable Analyses by Gender

As gender was a significant effect modifier, the stratified unadjusted and adjusted analyses were conducted and the weighted estimates were reported as unadjusted and adjusted odds ratios with 95% confidence intervals in Table 3.5.

Older adult men who were whites had greater odds of using OTC medication than other races.

Older adult men with higher than high school education were 1.54 times more likely (95% CI: 1.15-2.06) to use OTC medications than their counterparts. It was observed that with every unit increase in the number of co-morbid conditions, OTC medication use decreases by 26% (OR: 0.74, 95% CI: 0.65-0.84) among older adult men. Among older adult women, education (p value=0.0244), race (p value=0.0048), smoking (p value=0.0494), and social participation (p value=0.0341) showed a significant and independent association with OTC medication use.

Older adult women who were whites and non-smokers had greater odds of using OTC medication than their counterparts. Older adult women with higher than high school education were 1.36 times more likely (95% CI: 1.04-1.79) to use OTC medications than their counterparts. It was observed that with every unit increase in the social participation, OTC medication use increases by 15% (OR: 1.15, 95% CI: 1.01-1.31) among older adult women.

Stratified fully adjusted analyses by gender showed that education (p value=0.0023) and comorbidity (p value=<0.0001) were significant predictors of OTC medication use among men while controlling for other factors. Older men with higher than high school education were 1.90 times more likely (95% CI: 1.26-2.87) to use OTC medications than their counterparts while controlling for other factors. It was observed that with every unit increase in the number of comorbid conditions, OTC medication use decreases by 31% (OR: 0.69, 95% CI: 0.58-0.81) among men while adjusting with other factors. Among women no significant association was observed between any multi-level characteristics and OTC medication use.

Table 3.5: Multi-level characteristics odds associated with OTC medication use among older adults: Bivariate and Multivariable analyses			
Characteristics	Bivariate analyses OR (95% CI)	Multivariable analyses OR (95% CI)	Multivariable analyses p-Value
Male			
<i>Race</i>			0.1864
Whites	1 (Reference)	1 (Reference)	
Blacks	0.51 (0.37-0.70)	0.61 (0.37-1.00)	
Hispanics	0.68 (0.44-1.06)	0.86 (0.43-1.72)	
Others	0.41 (0.15-1.10)	0.39 (0.09-1.65)	
<i>Education</i>			0.0023
≤High school education	1 (Reference)	1 (Reference)	
>High school education	1.54 (1.15-2.06)	1.90 (1.26-2.87)	
<i>Smoking</i>			0.3965
Yes	1 (Reference)	1 (Reference)	
No	1.49 (0.96-2.32)	1.29 (0.72-2.31)	
<i>Comorbidity</i>	0.74 (0.65-0.84)	0.69 (0.58-0.81)	<.0001
<i>Doctor visits</i>			0.8107
Never	1 (Reference)	1 (Reference)	
Few times a year	1.10 (0.69-1.76)	1.02 (0.54-1.95)	
Several times a year	1.85 (0.98-3.49)	1.25 (0.48-3.25)	
<i>Insurance coverage</i>			0.7447
No	1 (Reference)	1 (Reference)	
Yes	1.33 (0.91-1.95)	0.90 (0.48-1.68)	
<i>Positive social support</i>	1.36 (0.99-1.88)	1.16 (0.78-1.72)	0.4603
<i>Social participation</i>	1.08 (0.97-1.21)	0.99 (0.84-1.16)	0.8691
Female			
<i>Race</i>			0.1250
Whites	1 (Reference)	1 (Reference)	
Blacks	0.67 (0.44-1.01)	0.58 (0.26-1.29)	
Hispanics	0.57 (0.35-0.92)	0.69 (0.36-1.33)	
Others	0.43 (0.19-1.00)	0.40 (0.16-1.04)	
<i>Education</i>			0.7724
≤High school education	1 (Reference)	1 (Reference)	

>High school education	1.36 (1.04-1.79)	1.07 (0.67-1.70)	
<i>Smoking</i>			0.1130
Yes	1 (Reference)	1 (Reference)	
No	1.76 (1.00-3.09)	1.93 (0.86-4.37)	
<i>Comorbidity</i>	0.92 (0.80-1.06)	0.82 (0.64-1.06)	0.1334
<i>Doctor visits</i>			0.3356
Never	1 (Reference)	1 (Reference)	
Few times a year	0.91 (0.61-1.38)	0.66 (0.28-1.51)	
Several times a year	1.41 (0.82-2.41)	1.05 (0.37-2.99)	
<i>Insurance coverage</i>			0.8115
No	1 (Reference)	1 (Reference)	
Yes	1.55 (0.99-2.44)	1.08 (0.58-2.01)	
<i>Positive social support</i>	1.21 (0.72-2.05)	1.03 (0.55-1.92)	0.9339
<i>Social participation</i>	1.15 (1.01-1.31)	1.17 (0.93-1.48)	0.1787
Note. Goodness-of-fit test (p=0.9514).			

3.5 Discussion

Major Study Findings

The present study reports a high weighted prevalence of OTC medication use (76%) in this older adult population, with highest prevalence of analgesics as the most prevalent (66%) and aspirin as the most common OTC medication (41%). Descriptive findings from the study reports higher weighted prevalence of OTC medication use among women, age group 75+, higher education group and among whites.

Unadjusted analysis reports a significant independent association of OTC medication use with gender, race, education, smoking, comorbidity, positive social support, social participation, doctor visits, and insurance.

Stratified analyses by gender further specified the predictors between men and women. It was found that education, race, and comorbidity independently predict the OTC medication use among men. Older men with higher than high school were 1.90 times more likely (95% CI: 1.26-2.87) to use OTC medications than those with lower education. It was observed that with every unit increase in the number of co-morbid conditions, OTC medication use decreases by 31%

(OR: 0.69, 95% CI: 0.58-0.81) among men. However, the association between race and OTC medication use lost its significance while controlling for other factors.

Among women, education, race, smoking, and social participation were independent predictors of OTC medication use. However, the independent association of education, race, smoking, and social participation with OTC medication use lost its significance in fully adjusted analyses.

Comparison with Other Studies

The weighted prevalence of OTC medication use in community-dwelling US older adults (65 years and older) was observed as 76% which falls within the range of prevalence estimates (54% to 90%) reported by previous studies in a similar population.^{10, 15, 17} However, a recent study by Qato et al. reports a substantially low prevalence estimate (38%) over a larger sample set using the same data, but they calculated the prevalence of only the most commonly used OTC medications.¹⁸

The current study reports analgesics/antipyretics as the most commonly used OTC therapeutic category followed by gastrointestinal, and cold/allergy products which is consistent with the previous literature.^{10,16} Similar to the previously published studies the present study reports comparatively higher use of OTC medication among women compared to men,^{8,10,18,20} among people with higher education as compared to the lower education,^{8,10} and among whites as compared to other race groups.^{7,8,18} The study did not find an association between OTC medication use and age group which is similar to a study conducted by Stoehr et al.¹⁰ in a similar sample of community-dwelling US older adults. Other than the socio-demographic factors, this study reports a positive independent association between doctor visits and OTC medication use, which is similar to previously reported study findings.⁹ Previous literature reports an association

between comorbidities and OTC medication use, and a positive relationship was observed between OTC medication use and chronic health conditions.^{17,21} However, the present study reports a negative correlation, as a decreasing trend was observed with every unit increase in the comorbidity level. This may be due to different operationalization of the variable, as the comorbidity variable was a continuous variable in this study. The variables measuring chronic health conditions in the past studies were dichotomous in nature indicating the presence of any or no chronic health conditions. A decrease in OTC medication use with increasing level of comorbidity in this study may be explained by the nature of healthcare, which may potentially be professionally guided and monitored with the increasing age and chronic health conditions.

The current study also adds to the literature by specifying the predictors of OTC medication use among men and women separately. Older adult men who were whites had greater odds of using OTC medication than other races. Older adult men with higher than high school education were 1.54 times more likely (95% CI: 1.15-2.06) to use OTC medications than their counterparts. It was observed that with every unit increase in the number of co-morbid conditions, OTC medication use decreases by 26% (OR: 0.74, 95% CI: 0.65-0.84) among older adult men. Among older adult women, education (p value=0.0244), race (p value=0.0048), smoking (p value=0.0494), and social participation (p value=0.0341) showed a significant and independent association with OTC medication use. Older adult women who were whites and non-smokers had greater odds of using OTC medication than their counterparts. Older adult women with higher than high school education were 1.36 times more likely (95% CI: 1.04-1.79) to use OTC medications than their counterparts. It was observed that with every unit increase in the social

participation, OTC medication use increases by 15% (OR: 1.15, 95% CI: 1.01-1.31) among older adult women.

Limitations

The study has several limitations as well. First, the study uses a cross-sectional retrospective design. Hence, causality cannot be established. Also, results from this study are only generalizable to the community-dwelling US older adult population. Secondly, there is a possibility of recall bias as well as information bias due to self-reported data on the variables such as social, behavioral and other health-related variables. The influence could be greater considering the potential for age-related memory issues among some older adults. Inaccurate information about the diagnosis of a health condition may lead to misclassification resulting in under- or overestimation of the findings. Finally, there could be other hidden/unobserved factors, which may confound study estimates (such as this study could not address policy-level factors- transportation to the source of care, drug-labelling, drug packaging). Lastly, there could be a possibility of multiple testing issue while performing several statistical tests simultaneously, yet compensating for multiple comparisons was beyond the scope of this study, and hence was not addressed.

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Chapter 4: Specific Aim 2

4.1 Overview

This chapter addresses specific aim 2, which focuses on exploring the OTC medication use and decision-making in older adult residents of senior-living communities. This chapter describes the methods, analyses, and findings of the qualitative phase of mixed-methods study. Findings from this study further inform the sequential quantitative phase (chapter 5) of this mixed-methods study.

4.2 Specific Aims

Specific Aim 2A: To explore the knowledge, attitudes, beliefs, and practices about OTC medications among older adult residents of senior-living communities.

Specific Aim 2B: To elicit the decision-making process which older adults use while using and buying OTC medication.

4.3 Methods

Study Design

This study employed a qualitative research approach. A series of focus groups were conducted to explore the knowledge, attitude, perceptions, and experiences about OTC medications, and the OTC medication decision-making process of older adults. Focus group methodology is one of the most commonly used qualitative research method which helps researchers to generate a broad range of information on a research problem in a shorter period of time. Focus groups

involve a group discussion session with 8-10 participants on an open-ended questionnaire which allows them to express their ideas, opinions, and views about a topic.^{1,2}

Study Setting and Sample Population

The study was conducted at two senior-living communities in Richmond, Virginia, USA. One is section 8 low-income housing with 240 residents and the population is 55% female and 62% black with an average age of 72 years. The other has 870 residents living in independent non-rent subsidized apartments, and the populations is 71% female and 70% white with an average age of 81 years.

A series of focus groups were conducted from September to December 2016 with a sample (n=80) of older adults 65 years and older. In total, 10 focus groups were conducted, 5 at each location. Each focus group had 7-8 participants, and ran approximately 80 minutes. Each group had at least one participant from a different gender and ethnicity. Participants were recruited using the criterion sampling strategy of purposeful sampling³. Participants for the study were recruited through flyers distributed to all residents in the communities.

This qualitative study aims to explore OTC medication use and decision-making in an older adult population who are considered vulnerable towards medication use⁴, the following inclusion criteria were used for recruiting subjects:

- 1) Age 65 years and older
- 2) Currently using or have used at least one OTC medication in the past three months
- 3) Ability to converse in English

Snowball sampling was also employed in the later phase of focus groups recruitment as many earlier participants encouraged their social circle to participate in this study. The same criteria were used to recruit these participants.

Data Collection

A set of open-ended questions were asked to facilitate a rich discussion about OTC medication use and decision-making. The questionnaire was developed based on the knowledge gaps in the previous literature, which indicates lack of studies and knowledge about general thoughts, perception, and attitudes on OTC medications in geriatric population. The questionnaire was designed to explore these aspects, then refined, and simplified by the geriatric pharmacotherapy and the qualitative research team to generate a thought provoking discussion among the participants. The questionnaire was also tested with a set of participants by conducting informal focus groups, and revisions were made to make it simpler and thought provoking for the older adult population.

The finalized version of the focus group questionnaire had 5 sections focusing on:

1. General thoughts about OTC medication
2. Perception of safety of OTC medication
3. Perception of efficacy of OTC medications
4. Decision-making about OTC medications
5. Overall experiences with OTC medications

Each section had 1 or 2 main open-ended questions which were followed by asking sub-questions and probes as appropriate to provoke a detail-oriented discussion about OTC medications.

The study (HM20007157) was approved by the IRB of Virginia Commonwealth University as qualified for exemption according to 45 CFR 46.101(b), Category 2. The approved version of the informed consent form (ICF) and the final questionnaire, which was used to conduct the focus groups, can be found in Appendix B & C respectively.

Finally, all focus group sessions were conducted according to the study protocol approved by the VCU IRB. The data was collected by two researchers, one served as a moderator and one as a facilitator to conduct these focus group sessions. Standard ethical guidelines were followed during the participant recruitment and data collection phase. Participants were fully informed about the research objective, methodology, and duration. Both verbal and written informed consent were obtained before the study and the participants were compensated for their participation after the study.

All participants were equally encouraged to express their thoughts and views during the discussion. Each focus group session included asking all the main questions and sub-questions from the open-ended questionnaire. Probes were used as required to elaborate on the responses, and to generate a rich discussion among the participants.

Data Analysis

Audio recordings from the focus groups were transcribed, and analyzed using N Vivo 11 software. The qualitative data analysis involved the analyses of the focus group transcripts manually as well as with N Vivo 11 software. Two cycles of coding were conducted using a grounded theory approach.⁵ In the first cycle of coding, an open coding approach was employed to generate initial codes by reading small textual passages (line-by-line) and then larger texts manually.⁶ Further, the second cycle coding was conducted with the help of N Vivo 11 software

to refine those initial codes, to put them into themes and categories, and to observe the relationship among those themes and categories.

Two approaches were used in the second cycle of coding according to the two types of research questions asked in the study. First, a focused coding approach was used to identify major themes emerging in the data.⁶ Next, these themes were grouped into categories and summarized in the form of tables according to the main questions asked during the discussion. Table 4.1 shows a summary of themes and categories representing general thoughts and attitudes toward OTC medication use. Tables 4.2 and 4.3 summarize the themes and categories identified while discussing the older adults' perception of the safety and efficacy of OTC medications respectively. Table 4.4 shows a summary of themes and sub-themes identified during the discussion about how older adults make a decision to treat with and purchase an OTC medication. Finally, Table 4.5 presents findings about older adults' overall experiences of using OTC medications.

Further, to analyze and elicit the decision-making process regarding OTC medication use and purchase, both focused and axial coding approaches were used.⁶ Focus coding was used to identify major themes and categories (Table 4.5) and the axial coding approach was used to analyze the sequences and to develop the relationship network for these codes, themes, and categories to create models for the OTC medication decision-making process.⁶ Two models were created to explain the thought process of older adults in order to treat and in order to buy an OTC medication. Model 1 illustrates the process of making a decision to treat with OTC medications based on causal conditions, mediating factors, and strategies applied. Model 2 illustrates the process of making a decision to buy an OTC medication including intervening factors and action strategies. Finally, all of these themes and categories were compared systematically across all the

transcripts to the point of saturation (YP). All the codes, themes and categories were further reviewed independently by another researcher (TG) and discussed until a concordance was reached.

4.4 Results

Sample Characteristics

A majority of focus group participants were women (62.7%) and 37.5% were men. Most of the participants were 65-74 years of age (62.5%) followed by 75-84 years of age (25%), and 85 years and older (12.5%). 53.7% of the participants were Caucasian, and 46.3% were African-American. 60% of the sample had gone on to education beyond high school, while 40% had an education equal to or less than a high school. 67.5% had an annual household income less than \$15,000, while 32.5% had more than \$15,000.

General Thoughts and Experiences about OTC Medications

Almost all the focus group participants appeared to understand the difference between a prescription and OTC medication. Most (N=43) defined OTC medications as those drugs which they can purchase without a prescription from a physician. However, very few (N=3) could differentiate between OTC medications and other nonprescription products such as multivitamins, herbals, and other dietary supplements. It was further clarified to the participants that the current discussion was about OTC medications only, which are pharmacologically active compounds (just like prescription medications) but are available to consumers to use without a prescription. It was observed that participants did not know much about how OTC medications and other OTC products are regulated, but they want to know more information as observed in the discussion while questioning back to the moderator.

Various themes were identified during the discussion over the definitions and general thoughts about OTC medications. Likes, dislikes, examples of medications, attitudes, and preferences were discussed during the discussion about general thoughts. In general, three major categories were identified, including various themes. Table 4.1 summarizes the identified themes and categories with the number of responses and quotes representing the general thoughts and attitudes towards OTC medications among older adults.

A majority of the responses showed a positive attitude towards OTC medications. Accessibility (N=20), convenience (N=15), and the safety (N=13) were the most commonly cited reasons for favoring OTC medications in general. Some participants expressed negative attitudes, considering OTC medications might be unsafe and less effective to use in comparison to prescription drugs. Among the participants showing negative attitudes, most discussed the challenges associated with OTC medication use (N=20) including hard time reading the drug label information due to too much information or small font size, confusion while choosing among various OTC options, lack of information on the drug-label, and struggle with child-resistant packaging, and hard to swallow big sized capsules. Some (N=5) showed disappointment that OTC medications are not covered by their insurance and are too costly to afford. Some also reported OTC medications as unsafe (N=5) and less effective (N=6). It was also observed that older adults had discrete choices when choosing between brand name product and generics. The proportion of older adults favoring generic or brand was observed almost equal and was influenced by their beliefs. Those who used generics, considered them as less costly and equally effective as brand names. Those who used brand names, considered them as more safe and effective compared to generics.

