

ASSESSING THE IMPACT OF EMPLOYEE WELLNESS PROGRAMS ON HEALTHCARE EMPLOYEE'S

WEIGHT

by

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ABSTRACT

ASSESSING THE IMPACT OF AN INCENTIVIZED EMPLOYEE WELLNESS PROGRAM ON PARTICIPATION AND WEIGHT

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Introduction: Over 32% of employees in healthcare are clinically overweight with a BMI over 30.

This level of obesity is more significant in healthcare than in other professions. (Aldana, 2021). The growing prevalence of diseases among employees in healthcare settings has increased the concern about their health, well-being, and productivity. (Aldana, 2021). Notably, the reduction of obesity rates holds the potential to avert 40 million instances of chronic diseases, encompassing hypertension, diabetes, and cardiovascular ailments. (Milken Institute Study, 2022) Therefore, maintaining a healthy body weight or shedding excess pounds is crucial to reduce the risk of developing these. As a response, employers are adopting employee wellness programs to proactively prevent illnesses or identify and address health issues early, preventing complications. One way to prevent health issues would be having a strategic focus that involves addressing obesity being the root cause of numerous chronic diseases. This research aims to assess the impact of Advocate Aurora’s healthy living programs Weight Watchers (WW), Health Management Resources (HMR), Healthy Habits, and Noom in comparison to their new added “Foodsmart” program on weight loss among overweight/obese employees measured by BMI (Body Mass Index). The findings of this research seek to determine the effectiveness of employee wellness programs (EMPs) on weight loss and overall

health and well-being, providing recommendations for future research. This study aims to contribute to the existing literature on holistic health, wellness promotion/education, and behavioral economics. This study will employ the use of two theoretical approaches to explain the patterns of participation in the EWPs: the self-care deficit theory, and behavioral economics theories, specifically present bias, and nudging.

Methods: This is a retrospective study, analyzing participants in Advocate Aurora's recent healthy living program, "Foodsmart," and comparing them with participants from their other wellness programs. The examination will encompass demographic differences among Foodsmart participants and participants in alternative wellness programs. Additionally, it will assess changes in BMI among participants in employee wellness programs from 2022 to 2023.

Result: Out of the 6,708 healthcare workers, 595 engaged in Foodsmart, 1,635 in Weight Watchers (WW), 3,290 in Noom, 438 in Healthy Habits, and 230 in Health Management Resources (HMR). The Foodsmart program demonstrated a minor reduction in the average BMI from 31.8 to 31.6 post-intervention, indicating a slight positive impact on participants' weight status (-0.2). Similarly, HMR participants exhibited a slight decrease in average BMI from 32.5 in 2022 to 32.3 in 2023 (-0.2). In contrast, WW, Healthy Habits, and Noom recorded slight increases in average BMI post-intervention (0.1-0.2). The collective average BMI for all programs in 2022 was 33.12, experiencing a marginal uptick to 33.14 in 2023 post-intervention. Despite being a minimal increase, it implies that, on average, there was a minor alteration in participants' BMI due to involvement in EWPs. Although the statistical analysis indicates no significant change, it is crucial to consider practical significance. The slight rise in average BMI

may not reach statistical significance, yet it suggests that, on average, there was no improvement in participants' BMI following the intervention.

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DEDICATION

In heartfelt acknowledgment and deep appreciation, I dedicate the completion of my PhD to the cherished memory of my father. His parting words, delivered just three months after the loss of my husband, resonate in my heart: "No matter what happens in life, finish your PhD. Don't let your circumstances stop you from reaching your goals." Though he departed from this world shortly thereafter, his enduring spirit and wisdom guide me. May he rest in peace, forever remembered as a beacon of inspiration and strength.

A profound thank you extends to my beloved mother, whose unwavering belief in me and steadfast support sustained me through every challenge. I am the woman I am today because of you. To my resilient children, Omar and Taliah, your daily demonstrations of strength and patience inspire me immeasurably. I love you both dearly, and I am proud of the remarkable individuals you are becoming. To my dear brothers, Muhammed, Fouad, Muaz, and sister Yvette, your love has been a constant source of strength. And to my uncles, aunts, grandma, cousins, and extended family. Thank you.

In sincere gratitude, I dedicate this achievement to my friends, Sarah, Arwa, Muriel, Melissa, who've been my chosen family when I needed it the most. You've had an everlasting impact on my life. To Hannah, Elyse, Alaa, Judi, Brad, Lauren, Megan, Sally, Nujood and others who touched my life in myriad ways over the past 5 years, your support and encouragement have been invaluable. A special appreciation to Jared, whose words of encouragement and support over the last two years have been a sustaining force for me. I am sincerely grateful. With a tribute reserved for my father's friend, Uncle Adnan and his wife, whose light has illuminated my path since my father's passing.

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Chapter 1: Introduction

1-A. Overview

As our world adapts to the many changes, the healthcare industry continues to transform as well to meet the needs of those changes. During the pandemic's outbreak, it was proven more than ever just how valuable our healthcare workers are. The well-being of our healthcare workers is a key component to providing optimal healthcare services to our communities. The Wellness Council of America (WELCOA) defines wellness as an active search by an individual to comprehend and meet their human desires, which allows one to get to a place where they feel fulfilled and realize their full potential in every aspect of life (WELCOA, 2018). The World Health Organization (WHO) defines health as being physically, mentally, and socially complete and not lacking an illness or infirmity (Rohini R., 2021). There are various vital areas of an individual lifestyle regarded as the overall wellness dimensions. They are physical, mental, emotional, environmental, social, and spiritual. Every one of these affects a person's overall holistic well-being. (Rohini R., 2021) Many healthcare organizations have partnered with different employee wellness programs (EWPs) to support all dimensions of their employee's well-being. There are about 59 million healthcare employees globally (WHO, 2016), and 22 million in the United States according to the Census 2019 (Bureau, 2021).

People see healthcare entities as a place to enhance wellness and associate hospitals with improved quality of life and great care. Healthcare facilities are the right places to promote prevention and early screening of illnesses. Implementation of employee wellness programs has been slow because healthcare organizations find it challenging to monetize the particular benefits offered by the wellness program. Even though organizations can point out all primary

advantages to observe, tracing approaches to collect and quantify this data becomes difficult. Employee' wellness programs contain health promotion interventions, strategies, and activities created to improve the health of employees. Though the employee wellness program components can differ substantially across organizations, the projected pros sought remain the same and range from reducing obesity rates/reducing chronic diseases, improving overall health, improving productivity, reducing health charges, and promoting cultural changes toward a culture of wellness.

This study aims to contribute to the following literature: health promotion/education and behavioral economics. In addition to contributing to the Healthy People 2030 initiative of the Community Preventive Services Task Force in recommending worksite programs to improve employees' diet and physical activity to help reduce their weight. (USDHH, 2022) This study will employ two theoretical approaches to explain the patterns of participation in the EWPs: The Self-care Deficit Theory and Behavioral Economics.

1-B. Statement of the Problem

Lifestyle disease epidemics have been increasing in the United States, obesity in particular. Between (1999-2000) and (2017-2018) obesity prevalence rates increased from 30.5% to 42.4%. (CDC, 2021). About 86% of full-time workers are above normal weight or have one chronic disease. (Witters et al., 2016). And amongst those overweight workers with one to three or more chronic conditions miss about 3.51 days of work per month (About 42 days per year). When it comes to healthcare workers in particular, the growing prevalence of diseases among employees in healthcare settings has increased employers' concern about their impact on employer health and productivity. Dadar Singh et al. (2021) reports that obesity among

healthcare employees is 29% greater than both the global and national obesity prevalence. Obesity leads to many different chronic diseases and illnesses. Absence due to sickness leads to lack of productivity, loss of work, thus affecting the overall well-being of the individual. Employee wellness programs aim to help enhance employee's overall lifestyle by improving physical and mental health, leading to improved work productivity and ability. (Rogen et al., 2013).