Table 4.1: General thoughts and attitudes towards OTC medications among older adults		
Themes	No. of responses	Representative quotes
<i>Category 1: Positive attitude towards OTC medications</i>		
Accessibility	20	<i>"Over-the-counter medication is when you go in the drug store and you can purchase over the counter without a prescription. That's when it's over the counter, rather than prescription. –FG6 participant</i>
Personal control	7	<i>"So when the doctor prescribes a prescription for you, it's only his thought as to what he thinks you would need. But when we go and buy over the counter, you already have an idea as to what you have to have like BC powder. You don't need a prescription for that." – FG1 participant</i>
Safety	13	<i>"They been studied for so long that the FDA determines they're OK." –FG1 participant</i>
Lower cost	12	<i>"Over-the-counter medications are just as good as prescription medications and much cheaper. With us on a fixed income, sometimes we can't afford those prescriptions that our doctor prescribes, but they have substitutes over the counter that will do the same thing that those prescriptions do." –FG6 participant</i>
Choice	7	<i>"I think, too, that you have more of a choice with over the counter. If you have a tummy ache, you've got a zillion things for a tummy ache, where a doctor would prescribe usually one thing, which is OK, but choice." –FG2 participant</i>
Convenience	11	<i>"Something you can buy at the pharmacy without waiting for prescriptions." –FG5 participant</i>
<i>Category 2: Negative attitude towards OTC medications</i>		
Less effective	6	<i>"They are generally just weaker. They are not as strong of a medication as the prescription." –FG5 participant</i>
Unsafe	5	<i>"And there are some over-the-counter medications that do make you sick or are a danger to your body." –FG4 participant</i>
Confusion	5	<i>"If you get a prescription drug, you have the feeling that the doctor knows what you want, what you need; you take it and you have the feeling it's going to work. If you go into a drug store and look at all that's on the shelf, you don't really know what's going to work. It's a trial and error sort of thing." –FG4 participant</i>
Lack of information	2	<i>"You get papers with the medicine that you get from the pharmacy telling you all the symptoms, this, that and everything else. But over-the-counter medicine doesn't have that." –FG2 participant</i>
Not covered with insurance	5	<i>"My prescription medicines, which I only take two, are cheaper than the over the counter. I have a copayment for them." –FG2 participant</i>
Hard to read the label	9	<i>"One thing is the directions they have on there are too small to read. That's one thing we don't like." –FG4 participant</i>
<i>Category 3: Generic versus Brand names</i>		
Generics are less costly and equally effective	10	<i>"And then, also, you can buy a generic and often times they are the same. Sometimes there might be one little thing off, everything but one little thing there. Besides that, I'm cost conscious, so I'll ask the pharmacist, who I believe is a knowledgeable person, and if they say, yes, the generic is just as good and it can be half the price or a third of the price, I buy the generic." –FG1 participant</i>
Brands are more safe and effective	7	<i>"You may think generics are a good thing. Maybe this person swears by generics, but I don't believe in taking generics. When I was growing up we didn't have generics; now things have changed. If people can take the generics, God bless you. I'm glad for them, but I can't take them." –FG4 participant</i>

Perception of Safety

Majority of older adults considered OTC medications safe enough to self-treat with if the instructions are followed appropriately. Major proportion (N=21) of older adults believed that the safety of an OTC medication depends upon the individual factors (such as age, health or biology). Age was mentioned repeatedly during all the discussions to be an important factor influencing safety. Very few participants believed that race or gender might also influence safety. While larger group of (N=13) participants were positive about the safety of OTC medications, some older adults considered them unsafe (N=11) as compared to prescription medications, especially because they might not have full information about an OTC medications like they have it for the prescription medication. A few (N=4) shared mixed thoughts about the safety of OTC medications, saying that it might differ across different people and different medications. Table 4.2 summarizes various themes identified during the discussion about how safe older adults think OTC medications are.

Table 4.2: Perception of safety about OTC medications among older adults		
Themes	No. of responses	Representative quotes
OTC medications are safe	13	<i>"I have no idea, but I think because of my doctor recommending those, I think the benefits are probably greater than the problems they might cause. I think those have maybe been weighed out before I got to them."-FG5 participant</i>
OTC medications are not safe	11	<i>"You've got to be careful, because they can give you ulcers too. Bleeding ulcers and all types of stuff. Even with some of your regular medicine, you will get a pain in your stomach, and that medicine has to be changed because it is causing acid in your stomach"-FG7 participant</i>
Sometimes safe sometimes not safe	4	<i>"Sometimes safe, sometimes unsafe. A lot of over-the-counter medication sometimes may not be FDA approved, so you've got to watch the type of over-the-counter medications that you get because some over-the-counter pills are not FDA approved."-FG6 participant</i>
Safety depends on the use	17	<i>"A lot of it depends on how much you take. Moderate amount, sparingly, the problem is if you are a heavy dosage you will have problems."-FG5 participant</i>
Safety depends on individual factors	21	<i>"Your body, as you get older, the medication you're dealing with from over the counter has a different effect, because your body don't cope with certain things like it used to. You don't have the immune system that's built up to deal with certain things. You build antibodies and stuff to help deal with it."-FG10 participant</i>

Perception of Efficacy

A larger portion of older adult participants considered OTC medications to be less effective to use (N=14), in general compared with prescription drugs. However, some (N=10) older adults believed that they are as effective as prescription medications. Again, a few (N=3) had mixed thoughts about the efficacy of OTC medications, believing that some OTC medications are effective and some are not effective. Majority (N=23) of older adults believed that the efficacy of OTC medications depends on individual factors such as age, illnesses, and other biological factors. Table 4.3 summarizes various themes identified during the discussion about how safe older adults think OTC medications are.

Table 4.3: Perception of efficacy about OTC medications among older adults		
Themes	No. of responses	Representative quotes
OTC medications are effective	10	<i>"I used to take Tums, right, and Tums worked very good for me. And then I went to the doctor for what they call it? Gas. He gave me a prescription for some stuff and, truthfully, I don't see no difference. I think the tums was doing it better than that other pill that he wrote me a prescription for."-FG6 participant</i>
OTC medications are not so effective	14	<i>"They don't work and don't work fast enough. Nothing isn't fast enough, especially when you are feeling real bad. Like the earlier part of the week, I was feeling real bad but I just get an old remedy medicine. The other medicine didn't work fast enough.-FG7 participant</i>
Sometimes effective sometimes not effective	3	<i>"Sometimes okay and sometimes not at all. Then I have to call my physician, and he will tell me what over-the-counter medication to take. I can't take aspirin or nothing like that. I take Tylenol, but no aspirin, because I take Coumadin and it has aspirin medication in it. Coumadin helps you bleed as it is then aspirin will shock the hell out of you."-FG7 participant</i>
Efficacy depends on individual factors	23	<i>"And it also depends on the condition of your health, whether you take certain things. For instance, my husband was using Aleve. The first thing the doctor told him for his heart, he can't use Aleve any more. So it has to do with the condition of your health, as to whether you can continue to use an over-the-counter drug. Obviously, I think that Aleve does not interact with some of the medication for his heart."-FG2 participant</i>

OTC Medication Decision-Making

Participants were asked to recall the last time they bought an OTC medication and how they make a decision to treat and then how they make a decision to buy an OTC medication. When

combining the findings from both questions, it was observed that there exists two types of decision-making scenarios after the older adults make sense of their symptoms: 1) treatment decision-making and 2) purchase decision-making. The treatment decision-making comes with two approaches: 1) a decision to treat their symptoms by themselves (self-recommended) or 2) a decision to ask and/or follow physicians' recommendation (physician-recommended). Each of these treatment approaches may lead to other depending on the person's financial and healthcare resources, severity of the symptoms, experiences with the medication (past or current), and relationship with the physician. There were observed two consumer groups: 1) consumers who base their decision to use an OTC medication on their previous experience or their physician's suggestion, buy the same OTC medications, and use them consistently, or 2) consumers who actively look for different OTC medication options to treat themselves, explore information from various resources (such as social circle, internet, media, pharmacist) and try them. Generally, the first type includes older adults who are very satisfied with their long-used OTC therapy or with their physician-recommended treatment, and no longer wants to experiment with that. However, the second type of consumers represent older adults with financial limitations and inadequate access to healthcare, or who do not trust their physicians as much. Hence, they actively look for different OTC medication options to treat themselves, and explore more information from various resources (such as social circle, internet, media, and pharmacist) in order to try new OTC options. Following the treatment decision-making, the purchase-decision-making process follow the same for both types of treatment approaches (self-recommended versus physician-recommended) and both types of consumers.

While purchasing OTC medication from the store, the majority of consumers first explored information on the drug-label, asked a pharmacist, compared various options (generic or brand),

compare prices/deals, and made a final purchase decision favoring the maximum and fast relief, lower cost, and easy to swallow dosage forms.

Table 4.4 provides a summary of themes and categories identified while exploring the OTC medication decision-making process. Figure 4.1 illustrates the model explaining the OTC medication treatment decision-making process and Figure 4.2 represents the thought process while buying OTC medications, including the strategies and intervening factors during the purchase process.

Table 4.4: OTC medication decision-making in older adults			
Themes	Sub-themes	No. of Responses	Representative quotes
<i>Category 1: Treatment decision-making</i>			
Seeking more information in order to try a new one	Seeking information from advertisements to give it a try	15	<i>"I don't have to think about it. There is such an explosion on television of ads for everything. You walk into a pharmacy, and you go straight to one that you've heard a hundred times on the TV. From there you try to figure what else...you know."-FG5 participant</i>
	Seeking information from internet to give it a try	3	<i>"...how I decided to buy this stuff was because the stuff that I was using wasn't working. I looked on the computer and I put in what my problem was and I asked for a cure. It brought up three items, so I chose the first one. I didn't really read the label; I just bought it..."-FG6 participant</i>
	Seeking information in the drug store, pharmacy to give it a try	5	<i>"The last time I got medication from over the counter it was the Excedrin. I got it at Kroger. I don't think I went to the doctor to take the Excedrin, but it doesn't make any difference. They told me to take aspirin and Excedrin is aspirin. Just a little help, some punch in it, caffeine I think."-FG9 participant</i>
	Seeking information from other people to give it a try	13	<i>"And sometimes you need to talk to people. This works for me, but it might not work for you. My daughter likes Ibuprofen. It doesn't work for me, so that's not something I'll be taking. So word-of-mouth; people may tell you something works for them. You might give it a try."-FG4 participant</i>
	Seeking information from a healthcare professional to give it a try	17	<i>"You know, sometimes you just have to stop taking, if you have a reaction or something is not working and your blood pressure goes up, or you're not sleeping, or you have a pain, or whatever. Then I think you need to talk to your doctor and say look, I'm taking these over-the-counter drugs and here are my prescriptions, what do I do now?"-FG3 participant</i>
Using the same OTC medication	Using OTC medications as prescribed/recommended	26	<i>"I discuss my medication with my doctor. I ask questions. I don't like taking medication. I ain't no pill type of person either. But I'll take medication because the doctor must think I need it and he writes a prescription so I take it."-FG6 participant</i>

	by healthcare providers		
	Using specific OTC medications from a long time	7	<i>"...and I think repetition through the years, so what I've been doing I just keep on doing it."-FG6 participant</i>
<i>Category 2: Purchase decision-making</i>			
Exploring information	Reading the label to get informed	15	<i>"I usually look at the labels to see if it has the same active ingredients in it. If it does, it's usually the same thing. Every once in a while, you will find something that is generic that doesn't do as well."-FG5 participant</i>
	Asking a pharmacist to get informed	7	<i>"Well Omeprazole, my doctor had prescribed Nexium to me at one time for the heartburn, so I asked the pharmacist what was a similar item to that and she said omeprazole."-FG1 participant</i>
Comparing information	Comparing the effectiveness before buying	8	<i>"....There's a lot of cold medications, but I would try to find the one that might have the maximum effect "-FG6 participant</i>
	Comparing the price or deals before buying	18	<i>"I check what it's marked and find the cheapest and sometimes there's a big difference. If you get a bottle for \$19 and get one free, it makes a big difference."-FG2 participant"</i>
	Comparing dosage forms before buying	7	<i>"I got the Tylenol and I made sure that I got the caplets and not the pills, because the caplets I can break in half. The pills, I can't really do that. If they're coated it makes it a bit more difficult, so I read the box to find out what I'm buying."-FG8 participant</i>

Figure 4.1: OTC Medication Treatment Decision-Making in Older Adults

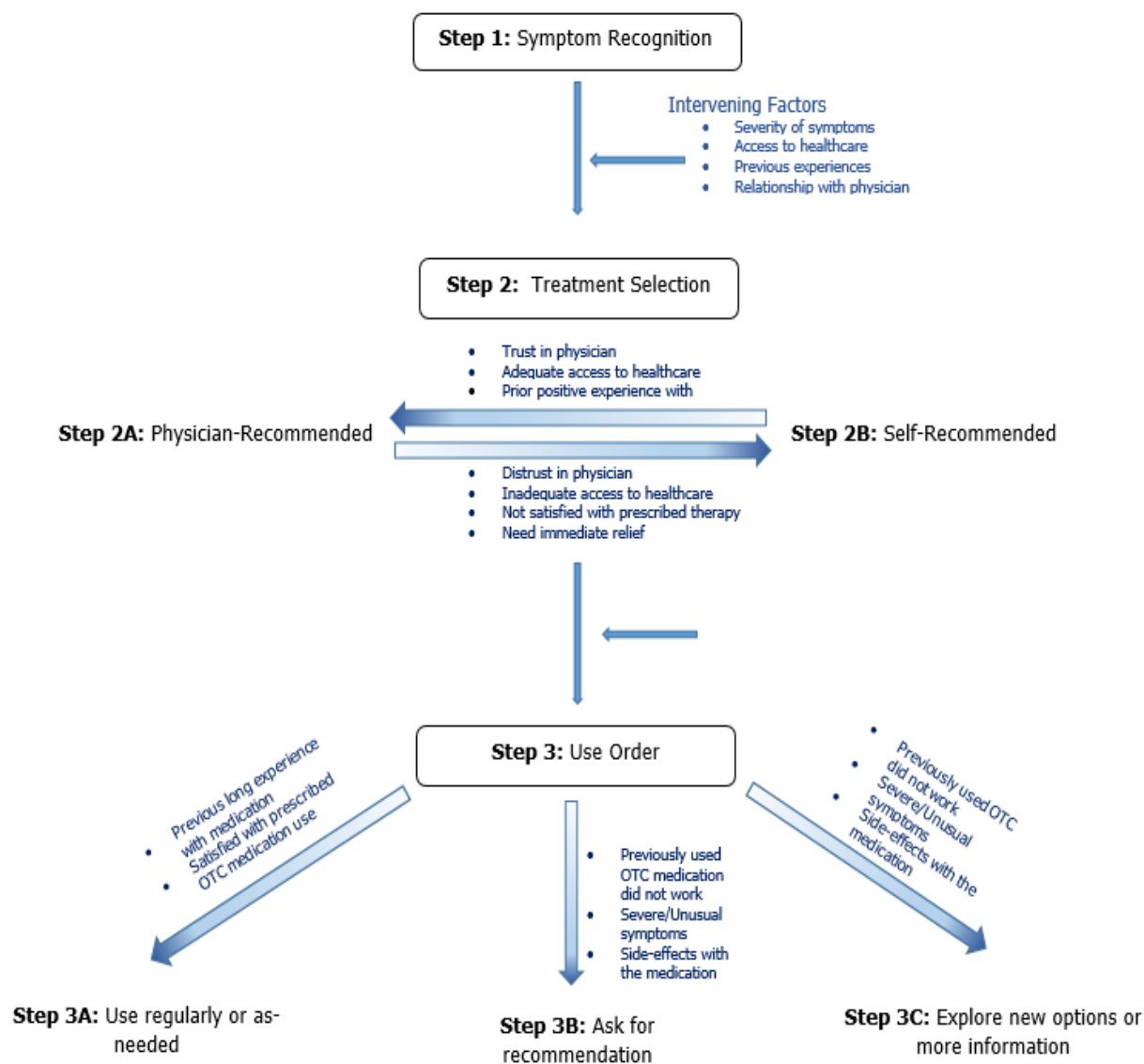
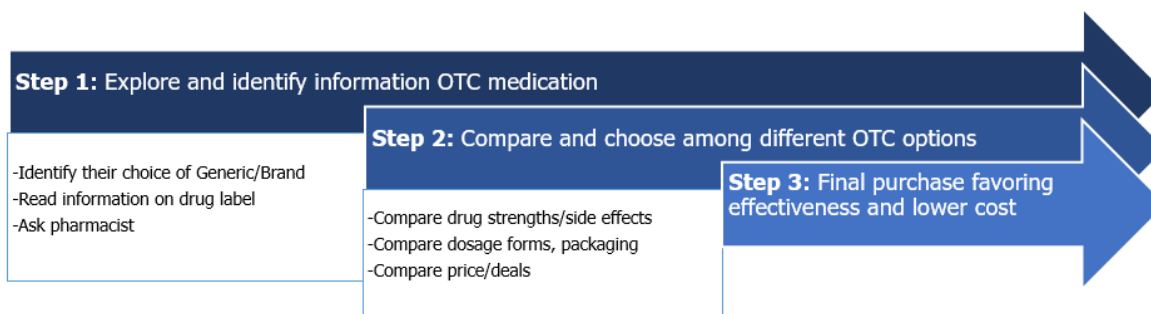


Figure 4.2: OTC Medication Purchase Decision-Making in Older Adults



Note: This process follows the same for all older adults who self-purchase their OTC medications followed by the decision to self-treat or to follow physician recommendation

Experiences with OTC Medication Use

At the end of the focus group session, participants were asked about their overall experiences and satisfaction with OTC medication use. A majority of them considered themselves satisfied consumers of OTC medications. Older adults primarily used OTC medications as needed until they were recommended to use them on a routine basis, such as aspirin for cardiovascular prevention. Most of them reported reading the drug label, specially information on the drug strength, side effects, and expiration date before they bought and started using the OTC medications. However, they denied reading the drug label every time buying the same OTC medication. Participants (N=10) also expressed some challenges associated with OTC purchase and use such as their need to have more information for better clarity, a simple and easy presentation of the information to help them read it more easily and accurately. Older adults reported getting confused because of the small and dense text on some drug labels. Some of them also mentioned challenges opening the child-resistant packaging and consuming large tablets.

Caplets and chewable medications were observed as the most preferred dosage forms in this population.

Some (N=19) older adults also shared their experiences of side effects such as drug-drug interactions, drug intolerance, and hypersensitivity. Some revealed having a desire to use OTC medications repeatedly and getting dependent on it (N=4), while some (N=15) intentionally misused OTC medications by taking more than the recommended dose or taking more frequently than directed. While they were sharing their experiences, it was observed that in general older adults do not share their concerns with their healthcare providers until it is important. Table 4.5 summarizes major themes identified while exploring the experiences using OTC medications in older adults.

Table 4.5: Experiences using OTC medications in older adults		
Themes	Frequency	Representative quotes
Satisfactory	9	<i>“Over-the-counter I really haven’t had any problem with it that I am aware of or it’s so general I have ignored it. It’s the prescriptions that are more deadly to me than the other stuff.”-FG5 participant</i>
Side effects	6	<i>“I’ve taken an 81 mg aspirin for a long, long time. Then one day my doctor said, ‘you have become aspirin resistant. You need to take 325 mg.’ So I took that for a period of time and I would bruise. I said, ‘can I go back to the 81?’ and he said yes. I’m back and feel very safe at that.”-FG4 participant</i>
Addiction	4	<i>“The aspirin is because the doctor recommended it. The Excedrin is because a pain medication I was prescribed, I was having a problem with it. It was very addictive and strong.”-FG10 participant</i>
Challenges	10	<i>“I had one that was a pill I wanted to get. I kept getting this one bottle of it and that bottle, I could not get that top off. I was so upset.”-FG2 participant</i>
Abuse	15	<i>“I must admit it was my stupidity because I knew I shouldn’t take it, but after those procedures I was just looking for some relief. Instead of taking two every four hours, I’d be taking three every four hours around the clock.”-FG4 participant</i>

4.5 Discussion

Major Study Findings

To the researcher's knowledge, this is the first published qualitative study in a sample of US older adults, which explored the knowledge, attitudes, and beliefs about OTC medications and decision-making in this population. Major portion of older adult participants in this study felt positive and satisfied about using OTC medications as needed. However, a small group of older adults also expressed negative attitudes towards OTC medications. The majority favored OTC medications because they are a safe and convenient therapeutic option, especially to treat minor illnesses rather than going to the physician for a consultation. However, a larger number of older adults did not consider OTC medications as effective as prescription medications for the treatment of severe symptoms. Most participants perceived generic products to be cost-savvy yet less effective option as compared to brand name products and this influenced their decision to choose generic versus brand.