This research is important because it sheds light in the field of health promotion/education and behavioral economics amongst healthcare employees. The employee wellness programs at Advocate Aurora focused on employees deemed overweight due to a BMI of over 25 or obese as determined by a BMI of over 30. Obesity is a complex illness defined by body mass index (BMI) interpreted as a high percentage of body fat. The BMI calculates an individual's weight relative to height. Research in the journal of Occupational & Environmental Medicine shows that among hospital employees who have a BMI over 30 have a greater consumption of fats, high sugar beverages and spend quality time watching television and sitting than those with average weight. (Sharma et al., 2016). Over 32% of employees in healthcare are clinically overweight with a BMI over 30 (Aldana, 2021). This level of obesity is more significant in healthcare than other professions. These employees are positively associated with chronic diseases such as hypertension, diabetes, and cardiovascular disease. The growing prevalence of diseases among employees in healthcare settings has increased the concern about their health, well-being, and productivity. Thus, employers are adopting employee wellness programs to either prevent onset of illnesses or diagnose and treat ailments early before complications occur. And one way for that to be done is focusing on the underline

cause of so many chronic diseases. Milken Institute researchers identified Obesity as the number one cause of many of those diseases and reported that 40 million cases of chronic diseases can be avoided if obesity rates are reduced. (Milken Institute Study, 2022)

With obesity numbers going up, studies have shown a direct correlation between excess fat and developing chronic diseases. Maintaining normal body weight or losing weight is essential to reducing the risk of developing these diseases. Full-time workers in the U.S who struggle with their weight and chronic conditions miss on average 42 additional days of work every single year. That costs the US more than \$153 billion annually just from loss of productivity from employees missing workdays, not including presenteeism where employees show up to work yet are less productive due to poor health and well-being. (Witters et al., 2016). According to the internationally recognized organization Partnership to Fight Chronic Disease, the annual impact of chronic disease on the U.S economy is more than \$1 trillion (about \$3,100 per person in the US) which is equivalent to nearly 6% of the nation's GDP (Gross Domestic Product) that is estimated to keep climbing to reach about \$6 trillion (about \$18,000 per person in the US). Obesity's estimated annual medical cost by itself in the U.S was \$173 billion (about \$530 per person in the US) back in 2019. (Milken Institute Study, 2022). So, on average the medical cost for individuals who struggle with obesity was about \$2000 higher than individuals with healthier weight. (CDC, 2021) Therefore, my research will help support that nutrition and healthy lifestyle habit changes are fundamental to managing weight, thus preventing, or in better cases reversing some of those diseases. This leads to improving employees' overall mental and physical well-being and improving work productivity, which will eventually help in lowering the overall cost of healthcare.

Some barriers to this research would be lack of participation, turnover rates, and access/affordability of healthier diets.

When it comes to lack of participation a study showed that employees who worked more or equal to 20 hours per week, worked night shifts or were paid hourly were less likely to participate. And employees who were administrators were 13% more likely to participate than non-administrators. Overall, only 58% of employees participated in employee wellness and health promotion programs across the United States. (Tsai et al., (2019). The data collected for this study could be skewed from the lack of employees' participation.

Moreover, employee turnover and its effects on participation is a challenging one, especially with how high the numbers are in healthcare. Healthcare employees are at a greater risk of encountering intense distress, burnout, mental and physical diseases. In the last three decades, the frequency of related illnesses such as burnout has grown, impacting 65% of physicians in 2022 which is an increase by 4 percentage points from back in 2021. (Landi H., 2022). More than half of those physicians have considered a different job within healthcare, and 4 in every 10 considered not practicing medicine. Burnout among healthcare employees, especially medical staff, has become a job risk. In result of that, about 47% of healthcare workers are planning to leave their job in the next 3 years. (Kelly J.,2022) Due to getting burnt-out, healthcare employees are leaving their professions creating a shortage (West, 2020). Before the pandemic 3.2% of healthcare employees quit, compared to 5.6% during and 3.7% after the pandemic. (Frogner et al., 2022). So, although the numbers did go down post the pandemic, it is still higher than years prior to the pandemic by 0.7%. And according to statistics collected staff turnover rate in United States hospital went from 16.2% back in 2016 to 19.5% in

2020. Meaning that the average hospital has had 90% of its workforce turnover since 2016. (Michas, 2021). Turnover would be a barrier to this study by affecting the data tracking of employees year to year.