The study also explored how older adults make a decision to treat with OTC medications. It was observed that OTC medication treatment decision-making depends on various factors and differs among the participants. Previous experiences with the medications, the severity of the symptoms, the relationship with the healthcare provider and access to healthcare were some major factors behind the OTC treatment decision-making process of an older adult. When making a decision about the final purchase, cost and effectiveness were frequently cited by the respondents as the most important factors they consider while making a final decision. Some participants also mentioned dosage forms. This study also explored the perception of the safety and efficacy of OTC medications in the older adult population. It was observed that the majority of the participants considered OTC medications safer but less effective in general or in comparison

with prescription medications. However, a few participants expressed mixed thoughts on the safety and efficacy of OTC medications considering that it might depend on certain other factors. In general, older adults believed that both safety and efficacy of an OTC medication depends on individual factors such as the age of a person, chronic health conditions, or other biological factors. Most considered that being older puts them at increased risk for medication-related problems. In addition, how the medication is being used might influence the safety of an OTC medication according to many participants. A few also mentioned that the information on the label may affect how they use the medication and how safe it would be upon use.

Comparison with the Existing Literature

There is a paucity of published literature exploring the OTC medication use and decision-making process in older adults. Previous studies often examined the prevalence and socio-demographic characteristics associated with OTC medication use in this population. There are few qualitative studies which explored medication-related issues such as medication adherence, multiple medications, and overall experiences with the medications in older adults,^{8,9,11,15} but there is no published study exploring OTC medication use and decision-making process in older adults. According to a previous study, older consumers were more likely to seek advice from a health professional rather than their common social circle when looking for information on OTC medications.⁷ Findings from our study suggests that the source of information differs for two general groups of OTC medication consumers. One group represents older consumers who trust their healthcare providers and follow their recommendation to use any OTC medication. Another group represents older consumers who do not trust their healthcare providers and seek information from various resources such as advertisements, their social circle, and in-store pharmacists. Information seeking behavior with respect to OTC medications seems to be

influenced by the patient-provider relationship in our study, which supports findings from a number of previous studies.⁸⁻¹¹ Modig et. al. reported in a similar way that there exists two groups of consumers with regards to receiving information on medications. One group trusts their healthcare providers and they are comfortable exchanging and receiving sufficient information from their providers while another group has distrust of their healthcare providers and feels frustration for not having enough information about the medications.⁸

While discussing the experiences with OTC medications in general, some participants revealed that they use or have used OTC medications not as recommended or directed in the past. Some mentioned using more than the required dosage of OTC medications when they wanted faster or urgent relief. Some took OTC medications more frequently than directed on the drug label for the same reason. Other than the need for urgent relief, participants also mentioned “abusing” OTC medications intentionally because they consider them safe or because they are available as a prescription in higher strength. While previous studies report the unintentional misuse of OTC medications in this population, the present study adds to those findings by reporting on intentional misuse of OTC medications and the reasons behind it.^{12,13}

Dependence to OTC medications is a commonly recognized issue among all age groups, and has been reported to be associated with having a genuine medical reason and medical prescribing as a starting point.^{14, 15} Our study also supports this as many participants mentioned becoming dependent on certain drugs while using them regularly.

The present study also documents experiences of side effects while using OTC medications. Aspirin and ibuprofen were observed as the most commonly reported medication causing side effects. OTC medication-associated side effects are well documented by a number of quantitative studies, however being qualitative in nature, the present study reveals various reason behind

them. In most cases, the side effects were not serious, but two participants mentioned being hospitalized due to severe adverse drug events. One of the events was due to a drug-drug interaction and other happened due to severe overuse of aspirin. A majority of older adults use aspirin on a regular basis to prevent cardiovascular events. Aspirin is one the most prevalently used drugs in this population, however aspirin is not a benign medication and its regular use may lead to mild to major side effects.¹⁶ A major concern is its availability over-the-counter for which it is perceived as a safe medication in general. This study observed a similar perception about the safety of aspirin as well as acetaminophen. Both were observed as the most inappropriately used OTC medications in this set of older adult population. Older adults are in general more sensitive to medications.¹⁷ Beer's criteria documents several OTC medications, including aspirin, ibuprofen, diphenhydramine which are considered as potentially inappropriate for use in older adults.¹⁷ Inappropriate use of these medications could worsen the negative health outcomes that are more commonly experienced in this population.

Strength and Limitations

This is the first qualitative study which explores a wide range of thoughts and opinions, as well as the decision-making process around OTC medication use of an older population in the US. Using a qualitative approach with focus group methodology, the study achieved an in-depth view of the practices and preferences associated with OTC medication use in this older adult population. Findings from this study address the existing knowledge gap in the literature. All of the focus groups were conducted until the point of saturation, which increases the credibility of the findings. All of the focus groups were comprised of a mix of race, gender, age (within the older adult age group) with a variation in the medication regimen, which increases the sample variation in the study and hence adds to the credibility of the study. All of the transcripts were

read twice and analyzed both manually and with N Vivo 11 software (YP). Further all the transcripts were independently checked by another researcher (TG) to triangulate the findings. Further, all findings were presented with representative quotes while summarizing the analytical themes and categories, and this increases the dependability and confirmability of the study findings. Being qualitative in nature with a small sample of population, the study results are not generalizable to the entire older adult population, but by recruiting from two different locations serving residents who differ socio-demographically, an effort was made to include a diverse sample to increase the transferability of the results.

There are some limitations as well. The study applied purposeful and snowball sampling for the recruitment and sample size is relatively small ($n=80$) and is not truly representative of the larger population of older adults, particularly in other geographic locations in the US with a different demographic composition of the older adult population. This may also introduce selection bias into the study. In addition, the study represents only US older adults, and results may vary in other countries where medications are regulated and available to consumers in a different way. Finally, there could be a possibility of researcher bias induced by the researcher's own way of moderating focus group discussions. Response bias may also be a possibility in a focus group setting where participants may respond differently in front of the researchers and other participants as compared to providing information during an in-person individual data collection procedure.

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Chapter 5: Specific Aim 3

5.1 Overview

This chapter addresses specific aim 3, which focuses on understanding the current prevalence, patterns, and practices associated with OTC medication use in older adult residents of senior-living communities. This chapter describes the study design, methods and results from the quantitative phase of the mixed-methods study which follows after the qualitative phase (chapter 4) using an exploratory sequential design.

5.2 Specific Aim 3

Specific aim 3A: To quantify attitudes, perception, preferences, and practices associated with OTC medication use and decision making of independent living older adult residents of senior-living communities.

Specific aim 3B: To identify and describe the reasons, frequency, and patterns of OTC medication use in this sample population.

Specific aim 3C: To identify and describe the interpersonal, intrapersonal, organizational, and group-level characteristics associated with the self-recommended OTC medication use in this sample population.

Specific aim 3D: To examine the association between the self-recommended OTC medication use and interpersonal, intrapersonal, organizational, and group-level characteristics in this sample population.

The following hypotheses were tested to address this aim:

HA1: There exists a positive relationship between intrapersonal characteristics and self-recommended OTC medication use among older adult residents of senior-living communities.

HA2: There exists a positive relationship between interpersonal characteristics and self-recommended OTC medication use among older adult residents of senior-living communities.

HA3: There exists a positive relationship between organizational characteristics and self-recommended OTC medication use among older adult residents of senior-living communities.

HA4: There exists a positive relationship between community-level characteristics and self-recommended OTC medication use among older adult residents of senior-living communities.

HA5: There exists a positive relationship between policy-level characteristics and self-recommended OTC medication use among older adult residents of senior-living communities.

5.3 Methods

Study Design

A retrospective, cross-sectional study design was used to address specific aim 3.

Survey Design and Questionnaire Development

The present study used survey methodology. In-person interviews were conducted using semi-structured questionnaires in two independent senior-living facilities in Richmond, Virginia. The questionnaire was developed by a research committee, including geriatric and mixed-methods researchers. First, a comprehensive literature review was conducted to identify important themes and knowledge gaps in the literature on OTC medication use and decision-making in US older adults. Based on those findings, questions were designed to include in the survey. Important social

and health-related questions were also incorporated from nationally representative datasets.^{11,12} The face and the content validity of the survey was assessed by several discussions and revisions within the committee. Questions that were hard to understand or ambiguous were simplified or removed. Further, new themes identified from the qualitative phase findings informed the development of the survey. The final survey includes total 51 questions with multiple choice and five-point Likert scale responses that were divided into 4 sections:

- 1) Socio-demographic composition: This section included basic demographic questions (age, gender, marital status, and race) and questions on socio-economic status (education, income, and employment)
- 2) OTC medications review: This section included information on the current use of OTC medications (the name of the medication, the frequency of use)
- 3) OTC medication use: This section included questions to assess the attitudes, perceptions and practices associated with OTC medications use in this population.
- 4) Health and health-related behaviors: This section included questions on overall health, health-related issues and health behaviors in general.
- 5) Personal and social life, life satisfaction: This section includes questions on social and personal life, and life satisfaction.

The study (IRB No. HM20008442) was approved by the IRB of Virginia Commonwealth University as qualified for exemption according to 45 CFR 46.101(b), Category 2. The approved version of the informed consent form (ICF) and the final questionnaire, which was used to conduct the surveys, can be found in Appendix D & E respectively.

Study Setting and Sample Population

The survey was conducted by two researchers from April to June 2017 in a convenience sample of (n=88) older adult residents of two senior-living communities in Richmond, VA. One is urban Section 8 low-income housing with 240 independent living residents, and the population is 55% female and 62% black with an average age of 72 years. The other is located in a suburban area adjacent to downtown and has 870 independently living residents. The population is 71% female and 70% white with an average age of 81 years. Both communities have a pharmacy located close by, either within the community or in the next city block.

Participants were recruited for the study through flyers and brochures. The survey was administered in-person and took approximately 10-15 minutes to administer.

Inclusion/Exclusion Criteria

Participants were included:

- 1) If they were currently using or have used an OTC medication past three months.
- 2) If they can understand and converse in the English language.

Participants were excluded:

- 1) If they could not understand the survey due to cognitive restriction or poor comprehensive abilities as observed while administering the survey
- 2) If they were less than 65 years of age.
- 3) If they were not currently using or have not used any OTC medication in the past three months.
- 4) If they participated in the qualitative phase of the mixed-methods study.

Study Measures

Exploratory Variables

This survey study was majorly an exploratory study where various variables were measured indicating the perception, attitude, preferences, and practices associated with the OTC medication use, and decision-making. Details of the questions measuring these variables can be obtained in appendix E.

1. Perception of Safety and Efficacy:

Perception of safety was measured by asking ‘how safe do you think over-the-counter medications are? The response categories for this question were-very safe, safe, unsure, unsafe, and very unsafe. Perception of safety about generic versus brands was measured by asking ‘comparing generic versus name brand versions of an over-the-counter medication, what are your thoughts on their safety in general?’ There were three response categories to this question- 1) generic version are safer than name brand versions of OTC medications, 2) name brand versions are safer than generic versions of OTC medications, and 3) both generic and name brand versions are equally safe.

Perception of efficacy was measured by asking ‘how effective do you think over-the-counter medications are? The response categories for this question were-very effective, effective, unsure, ineffective, and very ineffective. Perception of efficacy about generic versus brands was measured by asking ‘comparing again, generic versus name brand versions of an over-the-counter medication, what are your thoughts on how well they work in general?’ There were three response categories to this question- 1) generic version works better than name brand versions of OTC medications, 2) name brand versions work better than generic versions of OTC medications, and 3) both generic and name brand versions work equally well

2. Preferences in regards of OTC Purchase Decision-Making

The data about preferences in regards of OTC purchase was gathered by asking questions, with multiple responses/preferences and an option to check all that apply.

OTC purchase location preference was measured by asking a question ‘if it is a location where you buy over-the-counter medications? OTC information source preference was measured by asking ‘if it is a source from where you get information about over-the-counter medications?

Preferred attributes in OTC purchase process was measured by ‘if it is an attribute you generally consider when choosing an over-the-counter medication? Preferences while reading the OTC drug-label information was measured by ‘what information do you read on the drug label in general?

Finally, a question was asked to measure the most important factor behind the final OTC purchase by asking ‘what is the most important for you when you make a final decision to buy an over-the-counter medication?

3. Attitude about OTC Decision-Making

Attitudes about the steps involved in OTC decision-making process was measured by asking questions with 5 response categories-very confident, somewhat confident, neutral, somewhat doubtful, and very doubtful.

Attitude about the ability to recognize symptoms was measured by asking ‘how confident do you feel about your ability to recognize symptoms that can be treated with an OTC medication?’.

Attitude about the ability to locate OTC medication in the store was measured by asking ‘how confident do you feel about your ability to locate an OTC medication in the store?’. Attitude about the ability to read the information on the drug-label was measured by asking ‘How confident do you feel about your ability to read the information on the drug-label?’. Attitude

about the ability to select an OTC medication among various options was measured by asking ‘how confident do you feel about your ability to select an OTC medication among many options?’. Attitude about the ability to treat with an OTC medication was measured by asking ‘how confident do you feel about your ability to treat yourself with an OTC medication as required?’

4. Experiences of Using OTC Medications

Experiences of strong desire to repeatedly use an OTC medication was measured by asking ‘have you ever experienced a craving or a strong desire to use an over-the-counter medication again and again?’, and responses include 1) yes, once, and 2) yes, more than once.

Experiences using OTC medication in inappropriate way was asking ‘if you have ever consumed any over-the-counter medication in following ways’-1) consumed more frequently than indicated on the drug label, 2) consumed a higher or a lower dose than indicated on the drug label, 3) consumed more than the maximum daily amount indicated on the drug label, 4) consumed for a different purpose than indicated on the drug label, 5) consumed after the date of expiration as indicated on the drug label, 6) consumed with an alcoholic drink

Overall experience was measured by asking ‘how do you feel in general about your overall experience of using over-the-counter medications?’ , and the response categories include-very satisfied, somewhat satisfied, neutral, somewhat dissatisfied, and very dissatisfied.

Response Variable

This study was an exploratory descriptive study where several variables indicating attitude, perception and practices associated with OTC medications were quantified. For the inferential part of the study, a response categorical variable was created having two categories-self-

recommended OTC medication use and physician-recommended OTC medication use. This was based upon the participants' response to the question- "How often do you take over-the-counter medications without consulting a physician?" Self-recommended use was considered if the person responded 'always/usually/sometimes' to this question. Physician-recommended use was considered if the person responded 'rarely/never' to this question.

Explanatory Variables

The variable selection for the inferential analysis part of the study was informed by the ecological model of health behavior. Based on this model, multiple explanatory variables were identified and categorized into five categories: Intrapersonal, interpersonal, organizational, community and policy-level. Table 5.1 summarize the list of variables identified and selected for addressing the specific aim three.

Table 5.1: Selected multi-level variables to assess against OTC medication use	
<i>Socio-demographic composition</i>	Socio-demographic factors: Age, gender, ethnicity, marital status, income, education, and employment
<i>Intrapersonal</i>	Health-related factors: General health, sleep quality, disability, smoking, drinking, physical activity, self-care
	Psychological factors: Insurance satisfaction, life satisfaction
<i>Interpersonal</i>	Social factors: Social participation, health-related discussion with social circle, health-related suggestions from social circle
	Psychosocial factors: Social and emotional support
<i>Organizational/Institutional</i>	No. of physicians, insurance coverage, time since last doctor visit
<i>Group-level (Community-level Policy-level)</i>	Not addressed in this survey

Socio-Demographic Composition

Age, gender, race, marital status, education and employment were included to describe the socio-demographic composition of the sample. Age was categorized into two categories 65-74 and 75 and older which was consistent with the previous literature. Comorbidities increase with age and so may the use of OTC medications increase with age.^{1,2} Gender was included and was grouped into men and women. Previous literature suggests that women tend to use more medications than men, so this may be a potential confounding factor in the study.^{2,3} Including race as a potential confounder was based on the findings from previously published studies which report the differential use of OTC medications by race.^{3,4} Marital status was included. Having a spouse or living-in partner may potentially influence health, healthcare decision-making and healthcare utilization. Education was included and was categorized as “less than or equal to a high school education” and “more than high school education”. This categorization was informed by the previous literature.^{5,6} Income was categorized into two categories of “less than \$15,000”, ‘equal to or more than \$15,000. For employment, two categories were created-one for the people who are currently engaged in some kind of work or work-related activity as “employed”, and another category for people who are either retired or unable to work as “unemployed”.

Intrapersonal Factors

Intrapersonal factors included current health status, sleep quality, disability, smoking, drinking, physical activity, and self-care. For measuring general health, the participants were asked to rate their general health by asking “Would you say in general your health is: excellent, very good, good, fair, or poor?” General health status may be an important predictor of the self-medication. This was measured by recoding the original variable into two categories- ‘Poor/Fair’ and ‘Good/Very Good/Excellent’. To measure sleep quality, participants were asked to rate their

sleep quality by asking “Would you say in general your sleep quality is: excellent, very good, good, fair, or poor?” Sleep quality may also be an important predictor of the self-medication with OTC sleep aids. Those who have better sleep quality compared to their counterparts may be less likely to use OTC sleep aids. This was also measured by recoding the original variable into two categories- ‘Poor/Fair’ and ‘Good/Very Good/Excellent’. For measuring disability, participants were asked if they are limited in any activities because of physical, mental or emotional problems. The response was recorded as ‘yes’ and ‘no’. Smoking was measured as an indicator for health behavior. Participants were asked if they smoke cigarettes every day, some days, or not at all. Drinking was also included as an indicator for health behavior. Participants were asked that if they drink alcohol every day, some days, or not at all. Older adults who drink or smoke to feel better may be more likely to do self-care and self-medication. Physical activity was measured by asking if they exercise every day, some days, or not at all. Older adults who have sedentary lifestyle may have more health-related issues than their counterparts, which may further influence their OTC medication consumption.

Two psychological factors (Satisfaction with insurance, satisfaction with life) were included. The life satisfaction was measured by asking “How satisfied are you with your life?” The satisfaction with insurance was measured by asking “How satisfied are you with your current health insurance/coverage?” Both of these variables had five responses: very satisfied, somewhat satisfied, neutral, somewhat dissatisfied and very dissatisfied. These responses were recoded into three categories- very satisfied/somewhat satisfied, neutral, and somewhat dissatisfied/very dissatisfied, due to very few observations in some cells. Less satisfaction with the insurance may encourage a person to self-medicate with OTC medications. Not having satisfaction with life may be indirectly related to the poor health status and higher medication use.

Self-care was measured by asking- “Other than taking your regular prescription or over-the-counter medications, what else do you do to manage your health conditions?”. There were several categories for this question, yet only three categories were chosen by the participants in order to answer the question: exercise, eat healthy food, and take multi-vitamins/dietary supplements. Older adults who practice self-care may be more likely to practice self-medication with OTC medications.