Another barrier that could affect participation is access and affordability of healthier choices. According to research conducted by Harvard School of Public Health, a healthier diet costs \$1.50 more on average per day than a less healthy one. That might not be much for middle to higher income employees, but it makes a difference for those with less income. Individuals who had diets rich in fresh vegetables, fruits, protein, and nuts spent at least \$550 more per year. (Rao et al., 2013). So, by looking into making healthier diets more affordable and accessible, we could potentially see a higher participation of employees in the employee wellness programs offered.

This research will improve the understanding of how the use of behavioral economics helps promote behavioral changes by encouraging participation in employee wellness programs. When it comes to health incentives and behavioral economics, studies have shown the potential of promoting healthy actions by effective incentive programs. It is the practice of combining insights from psychology, economics, and marketing to improve decision making by individuals and understand human behavior. (Stevens, 2017) Behavioral economics provides nudges to help influence better decision making without dictating decisions. It is a way to help encourage yet provide a degree of freedom to participate or not. By providing rewards that make it attractive to participate in an employee wellness program. In doing so, it will shed light on the important contributing factors that help improve the social support given to employees. That encourages employees to adopt and maintain healthy behavior. Including adequate sleep,

physical activity, healthier diets and not smoking. Behavioral economics is used to examine the effects of financial incentives to promote healthy behavior and discourage unhealthy ones. One concept of behavioral economics is how in making decision individuals place more weight in the present than the future. In other words, immediate gratification rather than a delayed one would be more effective when it comes to incentivizing participation in an EWP. (Volpp et al., 2013) This project will change, improve, and guide strategic decisions related to what wellness programs are offered to employees.

Furthermore, hospitals are good at detecting and treating diseases yet are not involved enough in preventing them. In addition, that is where this research comes into place to help improve the application of wellness programs to prevent, and even reverse some chronic diseases. Most healthcare professionals prioritize their work by putting patients first and forgoing their own well-being, it is an admirable act, but there is always a price. As healthcare professionals struggle with their health, there is a great need for hospitals and other healthcare systems to offer wellness programs (Mattke et al., 2013). In the current competitive environment, organizations are beginning to note the importance of employee wellness. It is essential to understand that an extensive holistic perception of wellness goes above the lack of illness but includes individuals' body, mental, social, and spiritual well-being.

This research will be the first to evaluate Advocate Aurora's newest program "Foodsmart". It will help examine the success of weight loss amongst overweight/obese employees measured by BMI per participation in Foodsmart compared to the other healthy living programs. Including WW (Weight Watchers), Noom, HMR (Health Management Resources), Healthy Together, and Healthy Habits. While the Healthy living Programs were

launched back in 2019, Foodsmart was added as an EWP at Advocate Aurora at the start of 2022. And by specifically evaluating the effectiveness of Foodsmart compared to the other EWPs, we can help promote healthier behavioral changes amongst employees. To improve the efforts in preventing chronic diseases by fostering a culture of wellness and aiding in lowering the cost of healthcare for both employers and employees.

In addition, this research will help shed light on the importance of our nutrition in improving our overall well-being by discussing the use of “Food as Medicine”.

Food as medicine is the concept that the food we eat has a significant impact on our overall health and well-being. The idea of food as medicine is based on the premise that the nutrients and compounds found in whole, unprocessed foods can help prevent and treat various health conditions. By making healthy food choices, we can not only nourish our bodies, but also prevent chronic diseases such as diabetes, heart disease, and cancer.