Interpersonal Factors

Various social (social participation, health-related discussion with the social circle, health-related suggestions from social circle) and psychosocial (social and emotional support) were considered in this category as informed by the nationally representative datasets-BRFSS and NSHAP. The rationale for including these variables was to measure the psychosocial sources/deficits, which may directly/indirectly affect the health status and medication consumption in this population. Social participation was measured by asking, “How often do you get together with your social circle such as friends, relatives, or acquaintances?” There were several response categories to this question, which were further divided into three--rarely, moderately and frequently--due to low numbers of values in some cells.

Social and emotional support was measured by asking, “How often do you get the social and emotional support you need?” The question had five response categories, which were collapsed into three--always/usually, sometimes, and never/rarely. Not having a source of social and emotional support may be linked to poor health status and loneliness and may be associated with higher medication use.

Further, health-related discussion with the social circle was measured by combining responses from separately asking two questions “How often do you discuss your health-related issues

and/or treatment regimen with your social circle such as friends, relatives, or acquaintances?” and “How often do you discuss your health-related issues and/or treatment regimen with your family members?” Again, health-related suggestions from the social circle was measured by combining responses from separately asking two questions “How often do you follow a health-related suggestion from your family members?” and “How often do you follow a health-related suggestion from your social circle such as friends, neighbors, or acquaintances?” Health-related discussion and suggestions (such as experiences, side effects, and effectiveness of a medication) from family, friends, and social circle may encourage self-medication with OTC medications rather than going to a physician for recommendations.

Organizational Factors

Three variables were included as organizational factors: time since the last doctor visit, number of physicians, and having insurance. Time since the last doctor visit was measured by asking “About how long has it been since you last visited a doctor for a routine checkup?” It was recoded into two categories: ‘within the past 6 months’ and ‘within the past one year or beyond’.. ‘Insurance coverage’ was measured by asking “Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare, or Indian Health Service?”¹¹ The response was noted as “yes” or “no”. The number of physicians was measured by asking, “Do you have one person you think of as your personal doctor or health care provider?”¹¹ Response to this question had three categories: yes-only one, yes-more than one, and no.

Statistical Analyses and Model Building

Descriptive statistics were calculated to quantify attitudes, perception, preferences, and practices associated with OTC medication use in this sample of the older adult population. Socio-demographic, intrapersonal, interpersonal, and group-level characteristics of the participants were described by types of OTC medication use (self-recommended versus physician-recommended) using Chi-square/t-tests as appropriate. SAS version 9.4 was used for all the statistical analyses. PROCEDURE SURVEYFREQ was used for descriptive analyses using CLUSTER, STRATA, and WEIGHT statements.

Next in the process, a p-value of < 0.2 was used as the standard to choose the variables to include in the preliminary analyses. Bivariate analyses were conducted to examine the independent association between self-recommended OTC medication use and multi-level variables.

PROCEDURE SURVEYLOGISTIC was used for bivariate inferential analyses using CLUSTER, STRATA, and WEIGHT statements. Only 'income' showed a significant correlation with the self-recommended OTC medication use, hence no further multivariable analyses and model-building process was performed.

5.4 Results

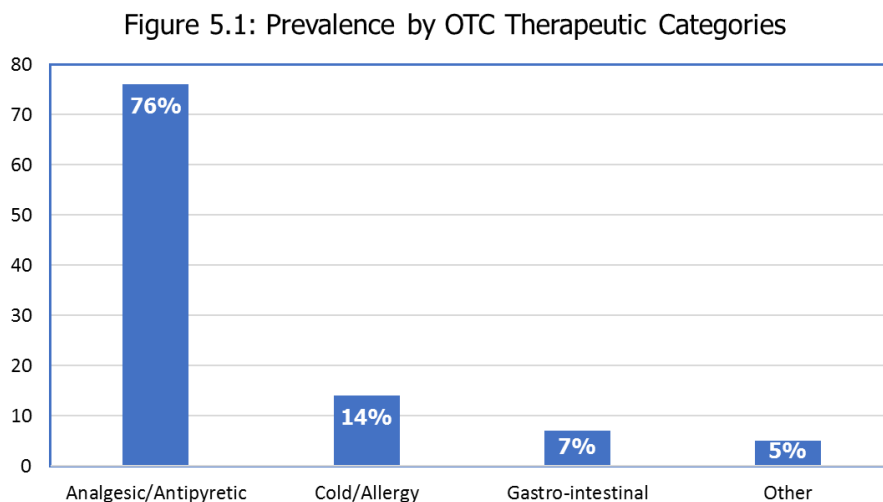
Sample Characteristics

Total 88 participants were interviewed in-person. Most of the sample belonged to the age group of 65-74 years (55%), followed by the age group of 75-84 years (27%), and the age group of 85 years and older (13%). The majority of participants were African-American (61%) and the remainder were Caucasian (36%). Women accounted for more than half sample (59%) and the

rest were men (41%). All the participants were unemployed, and the majority of them had an annual income of less than \$15,000 (64%). Only 9% of them were married or living with a partner, the majority of them were living single. A greater proportion (55%) had an education less than or equal to high school.

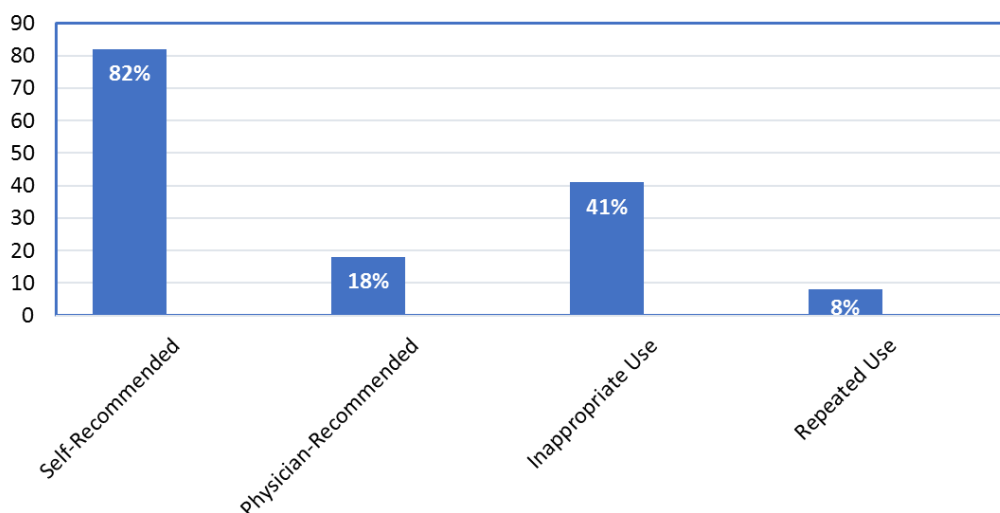
Types of OTC Medication Use and Experiences

Analgesics (76%) were the most prevalent category of OTC medications, followed by cold/allergy products (14%), gastro-intestinal products (7%), and others (5%). Aspirin was the most prevalent (65%) OTC medication. Among aspirin users, 63% were using it on a regular basis for the prevention of cardiovascular events, and 37% for other pain-related symptoms as needed. Figure 5.1 represents the prevalence by OTC therapeutic categories.



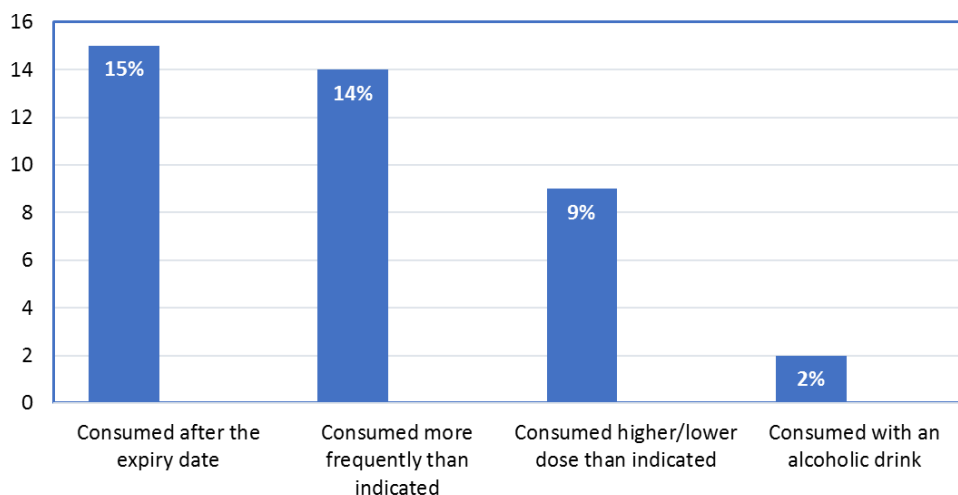
The major proportion (82%) of OTC medication users reported using OTC medications without consulting a physician. Approximately 8% of the participants reported getting dependent to an OTC medication and using them repeatedly, and half of them experienced the addiction more than once. Nearly 12% reported experiencing side effects associated with an OTC medication. Figure 5.2 represents types of OTC medication use in this sample of older adults.

Figure 5.2: Types of OTC Medication Use



Approximately 41% participants reported using OTC medication in inappropriate or incorrect ways. Total, 15% reported using an OTC medication after the expiration date, 14% reported consuming OTC medication more frequently than indicated on the drug label, 9% reported taking a higher or a lower dose than indicated on the drug label, and 2% reported consuming OTC medication with an alcoholic drink. Figure 5.3 represents types of inappropriate use in this sample of the older adult population.

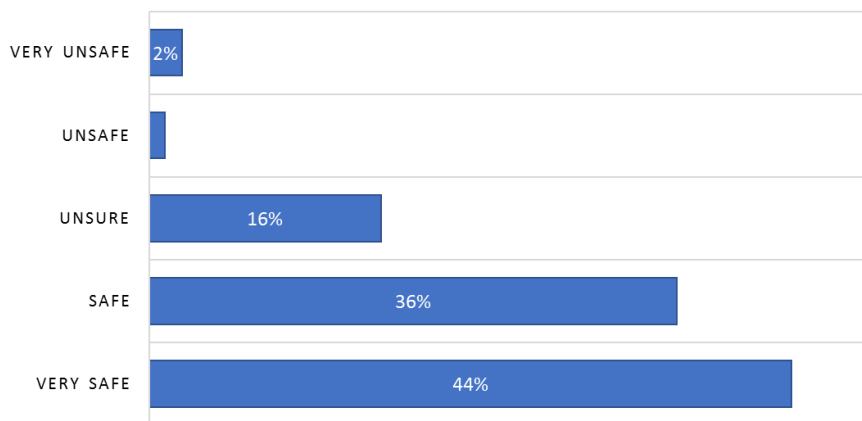
Figure 5.3: Types of Inappropriate Use of OTC Medications



Perception of Safety and Efficacy

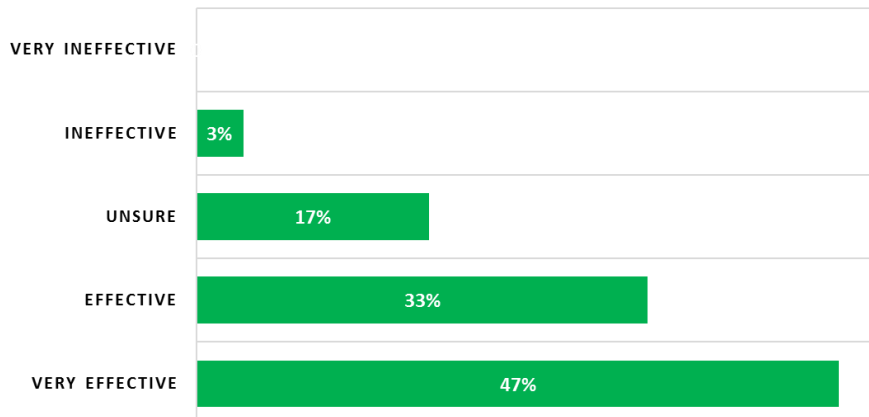
In general, older adults considered OTC medications as very safe to use. Nearly 44% of older adults reported OTC medications as very safe to use and 36% reported OTCs as safe to use. 16% were unsure about it, while only very few reported OTC medications as unsafe (1%) or very unsafe (2%) to use. Figure 5.4 represents a graphic summary of perception of safety about OTC medications in this sample.

FIGURE 5.4: PERCEPTION OF SAFETY



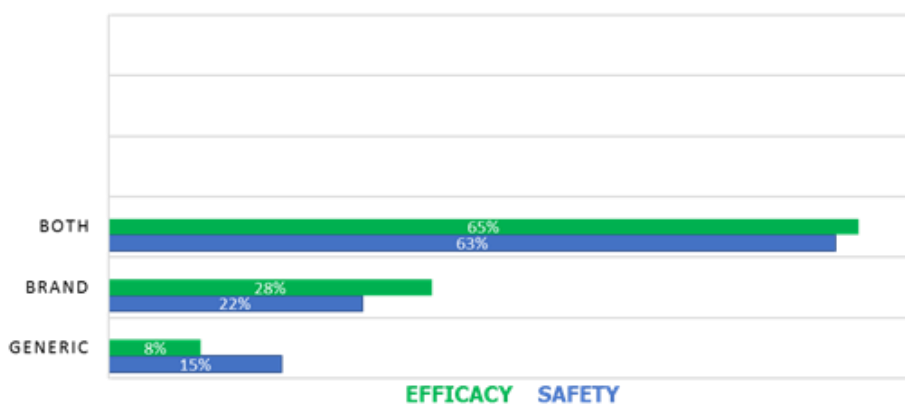
In terms of efficacy, a greater number (47%) reported OTC medications as very effective and 33% reported as effective to use. 17% were unsure about how well OTC medications work. Only a few (3%) reported OTC medications as ineffective. Figure 5.5 represents a graphical summary of perception of efficacy about OTC medications in this sample.

FIGURE 5.5: PERCEPTION OF EFFICACY



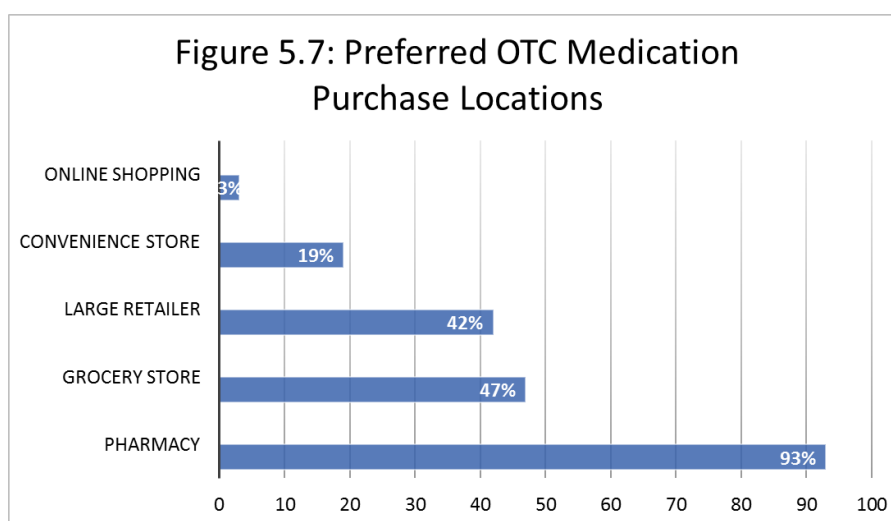
While comparing the safety of brand versus generic version OTC medications, a larger number (63%) of the participants reported that both generic and brand versions of OTC medications are equally safe. In terms of comparing effectiveness of generic versus brand, again the majority (65%) of the participants reported that both generic and brand versions of OTC medications are equally effective. Among older adults who preferred one over the other, a greater proportion (28%) favored brand as an effective option while only 8% favored generic over brand. Figure 5.6 represents a graphical summary and comparison between the perception of safety and efficacy of brand and generic version of OTC medications.

FIGURE 5.6: PERCEPTION ABOUT THE SAFETY AND EFFICACY OF GENERIC VERSUS BRAND

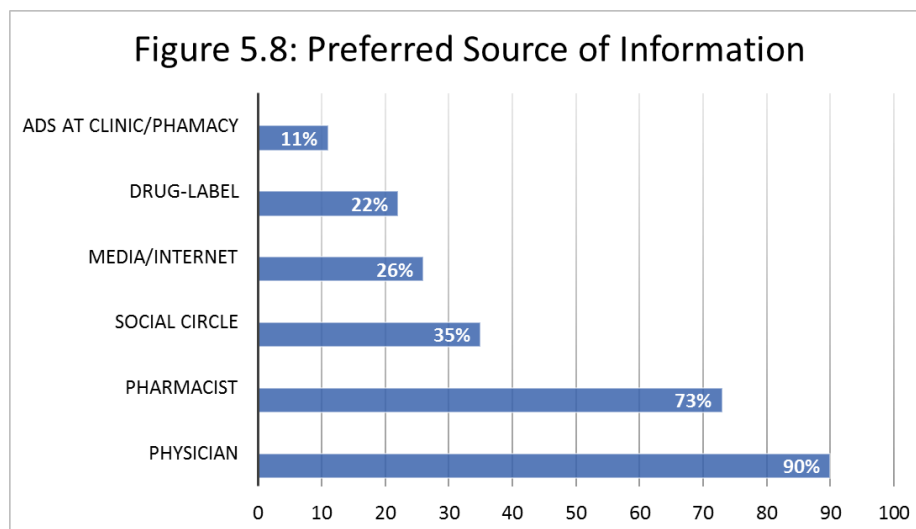


Preferences and Practices Associated with OTC Medication Use and Decision-Making

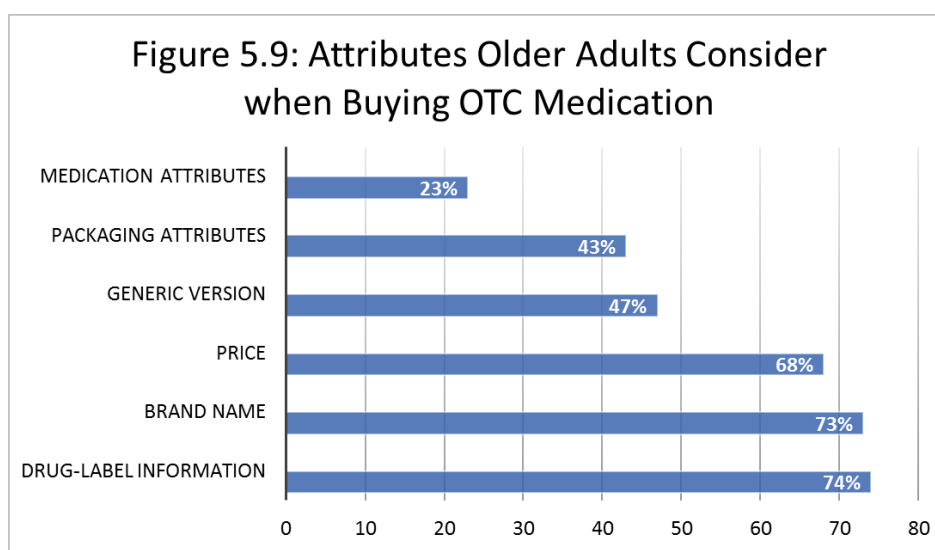
Participants were asked a question with multiple responses and the option to check all that apply about the location to buy an OTC medication. It was observed that the pharmacy was the most commonly (93%) checked location to buy an OTC medication, followed by the grocery store (47%), large retailer (42%), the convenience store (19%), and online shopping (3%). Figure 5.7 represents a graphical summary of preferred purchase locations for OTC medications.



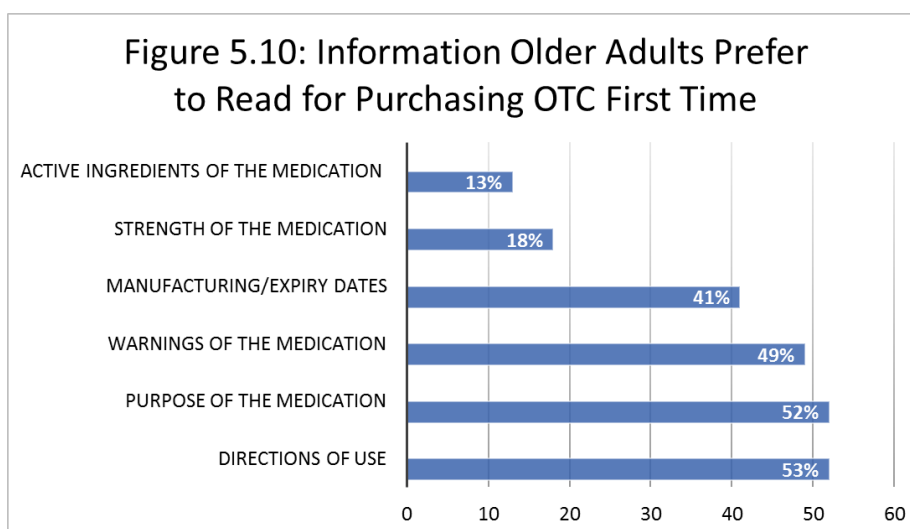
Further, a question was asked to the participants about the source of information on OTC medication, with multiple responses and the option to check all that apply. Analyses revealed that the physicians (90%) were the most frequently checked as the information resource for OTC medications, followed by the pharmacist (73%), social circle (35%), media (26%), drug-label (22%), and advertisements at clinics/pharmacy (11%). Figure 5.8 represents a graphical summary of preferred information sources for OTC medications.



Again, a question was asked to the participants about an attribute they generally consider when choosing an OTC medication, with multiple responses and the option to check all that apply. It was observed that while choosing an OTC medication, the drug-label information was most commonly checked (74%) response, followed by brand names (73%), price (68%), generic version (47%), packaging attributes (43%), and medication-related attributes (23%). Figure 5.9 represents a graphical summary of preferred attributes, which older adults consider while choosing an OTC medication to buy.

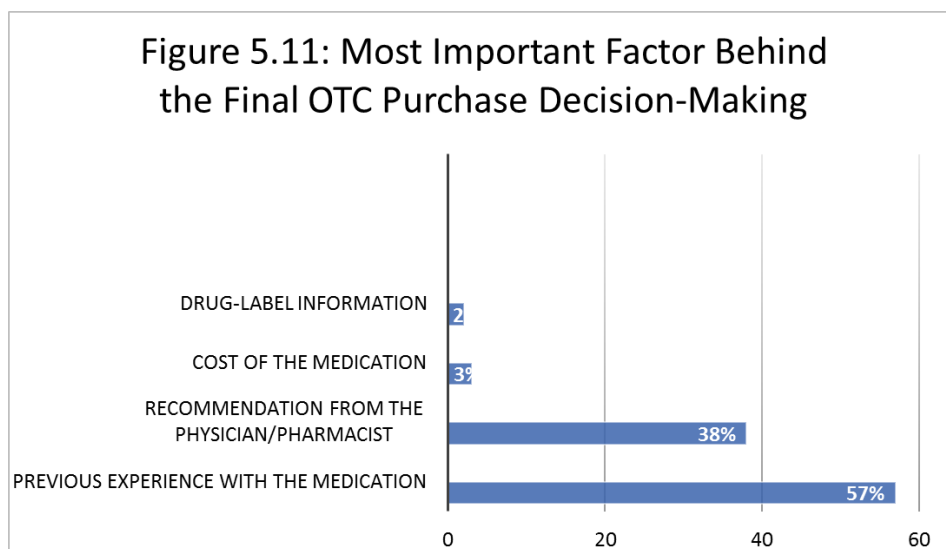


A question was asked about the type of drug-label information, older adults read while buying an OTC medication for the first time, with multiple responses and the option to check all that apply. The directions of use (53%) and the purpose of the medication (52%), both was the most commonly checked information by this set of population, followed by warnings about the medication (49%), dates of manufacturing and expiration (41%), strength of the medication (18%), and active ingredients of the medication (13%). Approximately 26% of the sample reported having issues while reading and understanding the information on the drug-label always/usually. Figure 5.10 represents a graphical summary of types of information, which older adults prefer to read while choosing an OTC medication to buy.



When asking what is the most important for them in order to make a final purchase decision to buy an OTC with an option to check only one response category, more than half (57%) of the participants reported their previous experience with the medication. The recommendation by the physician/pharmacist was the second most important point (38%) to consider while making a final purchase decision. Very few reported the price (3%), and the information on the drug-label (2%) as the most important point to consider while making a final decision. Figure 5.11

represents a graphical summary of types of information, which older adults prefer to read while choosing an OTC medication to buy.

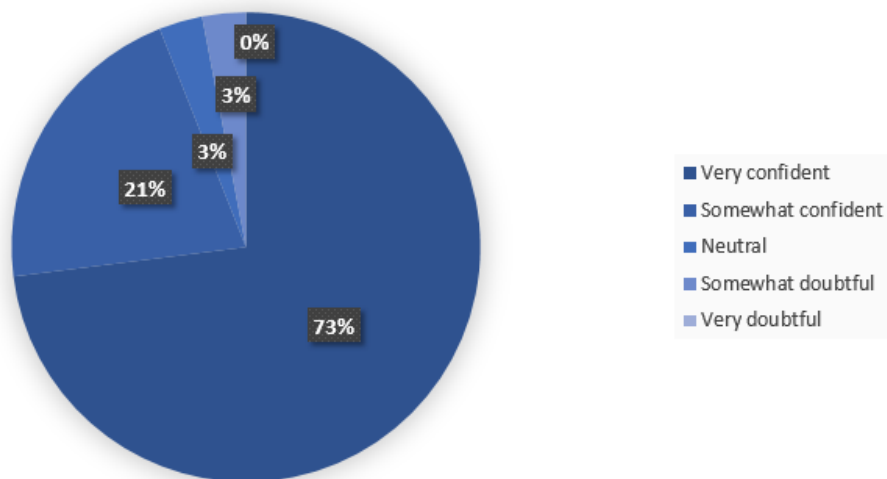


Attitude about the OTC Decision-Making

Attitude about the ability to recognize symptoms was measured by asking ‘how confident do you feel about your ability to recognize symptoms that can be treated with an OTC medication?’.

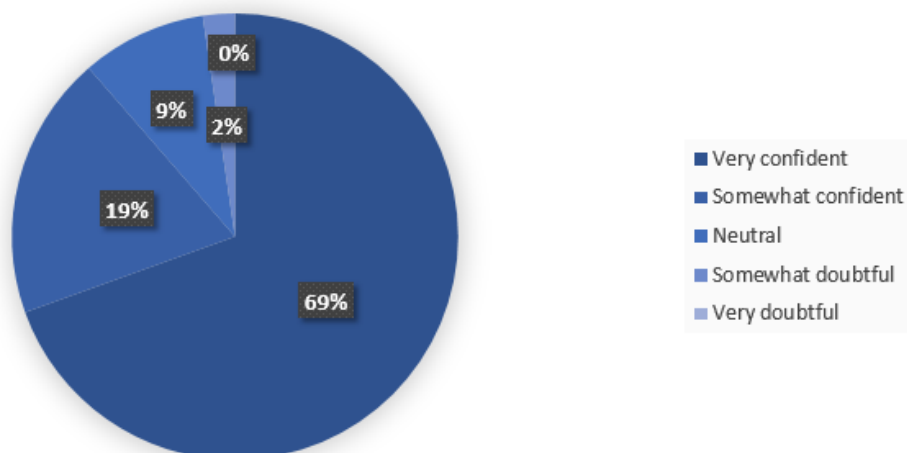
Total, 73% of the participants reported feeling very confident and 21% feeling confident about their ability to recognize symptoms that can be treated with an OTC medication. Approximately 3% gave a neutral response, and 3% reported feeling somewhat doubtful or very doubtful about their ability to recognize symptoms that can be treated with an OTC medication (Figure 5.12).

Figure 5.12: Attitude about the ability to recognize symptoms

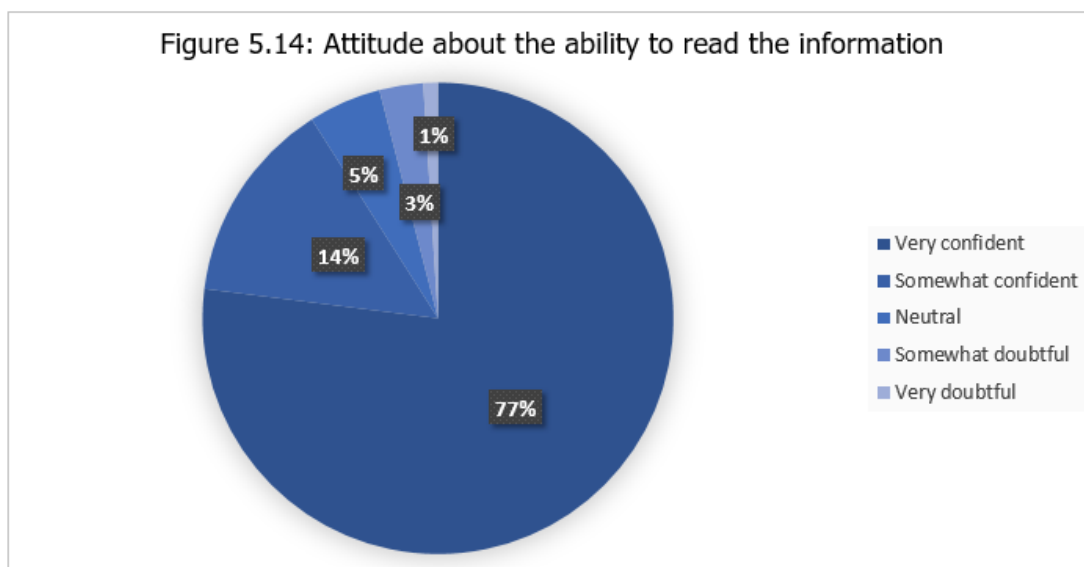


Attitude about the ability to locate OTC medication in the store was measured by asking ‘how confident do you feel about your ability to locate an OTC medication in the store?’. Total, 69% of the participants reported feeling very confident and 19% feeling confident about their ability to locate an OTC medication in the store. 9% were neutral about this, and 2% were somewhat doubtful about their ability to locate an OTC medication in the store (Figure 5.13).

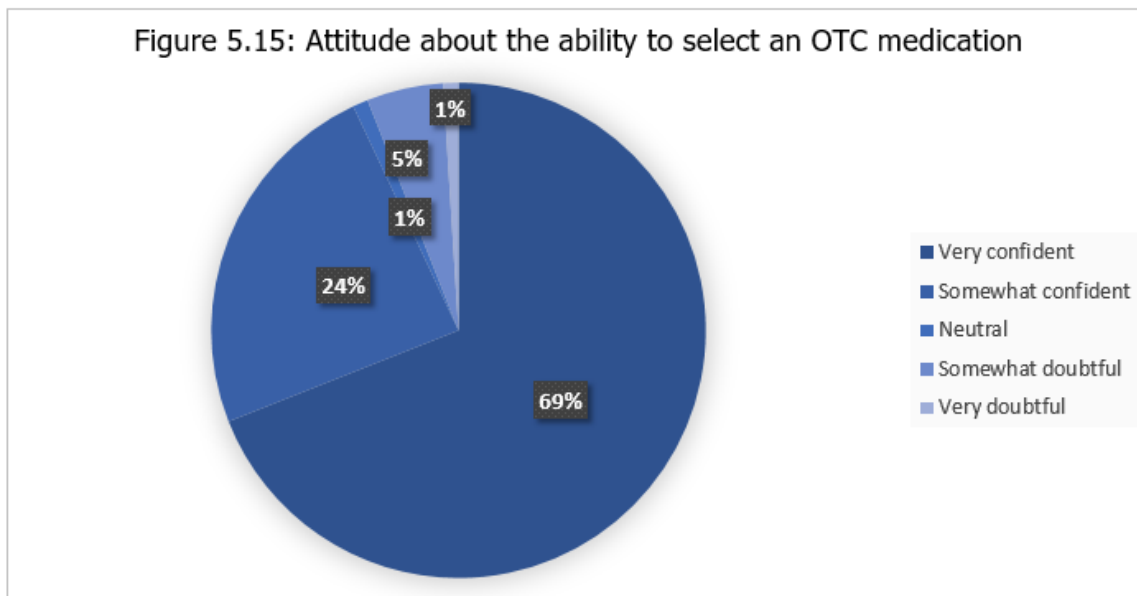
Figure 5.13: Attitude about the ability to locate OTC in the store



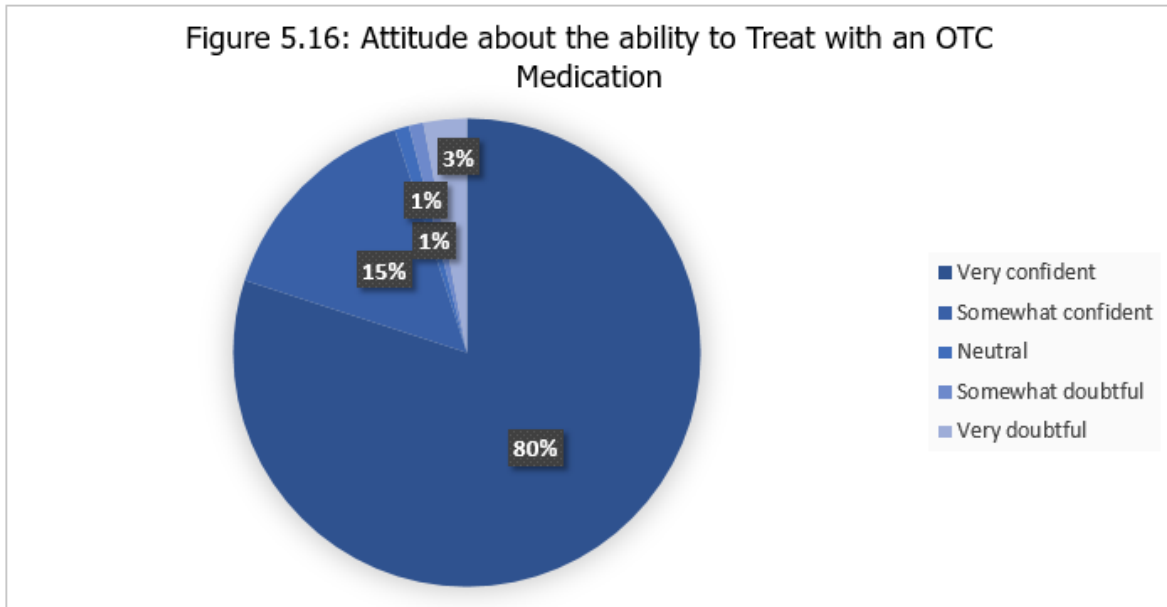
Attitude about the ability to read the information on the drug-label was measured by asking ‘How confident do you feel about your ability to read the information on the drug-label?’. Total, 77% of the participants reported feeling very confident and 14% feeling confident about their ability to read the information on the drug label. 5% were neutral about this, very few reported feeling somewhat doubtful (3%) or doubtful (1%) about their ability to read the information on the drug label (Figure 5.14).



Attitude about the ability to select an OTC medication among various options was measured by asking ‘how confident do you feel about your ability to select an OTC medication among many options?’. Total, 69% of the participants reported feeling very confident and 24% reported feeling confident about their ability to select an OTC medication from among many options. Very few (1%) were neutral about this, and 6% reported feeling somewhat doubtful or doubtful about their ability to select an OTC medication from among many options (Figure 5.15).

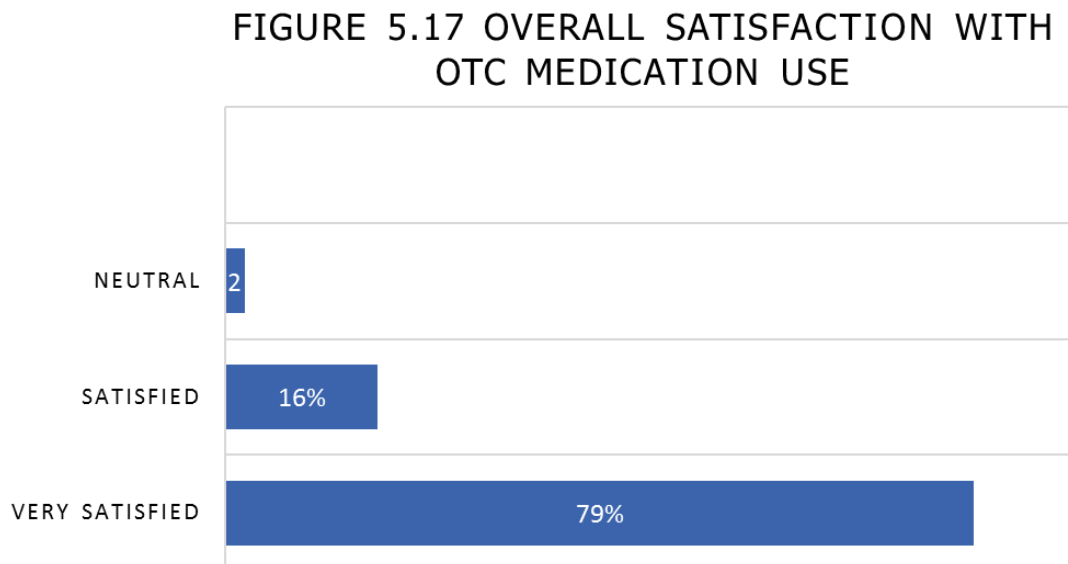


Attitude about the ability to treat with an OTC medication was measured by asking ‘how confident do you feel about your ability to treat yourself with an OTC medication as required?’. 80% of the participants reported feeling very confident and 15% reported feeling confident for their ability to treat themselves with an OTC medication as required. Very few (1%) were neutral about this and 5% were somewhat doubtful or doubtful (Figure 5.16).



Overall Satisfaction with OTC Medication Use

The majority (79%) of this sample felt very satisfied with their use of OTC medications, followed by 16% who felt satisfied, and 5% who felt neutral. None of the participants reported dissatisfaction about their overall experiences with OTC medications (Figure 5.17).