The emphasis on food as medicine is not new. Historically, food has been used as a source of healing in many cultures around the world. In Ayurvedic medicine (which is an alternative medicine approach practiced in India and Nepal), food is considered a primary tool for healing and maintaining health. (Shurtleff & Hopp, 2019) And in traditional Chinese medicine they also recognize the healing power of food and emphasizes the use of whole, unprocessed foods to promote good health. (Hopp & Shurtleff, 2019)

As early as 300 BCE humans relied on food harvest for medical purposes. It has always remained a part of western healing practices until the shift away from nutrition-based medicine towards allopathic medicine in the 18th and 19th centuries. Relying more on doctors to treat symptoms and diseases using medical interventions such as drugs, surgery, and radiation. That

is known as western medicine, orthodox medicine, or conventional medicine. With that said, many cultures still remain rooted with traditional healing practices that rely more on our food and nutrition than medical interventions. It's unfortunate that the use of food as medicine was largely overlooked by our academics and educational system until the 21st century. Due to the high level of social media and media access, the attention has gained momentum, and many have started the conversation on the importance of going back to our rooted scientific proven use of food as medicine. (NYC Food Policy Center, 2022)

Today, there is growing interest in the use of food as medicine in modern medical practices. Healthcare practitioners are recognizing the importance of nutrition in preventing and managing chronic diseases. By encouraging patients to adopt healthy eating habits and make informed food choices, healthcare providers can help improve patient outcomes and reduce healthcare costs. The concept of food as medicine is gaining traction, and it is likely to become an increasingly important component of modern healthcare practice in the years to come. (Aspry & Malik, 2023)

The concept of Food as medicine has grown tremendously in the last couple of years and has helped in aiding the understanding of how our nutrition affects our health not just physically but mentally as well. It's defined by the Academy of Nutrition and Dietetics as "a philosophy where food and nutrition aids individuals through interventions that support health and wellness" (ANDF, 2023)

The following 4 focus areas were identified by the Academy of Nutrition and Dietetics:

- Food as preventative medicine to encourage health and well-being.
- Food as medicine in disease management and treatment.

- Food as medicine to improve nutrition security.
- And finally, food as medicine to promote food safety.

(ANDF, 2023)

Many institutes and universities are helping further education on the use of Food as Medicine by offering courses and certifications such as Culinary Medicine Specialist, Food as Medicine course, Clinical Nutrition, Nutritional Sciences, Sport Nutrition certification.

The Aspen Institute and the Center for Health Law and Policy at Harvard law school released a research action plan outlining recommendations to strengthen the research on food as medicine. This report highlights steps to identify and gather the information that will help transform our health care system and its take on nutritional needs for our patients (Aspen Institute, 2022). Building a more holistic understanding of the effects of appropriate food on patients' recovery and health.

The vision of this initiative's lists the following:

- Everyone has the food that will allow them to live a healthy, dignified life according to their specific needs.
- Effective, appropriate Food is Medicine interventions are integrated into the U.S. health care system nationwide, providing access to a wide range of proven interventions.
- All Food is Medicine research applies an equity framework to ensure that interventions empower individuals and communities and are effective across demographic groups.

(Aspen Institute, 2022)

Similarly, the Center for Food as Medicine and the Hunter College NYC Food Policy Center has also published a report highlighting the evidence to drive change. They emphasize

the importance of starting with our healthcare system and current policies. Driving the change from inside out. By engaging “farmers, chefs, physicians, nutritionists, policymakers, elected officials, government staffers, community-based organizations, public health advocates, academics, insurance companies, food companies, media, and patients” (NYC Food Policy Center, 2022)

Foodsmart has been one of the few wellness program providers to focus its communication on Food is medicine and leading the conversation on using food as a step towards living a healthier life instead of the use of pills and medical intervention. According to a webinar conducted by Foodsmart titled “When is food your best medicine?” Food can replace pills and help us live a healthy more fulfilling life. The power of nutrition in keeping our body and mind healthy has been an understatement. Food has so much power over us physically and mentally, to the point where some chronic diseases and conditions such as high blood pressure, heart disease, type 2 diabetes and even some types of cancer can be controlled, reversed, and prevented with a healthy balanced fuel to our body. (Foodsmart, 2020)

Most chronic diseases are known as lifestyle diseases, and in the webinar, they covered how heart disease is the leading cause of death for both men and women in the U.S. And studies have shown that by simply focusing on nutrition we can not only treat it, but we can reverse and prevent it. Likewise for diabetes, 1.5 million American are diagnosed with diabetes each year. By empowering our body with good nutrition and eating less processed food we can help lower those numbers. (Foodsmart, 2020) When it comes to some types of cancer, research has supported how feeding and fueling our immune system with high nutritionist food, it can help arm our body to destroy and clear cancer cells before it becomes a problem.

Emphasizing the importance of including antioxidants and anti-inflammatory rich food in our diets. (Foodsmart, 2020)

Moreover, our food can also help balance our gut health by balancing our microbiomes. That are bacteria that live inside our gut which influences our overall health. When we have too much of the bad bacteria and too little of the good ones it can cause weight gain. The bad bacteria help us observe more fat leading to increased weight. (Foodsmart, 2020) So, it's critical to have a balance between the good and bad bacteria by having more fiber in our diet, and less sugar and processed food. Since a healthy microbiome is critical for digestion and preventing autoimmune disorders and allergies. (Foodsmart, 2020) Finally, they discuss how when it comes to cognitive health, nutrition helps increase blood flow to our brain and when on a healthy diet that blood is high in antioxidants and vitamins that help maintain and enhance our cognitive function. (Foodsmart, 2020)

Nutrition is one of the things that plays the largest role in keeping us healthy. In combination with good and restful sleep, the amount of activity we engage in, and how we deal with stress, we can improve our overall well-being and increase our chances of living a holistic long life.

Although the focus of this research is on healthcare employees, application and evaluation of wellness programs have seen success in aiding employees to adopt a healthier lifestyle and foster a culture of wellness in other fields. For instance, many participants in a western school district in the United States have seen improvement in their biometric scores over the course of one year. The overall number of high-risk employees went down. About 46% lowered their BMI, 34.7% had lower systolic blood pressure, 56.3% had lowered diastolic blood

pressure, 65.6% lowered their blood glucose and 38.6% lowered their cholesterol levels. (Merrill & Sloan, 2014).

The implementation addresses the employees' health issues to improve their overall health, assesses the participation rate of healthcare professionals in wellness programs provided, factors impacting participation, and the impact on employees' BMI. This research will help improve the scientific knowledge behind the importance and benefits of having a wellness program in promoting a culture of wellness.

1-C. Purpose

The goal of this research is to evaluate the effects of Advocate Aurora's healthy living program "Foodsmart" on weight loss amongst overweight/obese employees measured by BMI (Body Mass Index) in comparison with their other healthy living programs.

The results of this research will help determine the value of employee wellness programs (EMPs) on employee's weight loss, and overall health and well-being along with ways to encourage participation.

Aims:

Aim 1: To examine the demographics of employee participation in Advocate Aurora's employee wellness program Foodsmart (EWPs) compared to other programs.

Aim 2: To examine the success of weight loss amongst overweight/obese employees measured by BMI per participation in the new Foodsmart program to the other healthy living programs including Weight Watchers (WW), Health Management Resources (HMR), Healthy Habits and Noom).

1-D. Research Questions

To better understand the relationship between health-care deficits, behavioral economics, and participation in wellness programs among healthcare employees, this quantitative research study was conducted through the analysis of Foodsmart health assessment data, biometric data as compared to Noom, HMR, Healthy Habits, and Weight Watchers. As such this study aims to address the following research questions:

Q1: What are the demographics of the new Advocate Aurora Foodsmart program participants compared to the other Advocate Aurora Healthy Living programs?

Q2: What is the success of the new Foodsmart program measured by BMI compared to the other programs?

1-E. Significance of the Study

Advocate Aurora Health Care is an integrated non-profit healthcare provider where care is provided to help people live well. Advocate Aurora Health Care has merged with Atrium this year (2023) as an integrated non-profit healthcare provider. With a Footprint across Alabama, Georgia, Illinois, North Carolina, South Carolina, and Wisconsin. Making it the 5th largest non-profit nationwide. It has an estimated 150,000 teammates, 42,000 nurses, 21,000 doctors, more than 1000 sites of care, and a patient population of approximately 6 million. In addition to 27 billion in annual revenue, 5 million in community benefits. The data I will analyze will be from legacy Advocate Aurora Healthcare.