Characteristics Associated with the Self-Recommended versus Physician-Recommended Use of OTC Medications

Significant proportional differences were observed across income ($p = 0.0197$) and race ($p = 0.0418$) stratified by types of OTC medication use (self-recommended versus physician-recommended). The higher prevalence of self-recommended use of OTC medications was observed among the age group of 85+ years (85%), followed by 75-84 years (78%), and 65-74 (83%). The self-recommended OTC medication use was also higher among men (89%) compared to women (77%), among the lower education group (85%) compared to the higher education group (78%), among whites (84%) compared to blacks (83%), among lower income group (89%) compared to the higher income group (67%). Table 5.2 shows a summary of socio-demographic, intrapersonal, interpersonal, and organizational characteristics of older adult participants.

Table 5.2 Distribution of sample characteristics by types of OTC medication use

Characteristics	Overall sample N (%)	Self-recommended Use Mean (SD)/ N (Weighted %)	Physician recommended Use Mean (SD)/ N (Weighted %)	Chi-square/t- static p-value
Socio-demographic factors				
<i>Age</i>				0.8652
65-74	48 (54.6%)	40 (83.3%)	8 (16.7%)	
75-84	27 (30.7%)	21 (77.8%)	6 (22.2%)	
85+	13 (14.8%)	11 (84.6%)	2 (15.4%)	
<i>Gender</i>				0.1692
Male	36 (41.4%)	32 (88.9%)	4 (11.1%)	
Female	51 (58.6%)	39 (76.5%)	12 (23.5%)	
<i>Race</i>				0.0418*
Whites	32 (36.4%)	27 (84.4%)	5 (15.6%)	
Blacks	54 (61.4%)	45 (83.3%)	9 (16.7%)	
<i>Marital Status</i>				0.3416
Unmarried/Single	80 (90.9%)	64 (80.0%)	16 (20.0%)	
<i>Education</i>				0.4102
≤High school education	48 (54.6%)	41 (85.4%)	7 (14.6%)	
>High school education	40 (45.4%)	31 (77.5%)	9 (22.5%)	
<i>Household Income</i>				0.0197*
<\$15,000/Year	54 (64.3%)	48 (88.9%)	6 (11.1%)	
≥\$15,000/Year	30 (35.7%)	20 (66.7%)	10 (33.3%)	
Intrapersonal factors				

<i>Smoking</i>				0.3371
Everyday	19 (21.8%)	15 (78.9%)	4 (21.1%)	
Somedays	13 (14.9%)	9 (69.2%)	4 (30.8%)	
Not at all	55 (63.2%)	47 (85.5%)	8 (14.5%)	
<i>Drinking</i>				0.6679
Somedays	21 (24.4%)	16 (76.2%)	5 (23.8%)	
Not at all	63 (73.3%)	53 (84.1%)	10 (15.9%)	
<i>Exercise</i>				0.5379
Everyday	32 (36.8%)	26 (81.3%)	6 (18.7%)	
Somedays	41 (47.1%)	32 (78.0%)	9 (22.0%)	
Not at all	14 (16.1%)	13 (92.9%)	1 (7.1%)	
<i>General health</i>				0.1958
Excellent/very good	35 (39.8%)	31 (88.6%)	4 (11.4%)	
Good	26 (29.6%)	22 (84.6%)	4 (15.4%)	
Fair/Poor	27 (30.6%)	19 (70.4%)	8 (29.6%)	
<i>Sleep quality</i>				0.3938
Excellent/very good	48 (54.6%)	38 (80.0%)	10 (20.0%)	
Good	12 (13.6%)	9 (75.0%)	3 (25.0%)	
Fair/Poor	28 (31.8%)	25 (89.3%)	3 (10.7%)	
<i>Disability</i>				1.0000
Yes	30 (34.1%)	25 (83.3%)	5 (16.7%)	
No	58 (65.9%)	47 (81.0%)	11 (19.0%)	
<i>Self-care</i>				0.0804
Exercise	69 (80.0%)	55 (79.7%)	14 (20.3%)	
Eat healthy	16 (18.6%)	15 (93.7%)	1 (6.3%)	
<i>Life satisfaction</i>				0.6749
Very/somewhat satisfied	67 (77.0%)	53 (79.1%)	14 (20.9%)	
Neutral	15 (17.2%)	13 (86.7%)	2 (13.3%)	
<i>Satisfaction with insurance</i>				0.1769
Very/somewhat satisfied	73 (86.9%)	61 (83.6%)	12 (16.4%)	
Neutral	8 (9.5%)	5 (62.5%)	3 (37.5%)	
Very/somewhat dissatisfied	3 (3.6%)	2 (66.7%)	1 (33.3%)	
Interpersonal factors				
<i>Social participation</i>				1.0000
Low (About once/month)	12 (20.7%)	10 (83.3%)	2 (16.7%)	
High (Several times/month)	46 (79.3%)	37 (80.4%)	9 (20.0%)	
<i>Social and emotional support</i>				0.2225
Always/usually	62 (72.1%)	53 (85.5%)	9 (14.5%)	
Sometimes	16 (18.6%)	13 (81.3%)	3 (18.7%)	
Rarely/never	8 (9.3%)	5 (62.5%)	3 (37.5%)	
<i>Discussing health-related issue with social circle</i>				1.0000
Yes	71 (80.7%)	58 (81.7%)	13 (18.3%)	
No	17 (19.3%)	14 (82.3%)	3 (17.7%)	
<i>Following health-related suggestion from social circle</i>				0.7873
Yes	46 (52.3%)	37 (80.4%)	9 (19.6%)	
No	42 (47.7%)	37 (83.3%)	7 (16.7%)	
Organizational/Institutional factors				
<i>Time since last doctor visit</i>				0.6627
Within past six months	74 (89.2%)	61 (82.4%)	13 (17.6%)	
Within past one year/longer	9 (10.8%)	7 (77.8%)	2 (22.2%)	
<i>No. of physicians</i>				1.0000
1	70 (79.5%)	57 (81.4%)	13 (18.6%)	
>1	18 (20.5%)	15 (83.3%)	3 (16.7%)	
<i>Insurance coverage</i>				1.0000
Yes	85 (96.6%)	69 (81.2%)	16 (18.8%)	
Note. *p<.05.				
HCP = Health care provider.				

Cells with less than 5 observations were deleted for violating the assumption of chi-square test.

Association between Income and Self-Recommended OTC Medication Use

Bivariate analysis showed a positive association between income and self-recommended OTC medication use. It was observed that older adults with an income less than \$15,000 were four times more likely to self-use OTC medications than their counterparts ($p=0.0170$).

5.5 Discussion

Major Study Findings

The majority of the sample was of the age group of 65-74 years, women, and African-American. Analgesics were the most (76%) prevalent OTC therapeutic category, and aspirin was the most (65%) prevalent OTC medication. Greater (82%) number of the participants reported self-recommended OTC medication use (self-medication with OTC medications) rather than physician-recommended use. A high (41%) prevalence of inappropriate use of OTC medications was observed in this sample set of older adult population. Most participants considered OTC medications very safe or safe (80%) and very effective or effective (80%) to use. Majority (79%) of the participants felt very satisfied and 16% feel satisfied with their OTC medication use. Brand name OTC medications were considered more safe and effective compared to generic versions. The pharmacy was the most (93%) commonly reported purchase location to buy an OTC medication. Physicians were the most (90%) commonly reported information source about OTC medications.

Comparison with Other Studies

The current study reports analgesics/antipyretics as the most commonly used OTC therapeutic category which is consistent with the previous literature.^{2,7,8} The study also reports aspirin is the most prevalent OTC medication, which is similar to a previously published study which reported aspirin and acetaminophen as the most commonly used OTC medication.⁷

There are very few studies, which explore and quantify the practices and preferences associated with OTC medication use among the same age group sample as this study, so it is challenging to compare the descriptive findings of this study. However, some preferences associated with OTC medication use and decision-making have been studied in the past, which can be compared with the current study findings. In a study in US older adults, Reisenwitz and Wimbish (1995) reported that previous experience was considered the most important information source followed by recommendation from a physician.⁸ Our study reports similar finding where the majority of the sample chose previous experience with the medication as the most important factor when they make a final purchase decision, while the recommendation from physicians followed by the recommendation from the pharmacist was reported as the most preferred information source on OTC medications. This was consistent with the findings from another study by Amoako et. Al (2003).⁹ Comparing the prevalence and types of inappropriate use of OTC medications with a previous study in community-dwelling US older adults (n=157)¹⁰ where 18% misused OTC medications, our study reports comparatively higher prevalence (42%) of inappropriate use of OTC medications over a smaller sample size (n=88).

Findings from the Slone survey reports aspirin followed by acetaminophen as the most prevalent OTC medication in 65 years and older.¹³ Similar pattern was observed in this study as well, in regards of analgesic use (aspirin>acetaminophen). Further, a study conducted by Sansgiry and

Cady reports that people from the age group 18-27 prefer to buy their medications from the grocery store (77%) while people from the age group of 60 and above prefer to buy their medications from pharmacy store (52%).¹⁴ Same pattern was also identified in this study. A study by Stephens et al. reports that college-age adults (mean age 23.8 years) preferred price and product use information while purchasing OTC medications in comparison with older age adults (mean age 76.9 years) who preferred the side effect and drug interaction information while purchasing OTC medications.¹⁵ This study reports that older adults preferred reading the directions and purpose of the medication most, on the drug-label.

Limitations

The study has some limitations as well. First, the results from this study are not generalizable to the community-dwelling US older adult population as the study sample used in this study was very small (N=88) (because of recruitment challenges due to change in administration at one site, and smaller resident population at another site) and was only limited to two senior-living communities. Secondly, there is a possibility of recall bias as well as information bias due to self-reported data on the variables. The influence could be greater considering the potential for age-related memory issues among some older adults. Finally, this survey includes various social and health behavior related questions. Answering to these questions may be biased in a way which looks more appealing and socially accepted in the society and healthcare settings. This may result in social desirability bias in the study.

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Chapter 6: Discussion

6.1 Overview

This chapter integrates and discusses the findings from the qualitative and quantitative phase of the mixed methods study. The chapter also compares findings from the quantitative (survey) study and NSHAP study in regards of OTC medication use. Finally, the chapter summarizes the significance of findings and future research needed.

6.2 Discussion

OTC Medication Use: A Comparison between the Findings from Quantitative and Secondary Data Analysis (NSHAP Study)

NSHAP study reported the total weighted prevalence of OTC medication use as 76% including analgesics as the most prevalent (66%) OTC therapeutic category and aspirin as the most (41%) commonly used OTC medication. Similarly, the quantitative study where only the OTC users were targeted, also reported the analgesics as the most common (76%) OTC category and aspirin as the most (65%) prevalent OTC medication used.

In the NSHAP study, higher weighted prevalence of OTC use was observed among women (80%) compared to men (71%), and among higher education group (79%) compared to the lower education group (72%), and among whites (78%) compared to other races-blacks (67%), Hispanics (69%), and others (59%). Addressing all OTC users by the types of use-self-recommended versus physician-recommended, the quantitative study reports higher self-recommended (versus physician-recommended use) use of OTC medications among men (89%)

compared to women (77%), among the lower education group (85%) compared to the higher education group (78%), and among whites (84%) compared to blacks (83%).

NSHAP study also examined the predictors of OTC medication use. However, the quantitative study findings were more descriptive, and inferential analyses could not be conducted due to small sample size. The quantitative survey majorly examined the prevalence distribution of self-recommended OTC medication use across socio-demographic and multi-level characteristics, which was not addressed by the NSHAP study.

Quantitative study also explored the types of OTC medication use (such as misuse, incorrect use, abuse, self or physician-recommended use), perception, preferences, practices, and experiences associated with the OTC medication use which could not be captured with the NSHAP study.

For example, a high (82%) number of the participants reported self-recommended OTC medication use (self-medication with OTC medications) rather than physician-recommended use. A high (41%) prevalence of inappropriate use of OTC medications was observed in this sample set of older adult population. Most participants consider OTC medications very safe or safe (80%) and very effective or effective (80%) to use. Majority (79%) of the participants feel very satisfied and 16% feel satisfied with their OTC medication use. Brand name OTC medications are considered more safe and effective compared to generic versions. The pharmacy was the most (93%) commonly reported purchase location to buy an OTC medication. Physicians were the most (90%) commonly reported information source about OTC medications.

OTC Medication Use and Decision-Making: Integration of Findings from the Qualitative and Quantitative Study

According to both, the qualitative and the quantitative studies, the majority of the older adult population felt quite satisfied about their OTC medication use in general. Additionally, the qualitative study explored various reasons and factors explaining a positive attitude about OTC medication, such as accessibility, convenience, safety, lower cost, choice, and personal control. The qualitative study also explored thoughts of a smaller proportion of older adults who carry negative attitudes towards OTC medication use. For example, challenges and confusion while reading the label, lack of information, less effectiveness, not safe to use without consulting a doctor, and not covered by the insurance were reported as some reasons behind the negative attitudes about OTC medications and decision-making.

Comparing generic versus brand versions, the quantitative findings indicated that the largest percentage of older adults considered both generic and branded equally safe (63%) and equally effective (65%), yet there were certain attributes which influenced a decision to favor one over the other. The same pattern was observed and explored in the qualitative phase. Generic were favored over branded medications only when it is a decision based on the price, otherwise the brand versions were considered more safe and more effective compared to the generic version of OTC medications. This was consistent across both the qualitative and quantitative study findings. This is illustrated in the following quotes from the qualitative study:

“And then, also, you can buy a generic and often times they are the same. Sometimes there might be one little thing off, everything but one little thing there. Besides that, I’m cost conscious, so I’ll ask the pharmacist, who I believe is a knowledgeable person, and if they say, yes, the generic is just as good and it can be half the price or a third of the price, I buy the generic.”-FG1 participant

“You may think generics are a good thing. Maybe this person swears by generics, but I don’t believe in taking generics. When I was growing up we didn’t have generics; now things have changed. If people can take the generics, God bless you. I’m glad for them, but I can’t take them.”-FG4 participant

While the quantitative study reported the larger percentage of participants having a perception that OTC medications are safe/very safe (80%) and effective/very effective (80%), the qualitative study indicated the same pattern for the safety but not for the effectiveness (the larger portion of the sample reported that OTC medications were not that effective). This might defer due to the questions asked in a structured way in the quantitative and in an open-ended manner in the qualitative study where there could be an anchoring effect during the discussion. Further, the qualitative findings added insights on how older adults think that the safety of an OTC medications largely depends on how a person choose to use them (N=17), and certain individual factors where age was the most frequently reported factor which can influence the safety of an OTC medication (N=21). Quotes that illustrate this point from the quantitative study are as follows:

Your body, as you get older, the medication you’re dealing with from over the counter has a different effect, because your body don’t cope with certain things like it used to. You don’t have the immune system that’s built up to deal with certain things. You build antibodies and stuff to help deal with it.”-FG10 participant

“A lot of it depends on how much you take. Moderate amount, sparingly, the problem is if you are a heavy dosage you will have problems.”-FG5 participant

Similarly, the efficacy of an OTC medication was perceived to be influenced by individual factors such as age and chronic health conditions (N=23). This is illustrated in the following quote from the qualitative study:

“And it also depends on the condition of your health, whether you take certain things. For instance, my husband was using Aleve. The first thing the doctor told him for his heart, he can’t use Aleve any more. So it has to do with the condition of your health, as to whether you can continue to use an over-the-counter drug. Obviously, I think that Aleve does not interact with some of the medication for his heart.”-FG2 participant

One major objective of the qualitative phase of the mixed-methods study was to elicit the OTC treatment and purchase decision-making process. The quantitative phase complemented this objective of the qualitative phase by quantifying attitudes and preferences related to the various steps involved in a decision-making process. For example, the qualitative phase explained that recognizing the severity of the symptoms is the starting point where an older adult makes a decision whether he or she needs to self-treat with an OTC medication or consult a physician first. In order to purchase, a person first explores and compares the information to choose the one he or she wants to purchase. The quantitative phase also quantified their confidence level in making these decisions. By comparing the percentages indicating the highest level of confidence with respect to each decision-making step, it was observed that the largest percentage of older adults were very confident when self-treating with the OTC medication (80%) compared to reading the drug-label (77%), recognizing the symptoms (73%), locating the medication in a store (69%), and choosing one from among several options (69%).

Further, various preferences and attributes influencing a decision-making step were openly explored in the qualitative study, and were quantified in the quantitative phase. For example, in

order to become informed about an OTC medication, a healthcare provider was considered the most preferred source of information, and it was consistent across both the qualitative (N=26) and the quantitative phase (90%). Quotes from the qualitative phase that illustrate this point include:

“I discuss my medication with my doctor. I ask questions. I don’t like taking medication. I ain’t no pill type of person either. But I’ll take medication because the doctor must think I need it and he writes a prescription so I take it.”-FG6 participant

“I ask my pharmacist. ‘Which one you think would work better with me?’-FG3 participant

However, findings from the qualitative and quantitative phases differed when examining the most important factor behind the final purchase of an OTC medication. The qualitative study reported the cost (N=18), followed by the effectiveness (N=8) as the two most important factors which influence the final decision-making about OTC medication as illustrated by these quotes from participants:

“I check what it’s marked and find the cheapest and sometimes there’s a big difference. If you get a bottle for \$19 and get one free, it makes a big difference.”-FG2 participant

“....There’s a lot of cold medications, but I would try to find the one that might have the maximum effect “-FG6 participant

However, the quantitative study reported that the recommendation from the healthcare provider (57%), followed by the previous experience with the medication (38%) as the two most important factors which influence the final purchase decision. Comparing these to the qualitative phase findings revealing cost be the most important factor for the final purchase decision-

making, there might be some anchoring effect hidden as other participants followed on the first participant mentioned the cost.

The qualitative phase explored various store options older adults think of when buying an OTC medication and that was more influenced by their purpose. Some people buy medication from the grocery store while doing their regular grocery shopping, some prefer to buy from large retailers such as Walmart or Costco to get a good deal, and some prefer to go to pharmacies so that they may ask a pharmacist if they have any questions. The quantitative study indicated pharmacy as the most commonly preferred OTC purchase location in this sample (93%). This might be influenced by the proximity of a pharmacy, the availability of a pharmacist in the pharmacy store, or the need to go to the pharmacy for prescription medications anyway.

While discussing reading the drug-label, it was observed in the qualitative study that older adults read the label more extensively for the first time, and rarely on the second time. The quantitative study indicates that directions for use (53%) and purpose of the medication (52%) were the most commonly read information when reading the drug label in order to buy the OTC medication for the first time. Further, various issues while reading the label such as small print and too much information were discussed in the qualitative study (N=10). Older adults also reported having issues with child-resistant packaging and large sized capsules in the qualitative as illustrated by the following quote:

“I had one that was a pill I wanted to get. I kept getting this one bottle of it and that bottle, I could not get that top off. I was so upset.”-FG2 participant

Findings from the quantitative study indicated that nearly 41% of older adults used an OTC medication in an inappropriate way in the past. The study also reported types of inappropriate

use-such as 15% used the medication after expiration date, 14% used more frequently than indicated, 9% used higher/lower dose than indicated, and 2% used with alcohol. The qualitative study explored the misuse in detail (N=15) narrating personal experiences and reasons. It was found that aspirin was the most abused medication in the study population. Participant quotes illustrating this point include:

I must admit it was my stupidity because I knew I shouldn't take it, but after those procedures I was just looking for some relief. Instead of taking two every four hours, I'd be taking three Aspirin every four hours around the clock.”-FG4 participant

While quantitative study calculated the prevalence of OTC associated side effects as 12% in this population, the qualitative study explored experiences of side effects in detail (N=19). Such as, some side effects were associated with the inappropriate use of OTC medication. One person reported experiencing the side effects while increasing the dose of aspirin as her doctor suggested. It was observed that the aspirin and ibuprofen were cited repeatedly by the participants when talking about the side effects (such as gastro-intestinal (GI) irritation, bruises, and GI bleeding).