Aurora had its first wellness program back in 2016 by providing a novel employee wellness program that offered incentives to motivate employees to maintain a healthy BMI and to motivate those with an unhealthy BMI to lose weight. After the merger between Advocate

and Aurora in 2019, they launched a brand-new wellness initiative called “Healthy living” for 2020. Advocate Aurora has announced the investment in a personalized tele nutrition platform Foodsmart that has been added as an EWP in 2022. This program is a novel incentivized employee wellness program to support their “Whole Person Health Strategy” by “investing in solutions that complement the health system’s core clinical offerings to help people live well at every stage of life” (AAH, 2022).

Being the first to evaluate this program at Advocate Aurora will help determine if focusing on nutrition adds more value in reaching a healthy BMI, versus programs focusing on weight loss. Research is needed to evaluate Foodsmart program outcomes compared to existing employee wellness programs, to understand the demographics of those employees who utilize Foodsmart, and to assess impacts on weight BMI.

As Advocate Aurora continued to improve and diversify the programs offered to their employees, the addition of Foodsmart in 2022 was a big step. Foodsmart has received funding of more than \$25 million led by Advocate Aurora Enterprises, a newly launched subsidiary of Advocate Aurora Health (Advocate Aurora Health, 2021). This strategic growth investment is the first for Advocate Aurora Enterprises, which the Illinois- and Wisconsin-based Advocate Aurora Health recently established to invest in businesses that enable people to improve their health and well-being beyond traditional clinical care settings. The investment is to support the “Whole Person Health” and to enable Advocate Aurora to be a Health Destination company. The following table from Advocate Aroura lists their 2022 healthy living support programs including Foodsmart:

New! Foodsmart	<ul style="list-style-type: none"> • Free* virtual program that makes healthy eating easy and affordable through a nutritional assessment (NutriQuiz), 1:1 coaching, recipe planning, and food delivery. • Meet 1-on-1 with Registered Dietitians (RDs) who are clinically licensed to provide personalized nutrition advice, help manage chronic conditions, and assist in areas outside of nutrition such as sleep and mental health. • Plan affordable-delicious meals with digital grocery lists, grocery delivery integrations, and price comparison tools across grocery stores in your area. • Complete two nutritional assessments (NutriQuiz), an RD visit, and at least two different activities for 12 out of 16 consecutive weeks between the date of your program registration and Nov. 18, 2022.
WW (Weight Watchers)	<ul style="list-style-type: none"> • Register for a free* Digital + Workshops membership • Attend 10 of 12 consecutive weekly Wellness Workshops; virtual option available
Noom	<ul style="list-style-type: none"> • Free* app-based support program, tracking nutrition and weight • Virtual personalized health coaching and group support • Complete at least two different in-app activities each week for 12 of 16 program curriculum weeks
HMR (Health Management Resources)	<ul style="list-style-type: none"> • 12-week structured meal replacement program • Participate in 10 of 12 weekly group meetings – virtual or in-clinic • HMR meals cost \$13-\$15 daily (replacing most of current food costs); classes are free • Advocate Aurora reimburses \$500 upon program completion*
Healthy Together	<ul style="list-style-type: none"> • For participants with a BMI < 18.5 • Work with your primary care physician to create a personalized care plan using the Healthy Together form • Complete two online courses, track two goals and complete three telephonic coaching calls
Healthy Habits	<ul style="list-style-type: none"> • Free virtual lifestyle change program • Focus on diet, exercise, better sleep, and stress management • Three-month minimum engagement program requirement

Table.1 AHH Benefits, 2021

This research will help better understand the value of workplace employee wellness programs explicitly Foodsmart, and their associated impacts on participation rates and obesity rates, particularly BMI. This research will also support fields of study related to corporate employee wellness programs.