6.3 Limitations and Future Research Needs

Findings from the NSHAP study indicate high (76%) use of OTC medication in the national sample of community-dwelling US older adults. Consistent with the previous literature, the NSHAP study reports analgesics as the most prevalent therapeutic OTC class used, with aspirin as the most prevalent OTC medication used in this national sample of older adults. However, the survey did not capture if the OTC medication use was physician-recommended or self-

recommended, short-term or long-term, daily or as needed, and how survey participants were using these medications. Future nationally representative surveys/studies can address this by including more questions on OTC medication use in this population as very few nationally representative surveys capture any information about OTC medication use and it is also not available in medical claims databases since the cost of OTC medications are not covered by insurers much of the time.

This will be important to reveal some generalizable findings about the types of use, such as misuse, abuse, inappropriate/incorrect use, or duplicate use. Aspirin (81 mg) is the most widely prescribed OTC medication in this population, and a very common pain reliever (325 mg and above). Having detailed information about the dose and self-use versus prescribed-use of aspirin would be helpful to address the use and characteristics associated with aspirin users, which may further inform healthcare providers to educate and counsel aspirin users for better therapeutic outcomes. Further, understanding whether side effects are more likely to be associated with self-use versus prescribed use might be important in planning interventions for example by indicating how to target the intervention (patients versus providers).

Finally, some variables such as transportation in the community, source of care in the community, variables examining health-literacy, and drug-label comprehension could not be captured and hence could not be analyzed in this survey. Future surveys or large-scale studies may address these limitations.

While the NSHAP study informs the characteristics of OTC users, educational interventions may be emphasized more on these groups. Educational interventions may take the form of a

workshop, group meetings, educational brochures/pamphlets, personal meetings with HCPs, digital/mobile learning using smart apps to generate more awareness and understanding about the safe and effective use of OTC medications in this population.

Findings from the mixed-methods study may not be generalizable to the US older adult population at large but covers some key in-depth information about OTC medication use and decision-making in adults aged 65 years and older. Hence, the mixed methods study may specifically guide and inform some important aspects of developing these educational interventions. The qualitative study findings reveal that older adults do not clearly understand the FDA regulatory process of prescription and OTC medications, which may influence their perception and beliefs about OTC medication safety and effectiveness. Providing them with easy to understand information about the regulatory process may influence their perceptions and inform their OTC decision-making. Further, some OTC medications are heavily used in this population such as analgesics (aspirin, acetaminophen, ibuprofen), and this is supported by previous literature and findings from both NSHAP and mixed-methods study of this project. Yet, qualitative phase of the mixed-methods study also indicates misuse of these analgesic products. An educational intervention may address this issue, providing more information about safe/unsafe dosage strengths, their presence in the market as different generic/brand names, their active ingredients, purpose, and direction to use, their therapeutic combinations with other prescription or non-prescription products, common side effects associated with these medications, symptoms indicating the side effects, and when there is a need to discuss or reveal the medication regimen to the HCPs even if not asked. More counselling can be done to inform about the useful and authentic health and medication-related information sources on internet, considering it is one of the approaches to look for more information about OTC medications

according to the qualitative study. Further, more qualitative research can be conducted about analgesic use in this population.

Findings from the qualitative study also suggest that there is a need to develop strong relationships and trust between older patients and HCPs to facilitate open communication about OTC medications. This approach may positively influence medication adherence (prescription as well as non-prescription), responsible and safe use of OTC medications, timely communication in case of a negative health outcome, and better therapeutic management in older adults who often suffer from chronic conditions and use multiple medications. Considering older adults' attitudes of having personal control over the management of their health and feeling empowered when treating their symptoms with OTC medications, shared decision-making models should be an effective approach, especially if a person feels more independent and willing to do so. Older patients would feel more satisfied in terms of information sharing, and more encouraged to follow the medication regimen regularly and appropriately. This will further reduce the inappropriate and incorrect use of OTC medications and may contribute to better therapeutic outcomes.

Further, considering the findings from the qualitative as well as quantitative study, it is clear that older adults want detailed information about OTC medications, especially when they are trying the medication for the first time. While different information resources are considered to get informed, HCPs (physicians and pharmacists) are their first choice according to both studies. Yet again, both studies documented the practice of using OTC medications inappropriately by some individuals, which certainly indicates the lack of awareness and a need for more guidance on their OTC decision-making. More education and training for physicians and pharmacists to effectively guide their older patients, would be helpful. Further, these training sessions should be

tailored to address the needs of different groups of older adults such as those who have sensory or cognitive limitations and people with different chronic health conditions. Research on OTC medication use in different subgroups of older adults with specific health condition was not studied and hence is a limitation of the current study.

The study also provides information about the preferences and challenges associated with the OTC medication use and decision-making in older adults, which may inform both pharmaceutical company marketing plans and regulatory body guidance to develop and implement safe and effective advertisement strategies. More specifically, on the one hand, older adults express decision-making challenges associated with too much information, complex terminology and small fonts on the drug-label, and on the other hand, they also express their concerns about having too little information and lack of age-specific warnings about OTC medications in order to make an optimal self-care decision. This suggests two types of research needs. First, there is a need to conduct more label-comprehension and readability studies focusing on challenges faced by the older adult population and strategies to improve labeling, and second, there is a need to provide more information on OTC medications. If it is not possible to provide more information directly on the drug label, it can still be addressed by developing and distributing drug-information brochures in clinic or pharmacy areas or developing more novel approaches through smartphone apps or other technologies.

Finally, considering the limitations of this small-sized mixed-methods exploratory study in a convenience sample of older adults, more research is needed with a larger sample of community-dwelling US older adults in different samples, subgroups, and settings to more fully understand and improve the OTC medication decision-making process among older adults.

Appendix A

- Acetaminophen
- Acetaminophen-diphenhydramine
- Acetaminophen-phenylephrine
- Acetylcysteine
- Aluminium hydroxide-magnesium hydroxide
- Ammonium lactate topical
- Apap/asa/caffeine
- Aspirin
- Aspirin-caffeine
- Bisacodyl
- Brompheniramine
- Budesonide nasal
- Butenafine topical
- Caffeine
- Calcium carbonate-magnesium hydroxide
- Calcium carbonate-simethicone
- Bismuth subsalicylate
- Camphor-menthol topical
- Capsaicin topical
- Cetirizine
- Chlorpheniramine
- Coal tar topical
- Chlorpheniramine-dextromethorphan
- Chlorpheniramine-phenylephrine
- Cimetidine
- Clotrimazole
- Codeine-guaifenesin
- Dexbrompheniramine-psuedoephedrine
- Dextromethorphan-promethazine
- Diphenhydramine
- Diphenhydramine-ibuprofen
- Docusate
- Docusate-senna
- Epinephrine
- Omeprazole
- Omeprazole-sodium bicarbonate
- Esomeprazole
- Fexofenadine
- Fexofenadine-psuedoephedrine
- Fluticasone nasal
- Guaifenesin
- Hydrocortisone topical

- Ibuprofen
- Ketoprofen
- Lansoprazole
- Loperamide
- Loratidine
- Loratidine-psuedoephedrine
- Magnesium hydroxide
- Meclizine
- Menthol topical
- Methyl salicylate-menthol topical
- Naphazoline-pheniramine Ophthalmic
- Naproxen
- Nizatidine
- Orlistat
- Oxybutynin
- Oxymetazoline nasal
- Oxymetazoline ophthalmic
- Phenazopyridine
- Phenylephrine
- Polyethylene glycole 3350
- Prochlorperazine
- Progesterone
- Psuedoephedrine
- Ranitidine
- Salicylic acid topical
- Simethicone
- Sodium bicarbonate
- Sodium chloride nasal
- Terbinafine
- Urea topical

Appendix B

OTC-Med Study

Informed Consent Form

About the Study

The study will help us better understand your thoughts on OTC medication use and decision making. OTC medications do not require a prescription, and are purchased over-the-counter from retail stores, supermarket, or pharmacies. The purpose of this study is to know your opinions and beliefs about OTC medications, and how you make certain decisions about OTCs to use them personally. This focus group discussion should take no more than 90 minutes to complete. The group discussion will start with introductions, and then researchers will ask questions about how you use OTC medications, how you make decision about purchasing and using those medications, and about your overall experiences of using OTCs.

Risk/Benefit

The main risk associated with the participation in this study may be potential disclosure of your individual answers to the researcher's questions. However, we will keep all the discussions and study findings private, hence the risk of disclosure is low. The information collected during the study will not benefit you directly, but your participation will help researchers to learn more about how consumers use and decide to use OTC medications.

Confidentiality

Your participation in this study will remain confidential, and your name or any other identifiable information will not be used in any reports about this discussion group. The discussion will be audio-taped so that when we write our report we can make sure we understand everything that was said. All audio-recordings will be destroyed after the study ended.

Participation

Your participation in this study is voluntary. There will be no penalty or loss of benefits if you withdraw from the study. Also, the information you share with us during the study will never influence your present or future housing, or the medical care you are receiving from your healthcare provider. You will receive \$15 for participating in this group discussion.

If you have any questions, complaints, or concerns about your participation in this research, please contact:

Dr. Patricia Slattum

Phone: (804)828-6355 (office) or (804)-519-8838 (cell)

Email: pwslattu@vcu.edu

For other general questions about your rights as a participant in this study you may contact:

Office of Research

Virginia Commonwealth University

800 East Leigh Street, Suite 3000

P.O. Box 980568

Richmond, VA 23298

Phone: (804) 827-2157

By signing this agreement, you acknowledge that you have read all the information described in this document, and agree to participate in this research.

Sign: _____ **Date:** _____

Thank you for your kind participation in this study.

Appendix C

Qualitative Study

Moderator's Guide and Protocol

INTRODUCTION [5 MIN]

Thank you everyone, for your participation in this study!

My name is **Yoshita Paliwal** and today I am going to conduct a discussion about over-the-counter medications. _____ will be assisting me here. We are from Virginia Commonwealth University and this study aims to understand the over-the-counter medications use and decision-making in your community.

I highly appreciate your participation in this study. Your honest views and knowledge will help us to understand this topic. Your participation in this study is voluntary. This group discussion will be audio-recorded in order to capture all the information. We will be taking notes as well. However, all your dialogues will be confidential so please do not hesitate to talk. After reviewing all the information, we will destroy all the notes and audio-recordings permanently. Also, we will not write or mention your name or any other identifiable information in our study reports.

Before I start, let me give you a quick overview of the process. This will be a 90 minutes discussion on over-the-counter medications based on a set of questions. I encourage you to answer all the questions and share your knowledge on this topic. I would highly appreciate an equal participation and all kinds of thoughts and views as long as they are relevant to the topic. In case if you have other questions on over-the-counter medications, please feel free to ask them to your pharmacist or physician. Considering the time limit of 90 minutes, we will not be able to help you with your personal queries.

As a moderator, my role is to generate and facilitate the discussion. I may ask additional questions based on your reply. I may also specifically ask someone to share their views if they did not have a chance to talk yet. Considering the time limit for this discussion, I may also move on to the next question. Please do not be offended!

Please speak one by one and let others have a chance to participate too. Please call each other by their first names. Please avoid any harsh language or comments, even if you disagree with other's point of view. Finally, please remember to respect the privacy of others in the group. Please keep the content of our discussion confidential.

Finally, we sent you a confirmation letter with a copy of consent form for you to read and understand in advance. You can keep both of them for your records. We would now provide you another copy of the consent form and substitute W-9 form in order to give you the compensation (\$15) before we start the group discussion. Please ask if you have any questions? [Distribute forms, collect them back and answer all questions]

We are about to begin now, so I would request everybody to keep their phones silent or switched off.

[Digital recorder turned on at beginning of remarks, which are to be made by the moderator]

WARM-UP [5 MIN]

Moderator: We begin our session now. Let's introduce each other with your first name or the name you would prefer to be called during the discussion. [Moderator will introduce herself/himself while note-taker will start taking notes]

Thank you for introducing yourselves, let's begin the discussion now.

SECTION 1: Discussing over-the-counter medications in general [10 MIN]

- 1. First of all we are going to discuss about over-the-counter (OTC) medications in general. So, when I say ‘over-the-counter medications’, what kind of medications comes into your mind?**

PROBES

- Can you give me some examples of over-the-counter medications?
- What kind of over-the-counter medications you are taking currently?
- How do you think over-the-counter medications are different from other medications such as prescription medications or other over-the-counter products such as multivitamins or herbal supplements?

BEFORE GOING TO THE NEXT SECTION--

- Make sure that participants understand that over-the-counter (OTC) medications are pharmacologically active compounds, which can be bought from pharmacies or retail stores without any prescription from the physician. Make sure to discuss few examples of over-the-counter medications such as Aleve, Allegra or Tylenol etc.
- Make sure that participants understand the difference between over-the-counter medications and other medications. Participants should know that unlike prescription medications, over-the-counter medications can be bought without a prescription from physician. Participants should also know that over-the-counter medications are pharmacologically active compounds, which are approved by FDA before being available directly to the consumers while other over-the-counter products such as herbal supplements, multi-vitamins or alternative medications are not FDA approved.
- Answer if they have any other question. Proceed to the next section after making sure that all participants understand of what over-the-counter medications are, and how they are different from other medications.

SECTION 2: Exploring perceptions about the safety and efficacy of over-the-counter medications [15 MIN]

- 1. Now, focusing your thoughts on ‘over-the-counter’ medications only such as Aleve, Allegra or Tylenol etc., tell me how do you think about the safety of over-the-counter medications?**

PROBES

- You may want to think in terms of side effects or you may want to compare them with other medications such as prescription medications or other over-the-counter products. Do you think that they are safer than other medications or do you think they are less safe? Do you have any example or any personal experience to share with the group?
 - Thinking again about the safety, do you think that the safety of an over-the-counter medication may change due to certain factors (such as age, gender or health issue) or under certain circumstances, (such as taking over-the-counter medications with other medications or not taking them as directed)? Do you have any example or any personal experience to share with the group?
- 2. Now thinking about the ability of over-the-counter medications to treat symptoms, what do you think of how well over-the-counter medications work?**

PROBES

- How well do you think over-the-counter medications treat symptoms or discomforts? You may want to compare them with other medications such as prescription or multivitamins, herbal supplements etc. Do you think over-the-counter medications work better than other medications or do you think they are less effective than other medications? Do you have any example or any personal experience to share with the group?

- Thinking again about their efficacy, do you think that how well over-the-counter medications work may change due to certain factors (such as age, gender or health issue) or under certain circumstances (such as taking over-the-counter medications with other medications or not taking them as directed)? Do you have any example or any personal experience to share with the group?

SECTION 3: Understanding over-the-counter purchase decision making [15 MIN]

- 1. Now, I would ask you to think about the last time you bought an over-the-counter medication. Try to recall the whole situation and tell me about your overall buying experience?**

PROBES

- Tell me if that was your first purchase or your regular purchase of that medication?
You may want to tell us the reason of buying that medication, the store you bought it from or if you bought a generic or brand version of it. You may want to tell if you had decided to buy the medication by yourself or someone else had advised you to buy it. If it was your decision, then tell me how did you hear about the medication at first?

- 2. Now, there are several options available for a medication in a retail store or pharmacy such as generic version or many brands with different costs, flavors or formulations. Try to recall the same scenario of your recent purchase and tell me how did you choose your medication among them?**

PROBES

- Tell me what influenced your choice most while choosing among several options?
- Tell me if you had chosen by yourself or you had taken help from someone else making a choice?
- Tell me if you had read the label while making a choice, if yes what information influenced you most? You may also share if you had difficulties in making a choice and how did you overcome those?

SECTION 4: Exploring the use and experiences with over-the-counter medications [10 MIN]

- 1. Now, thinking of your past or current use of over-the-counter medications in general, tell me your overall experiences with over-the-counter medications?**

PROBES

- You may want to tell us what you like or what you dislike most about over-the-counter medications?
- Tell me how satisfy you feel overall about using over-the-counter medications for treating yourself?
- Tell me if you have ever faced side effects with over-the-counter medication or if you had issues managing them with other medications? How did you deal with those issues?

- 2. Now thinking again of your over-the-counter medications use, how do you use over-the-counter medications in general?**

PROBES

- Tell me how often you use over-the-counter medications like regularly or as needed?
- Tell me if you talk to your physician or pharmacist every time you use them or only when you have concerns?
- Tell me if you have ever used any over-the-counter medication not as directed by your physician or not as indicated on the drug label?

Thank you again for sharing your thoughts with us today. Do you have any other thoughts or views to share on this topic? [If no thoughts coming, thank politely and end]

We really appreciate your participation in this focus group. Hope you have a great day!

Appendix D

Survey Study: Understanding OTC Medication Use and Decision-Making among Community-dwelling US Older Adults

IRB No. HM20008442

Informed Consent Form

Greetings,

This survey is being conducted by Virginia Commonwealth University. We are interested in understanding how older adults select and use over-the-counter medications. You are invited to participate in this survey about over-the-counter medications. This survey is being conducted by **Miss Yoshita Paliwal** under the super vision of **Dr. Patricia Slattum**, Director of the Geriatric Pharmacotherapy Program, at Virginia Commonwealth University.

Unlike prescription medications, over-the-counter medications are available to buy from retail stores, supermarket, or pharmacies without a prescription from the doctor. This survey will ask about your current prescription and over-the-counter medications use, and how you choose and use over-the-counter medications. The survey will also ask a few questions about issues that might influence your over the-counter medication use. The survey will take less than 30 minutes, and will be administered by an interviewer.

The information collected will not benefit you directly, but your participation will help researchers learn more about how older adults choose and use over-thecounter medications. This information would potentially be helpful to inform healthcare researchers and policy makers to promote safe and responsible use of over-the-counter medications for better health outcomes.

Confidentiality

All your survey responses will be kept confidential. The completed surveys will be kept in a secure location and only those directly involved with the research at VCU will have access to them.

Participation

Your participation in this study is entirely voluntary. It is your choice to complete the survey. The alternative is not to participate in the study. Refusal to participate will involve no penalty or loss of benefits, and you may discontinue your participation at any time without penalty or loss of benefits. You will receive a \$10 compensation for your participation in this study. You will need to complete a W-9 tax form in order to receive the compensation.

If you have any questions, complaints, or concerns about your participation in this research, please contact:

Dr. Patricia Slattum

Phone: (804)828-6355 (office) or (804)-519-8838 (cell)

Email: pwslatt@vcu.edu

For other questions about your rights as a participant in this study, please contact:

Office of Research, Virginia Commonwealth University

800 East Leigh Street, Suite 3000

P.O. Box 980568

Richmond, VA 23298

Phone: (804) 827-2157

Thank you for your participation in this study!

Appendix E

In-person Questionnaire

Section one: Demographic Information

First, we would like to know some basic demographic information about you. This information is just for the study purpose, and this will be kept confidential.

1.1 May I know what category best describes your age? Would you say...

1. 65-74
2. 75-84
3. 85+
4. Refused

1.2 May I know your last or highest grade of education completed? Would you say...

1. Did not graduate high school
2. Graduated high School
3. Attended College or Technical School
4. Graduated from College or Technical School
5. Don't know/Not sure/Missing
6. Refused

1.3 May I know your combined annual household income? Would you say...

1. Less than \$15,000
2. \$15,000 to less than \$25,000
3. \$25,000 to less than \$35,000
4. \$35,000 to less than \$50,000
5. \$50,000 or more
6. Don't know/Not sure/Missing
7. Refused

1.4 May I know your marital status? Would you say...

1. Married
2. Divorced
3. Widowed
4. Separated

5. Never married
6. A member of an unmarried couple
7. Refused

1.5 May I know what category best describes your race or ethnicity? Would you say...

1. Caucasian or White
2. African American or Black
3. Latino or Hispanic
4. Other race
5. Don't know/Not sure
6. Refused

1.6 May I know what best describes your gender? Would you say...

1. Male
2. Female
3. Transgender
4. Refused

1.7 May I know your current employment status? Would you say...

1. Employed for wages
2. Unemployed
3. Self-employed
4. Retired
5. Unable to work
6. Don't know/Not sure
7. Refused

Section 2: Medication Review

Now, we would like to know about the medications you are taking currently on a regular basis. On a regular basis would be daily, weekly or as frequently as needed (at least once in the past 3 months).

[NOTE: Ask the respondents to show their medications, if they do not remember them accurately.]

Section 3: Over-the-counter Medication Use

Now we would like to know how you use over-the-counter medications, how you feel about the safety and efficacy of these medications, and how you make decisions to buy them.

So, thinking about your OTC medication use in general:

3.1 How safe do you think over-the-counter medications are?

1. Very Safe
2. Safe
3. Unsure
4. Unsafe, or
5. Very Unsafe
6. Refused

3.2 Next, I have a list of reasons or factors you think may influence the safety of an over-the-counter medication? For each one, please tell me if you think it influences the safety of over-the-counter medication.

- | | | |
|--|---------------------------|--------------------------|
| 1. The name brand of OTC medication, does that influence the safety? | <input type="radio"/> Yes | <input type="radio"/> No |
| 2. Dose/strength of the OTC medication? | <input type="radio"/> Yes | <input type="radio"/> No |
| 3. Drug label information on the medication? | <input type="radio"/> Yes | <input type="radio"/> No |
| 4. Using the OTC medication with other medications? | <input type="radio"/> Yes | <input type="radio"/> No |
| 5. Using the OTC medication not as directed on the drug label? | <input type="radio"/> Yes | <input type="radio"/> No |
| 6. Using the OTC medication with alcoholic drink? | <input type="radio"/> Yes | <input type="radio"/> No |

7. Individual characteristics of the user such as age, gender, health status? ☐ Yes ☐ No
8. Something else?
Please specify_____
9. Don't know/Not sure
10. Refused

3.3 Now comparing generic versus name brand versions of an over-the-counter medication, what are your thoughts on their safety in general? Would you say...

1. Generic version are safer than name brand versions of OTC medications
2. Name brand versions are safer than generic versions of OTC medications
3. Both generic and name brand versions are equally safe
4. Don't know/Not Sure
5. Refused

3.4 How effective do you think over-the-counter medications are?

1. Very effective
2. Effective
3. Unsure
4. Ineffective, or
5. Very Ineffective
6. Refused

3.5 Now, I have a list of reasons or factors you think may influence how well OTC medications work? For each one, please tell me if you think it influences how well the over-the-counter medication works.

1. The name brand of the OTC medication, does that influence how well it works?
☐ Yes ☐ No
2. Dose of the OTC medication? ☐ Yes ☐ No
3. Drug label information on the OTC medication? ☐ Yes ☐ No
4. Using the OTC medication with other medications? ☐ Yes ☐ No
5. Using the OTC medication not as directed on the drug label? ☐ Yes ☐ No
6. Using the OTC medication with alcoholic drink? ☐ Yes ☐ No
7. Individual characteristics of the user such as age, gender, health status? ☐ Yes ☐ No
8. Something else?
9. Please specify_____

3.6 Now comparing again, generic versus name brand versions of an over-the-counter medication, what are your thoughts on how well they work in general? Would you say...

1. Generic version works better than name brand versions of OTC medications
2. Name brand versions work better than generic versions of OTC medications
3. Both generic and name brand versions work equally well
4. Don't know/Not Sure
5. Refused

Now, the next few questions ask about how you make certain decisions while buying over-the-counter medications. So, thinking about your over-the-counter medication use in general:

3.7 Please tell me for each option I would read to you that if it is a location where you buy over-the-counter medications?

- | | | |
|---|---------------------------|--------------------------|
| 1. Pharmacy (Walgreens, CVS, Rite Aid, Independent, etc.) | <input type="radio"/> Yes | <input type="radio"/> No |
| 2. Grocery Store (Martins, Kroger, etc.) | <input type="radio"/> Yes | <input type="radio"/> No |
| 3. Large Retailer (Walmart, Target, Sam's Club, Costco, etc.) | <input type="radio"/> Yes | <input type="radio"/> No |
| 4. Convenience Store (7-11, gas station, etc.) | <input type="radio"/> Yes | <input type="radio"/> No |
| 5. Online Shopping | <input type="radio"/> Yes | <input type="radio"/> No |
| 6. Something else? | | |
| Please specify _____ | | |
| 7. Don't know/Not sure | | |
| 8. Refused | | |

3.8 Now tell me for each option I would read to you that if it is a source from where you get information about over-the-counter medications?

- | | | |
|--|---------------------------|--------------------------|
| 1. Pharmacist | <input type="radio"/> Yes | <input type="radio"/> No |
| 2. Physician | <input type="radio"/> Yes | <input type="radio"/> No |
| 3. Partner/Family/Friends/Acquaintances | <input type="radio"/> Yes | <input type="radio"/> No |
| 4. Media (TV/ Magazines/ Internet/News Papers) | <input type="radio"/> Yes | <input type="radio"/> No |
| 5. Advertisements/Pamphlets/Brochures at Clinics/Pharmacy/Health Campaigns | <input type="radio"/> Yes | <input type="radio"/> No |
| 6. Drug label information | <input type="radio"/> Yes | <input type="radio"/> No |
| 7. Other _____ | | |
| 8. Don't know/Not sure | | |
| 9. Refused | | |

3.9 Now tell me for each option I would read to you that if it is an attribute you generally consider when choosing an over-the-counter medication?

- | | | |
|------------------------------------|---------------------------|--------------------------|
| 1. Availability in generic version | Yes <input type="radio"/> | No <input type="radio"/> |
| 2. Name of the brand | Yes <input type="radio"/> | No <input type="radio"/> |

- | | | | | |
|---|-----|-----------------------|----|-----------------------|
| 3. Price | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 4. Medication attributes (such as flavor, color, pill size etc.) | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 5. Packaging attributes (such as easy grip, clarity of label, etc.) | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 6. Information on the drug label | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 7. Other _____ | | | | |
| 8. Don't know/Not sure | | | | |
| 9. Refused | | | | |

3.10 Now, when you buy an over-the-counter medication for the first time, what information do you read on the drug label in general? Do you read..

- | | | | | |
|--|-----|-----------------------|----|-----------------------|
| 1. Active ingredients in the medication | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 2. Strength of the medication | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 3. Purposes/Uses of the medication | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 4. Warnings about the medication | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 5. Directions to use the medication | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 6. Dates of manufacturing and expiration | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 7. All the information printed on the drug label | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 8. Don't know/Not sure | | | | |
| 9. Refused | | | | |

3.11 Now, if you buy the same medication again, what information do you make sure to read again? Do you read..

- | | | | | |
|--|-----|-----------------------|----|-----------------------|
| 1. Active ingredients in the medication | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 2. Strength of the medication | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 3. Purposes/Uses of the medication | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 4. Warnings about the medication | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 5. Directions to use the medication | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 6. Dates of manufacturing and expiration | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 7. All the information printed on the drug label | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 8. Don't know/Not sure | | | | |
| 9. Refused | | | | |

3.12 Now tell me how often do you face issues while reading and understanding the drug label information on the package. Would you say...

1. Always → Go to the next question
2. Usually → Go to the next question
3. Sometimes → Go to the next question
4. Rarely, or → Skip to the next question

5. Never → Skip to the next question
6. Don't know/Not sure
7. Refused

3.13 So, tell me what kind of issues you face while reading and understanding the drug label information on the package.

3.14 Please tell me what is most important for you when you make a final decision to buy an over-the-counter medication? I would read to you few options and you have to select only one.

1. Your previous experience with the medication
2. Recommendation by your physician/pharmacist
3. Suggestion by your family, friends or acquaintances
4. Information on the drug label
5. The name brand of the medication
6. Availability in the generic version
7. Price of the medication
8. Convenience/Accessibility
9. Medication attributes (such as flavor, color, pill size etc.)
10. Packaging attributes (such as easy grip, clarity of label, etc.)
11. Something else, please specify _____
12. Don't know/Not sure
13. Refused

Next few questions ask about how confident or doubtful you feel about your ability to make a decision to use over-the-counter medications. Please tell me whether you are very confident, somewhat confident, neutral, somewhat doubtful, or very doubtful.

3.15 For your ability to recognize symptoms that can be treated with an OTC medication. Are you:

1. Very confident
2. Somewhat confident
3. Neutral
4. Somewhat doubtful, or
5. Very doubtful
6. Refused

3.16 For your ability to locate an OTC medication in the store. Are you:

1. Very confident
2. Somewhat confident
3. Neutral
4. Somewhat doubtful, or
5. Very doubtful
6. Refused

3.17 For your ability to read the information on the drug label. Are you:

1. Very confident
2. Somewhat confident
3. Neutral
4. Somewhat doubtful, or
5. Very doubtful
6. Refused

3.18 For your ability to select an OTC medication among many options. Are you:

1. Very confident
2. Somewhat confident
3. Neutral
4. Somewhat doubtful, or
5. Very doubtful
6. Refused

3.19 For your ability to treat yourself with an OTC medication as required. Are you:

1. Very confident
2. Somewhat confident
3. Neutral
4. Somewhat doubtful, or
5. Very doubtful
6. Refused

Now, the next few questions ask you about your experiences of using over-the-counter medications.

3.20 So, thinking of your over-the-counter medication use in general, how often do you take over-the-counter medications without consulting a physician? Would you say...

1. Always
2. Usually
3. Sometimes
4. Rarely, or
5. Never
6. Don't know/Not sure
7. Refused

3.21 To the best of your knowledge, have you ever experienced a craving or a strong desire to use an over-the-counter medication again and again? Would you say...

1. Never → skip to the next question
2. Yes, Once → go to the next question
3. Yes, more than once → go to the next question
4. Don't know/Not sure → skip to the next question
5. Refused → skip to the next question

3.22 For the time or times you experienced a craving or a strong desire to use an over-the-counter medication again and again, please describe what exactly happened. What was the name of the medication, what symptoms did you have, and how did you deal with the situation (such as if you went to the doctor or pharmacist, or you managed it by yourself). [NOTE: Ask the respondents who answered YES to the above question. Probe as needed to get all the details that are requested in this question.]

3.23 Now thinking about your over-the-counter medication use in general, please tell me for each option I would read to you that if you have ever consumed any over-the-counter medication in following ways:

- | | | | | |
|--|-----|-----------------------|----|-----------------------|
| 1. Consumed more frequently than indicated on the drug label | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 2. Consumed a higher or a lower dose than indicated on the drug label | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 3. Consumed more than the maximum daily amount indicated on the drug label | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 4. Consumed for a different purpose than indicated on the drug label | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 5. Consumed after the date of expiration as indicated on the drug label | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 6. Consumed with an alcoholic drink | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 7. None of the above | | | | |
| 8. Don't know/Not sure | | | | |
| 9. Refused | | | | |

3.24 Please try to recall and tell me the reason for you to consume the medication in this way? [Ask only if they choose an option from 1 to 6 for Question 3.23]

3.25 Now, try to recall and tell me if you have ever experienced any harmful effect of an over-the-counter medication? Would you say...

1. Never → skip to the next question
2. Yes, Once → go to the next question
3. Yes, more than once → go to the next question
4. Don't know/Not sure → skip to the next question
5. Refused → skip to the next question

3.26 For the time or times you experienced harmful effects with an over-the-counter medication, please describe what exactly happened. What was the name of the medication, what symptoms did you have, and how did you deal with the situation (such as if you went to the doctor or pharmacist, or you managed it by yourself). [NOTE: Ask the respondents who answered YES to the above question. Probe as needed to get all the details that are requested in this question.]

3.27 Please tell me how do you feel in general about your overall experience of using over-the-counter medications? Would you say...

1. Very satisfied
2. Somewhat satisfied
3. Neutral
4. Somewhat dissatisfied, or
5. Very dissatisfied
6. Refused

Section 4: Health & Health-related Behavior

The next few questions ask about your overall health, health related issues and health behaviors in general. So thinking over the past couple of months and now:

4.1 Would you say in general your health is:¹

1. Excellent
2. Very Good

3. Good
4. Fair, or
5. Poor
6. Don't know/Not sure
7. Refused

4.2 Would you say in general your sleep quality is:

1. Excellent
2. Very Good
3. Good
4. Fair, or
5. Poor
6. Don't know/Not sure
7. Refused

4.3 Are you limited in any way in any activities because of physical, mental, or emotional problems?¹

1. Yes
2. No
3. Don't know/Not sure
4. Refused

4.4 Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare, or Indian Health Service?¹

1. Yes
2. No
3. Don't know/Not sure
4. Refused

4.5 What kind of health insurance/coverage do you have?¹

1. Medicare
2. Medicaid

3. Both Medicare & Medicaid
4. Other private healthcare coverage
5. None
6. Don't know/Not sure
7. Refused

4.6 How satisfied are you with your current health insurance/coverage? Would you say...¹

1. Very satisfied
2. Somewhat satisfied
3. Somewhat dissatisfied, or
4. Very dissatisfied
5. Don't know/Not sure
6. Not applicable
7. Refused

4.7 Do you have one person you think of as your personal doctor or health care provider? Would you say...¹

1. Yes, only one
2. More than one
3. No
4. Don't know/Not sure
5. Refused

4.8 About how long has it been since you last visited a doctor for a routine checkup? [A routine checkup is a general physical exam, not an exam for a specific injury, illness, or condition.] Would you say...¹

1. Within past 6 months
2. Within past year
3. One or more years ago
4. Don't know/Not sure
5. Never
6. Refused

4.9 In general how satisfied do you feel about the treatment you are receiving from your doctor? Would you say...¹

1. Very satisfied
2. Somewhat satisfied

3. Neutral
4. Somewhat dissatisfied, or
5. Very dissatisfied
6. Not applicable
7. Refused

4.10 In general, how satisfied do you feel about the communication between you and your doctor? Would you say...¹

1. Very satisfied
2. Somewhat satisfied
3. Neutral
4. Somewhat dissatisfied, or
5. Very dissatisfied
6. Not applicable
7. Refused

4.11 Was there a time in the past three months when you could not visit your doctor due to some reason?¹

1. Yes
2. No
3. Don't know/Not sure
4. Refused

4.12 What was the reason behind not visiting your doctor? [Note: Ask only if the respondent said YES to the above question; else skip to the next question.]¹

4.13 Was there a time in the past 3 months when you did not take your medication as prescribed due to some reason? Do not include over-the-counter medications.¹

1. Yes
2. No
3. No medication was prescribed
4. Don't know/Not sure

5. Refused

4.14 What was the reason behind not taking your prescription medications? [Note: Ask only if the respondent said YES to the above question; else skip to the next question.]¹

4.15 Other than taking your regular prescription or over-the-counter medications, what else do you do to manage your health conditions? I would read to you few options, and for each option you choose either yes or no. Would you say you...

- | | | | | |
|---|-----|-----------------------|----|-----------------------|
| 1. Exercise | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 2. Eat healthy food | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 3. Take multivitamins or dietary supplements | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 4. Take herbal or alternative medications | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 5. Practice alternative therapies (ex. yoga, meditation, tai-chi, etc.) | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 6. Drink alcohol | Yes | <input type="radio"/> | No | <input type="radio"/> |
| 7. Other _____ | | | | |
| 8. None | | | | |
| 9. Don't know/Not sure | | | | |
| 8. Refused | | | | |

Now thinking over the past couple of months and now:

4.16 Do you exercise every day, some days, or not at all? Would you say...

1. Everyday
2. Some days, or
3. Not at all
4. Don't know/Not sure
5. Refused

4.17 Do you smoke cigarettes every day, some days, or not at all? Would you say...

1. Everyday
2. Some days, or
3. Not at all
4. Don't know/Not sure
5. Refused

4.18 Do you drink alcohol every day, some days, or not at all? Would you say...

1. Everyday
2. Some days, or
3. Not at all
4. Don't know/Not sure
5. Refused

Section 5: Personal and Social life, Life Satisfaction

Now we would like to ask a few questions about your personal and social life. So thinking over the past couple of months and now:

5.1 In general, how satisfied are you with your life? Would you say...¹

1. Very satisfied
2. Satisfied
3. Neutral
4. Dissatisfied, or
5. Very dissatisfied
6. Don't know/Not sure
7. Refused

5.2 How often do you get the social and emotional support you need? Would you say...¹

1. Always
2. Usually
3. Sometimes
4. Rarely, or
5. Never
6. Don't know/Not sure
7. Refused

5.3 In general, how often do you get together with your social circle such as friends, relatives, or acquaintances? Would you say...²

1. Less than once a year
2. About once or twice a year
3. Several times a year
4. About once a month
5. Every week
6. Several times a week, or
7. Never
8. Don't know/Not sure

9. Refused

5.4 Tell me how often do you discuss your health-related issues and/or treatment regimen with your social circle such as friends, relatives, or acquaintances? Would you say...²

1. Every time
2. Almost every time
3. Occasionally/Sometimes
4. Almost never, or
5. Never
6. Don't know/Not sure
7. Refused

5.5 In general, how often do you discuss your health-related issues and/or treatment regimen with your family members? Would you say...²

1. Every time
2. Almost every time
3. Occasionally/Sometimes
4. Almost never, or
5. Never
6. Don't know/Not sure
7. Refused

5.6 In general, how often do you follow a health-related suggestion from your family members? Would you say...²

1. Every time
2. Almost every time
3. Occasionally/Sometimes
4. Almost never, or
5. Never
6. Don't know/Not sure
7. Refused

5.7 In general, how often do you follow a health-related suggestion from your social circle such as friends, neighbors, or acquaintances? Would you say...²

1. Every time
2. Almost every time

3. Occasionally/Sometimes
4. Almost never, or
5. Never
6. Don't know/Not sure
7. Refused

References:

1. CDC—BRFSS, https://www.cdc.gov/brfss/annual_data/2015/pdf/codebook15_llcp.pdf
2. National Social Life, Health, and Aging Project (NSHAP): Wave 2 and Partner Data Collection (ICPSR 34921), <http://www.icpsr.umich.edu/icpsrweb/NACDA/studies/34921>

Vita

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