The genesis of Foodsmart is to address the increased population of both remote and traditional in-house employees. For the remote employee, company cafeterias are not as accessible to employees as in the past, especially since Covid 19 resulted in an increase in the population of tele-commuting employees. To address these needs, Foodsmart offers a tele-nutritional service. The primary objectives of Foodsmart are to first reduce barriers to healthy food and second, educate consumers on smarter nutritional choices to improve health outcomes. According to Foodsmart, they are the first telehealth program that offers access to

registered dietitians, tailored meals to individuals and food delivery services. (Foodsmart, 2022)

This program provides the opportunity to determine the benefit of a wellness program in a healthy biometric population. In essence, measuring a health promotion program versus a health prevention or intervention program. For the purpose of this study, it is crucial to highlight that Advocate Aurora is extending this program to employees with a BMI of 25 or above.

Employees enrolled in an Advocate Aurora Medical Plan who met the BMI guidelines were awarded \$600; Employees who did not meet BMI guidelines had to participate in a Healthy Living program to earn up to \$600. Thus, this program provides the opportunity to determine the benefit of a wellness program in a healthy biometric population. Foodsmart in comparison to other Healthy Living programs is a proactive novel concept for all employees versus a reactive wellness program that tries to change health outcomes once a person is determined to have a high BMI.

All EWP's are applicable to employees who are enrolled in the Advocate Aurora health insurance plan. These employees complete an online health assessment questionnaire and earn \$100 of the available \$600 reward. Next, the individual attends a biometric screening where the following biometric data is gathered: Height, weight, body fat composition, blood pressure, lipid profile to include cholesterol, HDL, LDL and a calculated cholesterol/HDL ratio, and fasting blood sugar. If they have a healthy BMI between 18.5 - 24.9 they earn the remaining incentive of \$600. If they are underweighting with a BMI < 18.5 or overweight with a BMI between 25 to 29.9, the employee would earn another \$200 but not earn the remaining \$300 unless a Healthy Living program was completed. These Healthy Living programs are Weight Watchers, Noom,

Health Management Resources (HMR), Healthy Together (for low BMI), Healthy Habits. For those with a BMI of 30 or more at the beginning of the program, these individuals would need to complete a Healthy Living Program to earn another \$300 then complete a follow up screening after and depending on the BMI/body fat at the end of the program, the remaining \$200 may be earned.

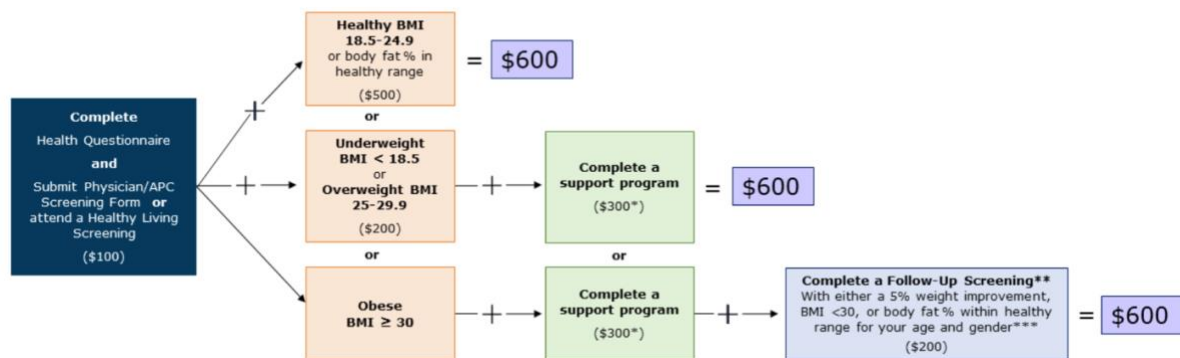


Figure.1 Healthy Living Participation Incentives -_AHH Benefits, 2021

Outcomes could be that Foodsmart participants tend to be a younger demographic compared to the other Health Living programs. A second anticipated outcome is that participation in an EWP helps employees decrease/maintain their weight. And lastly, participation will be higher amongst urban residents compared to rural.

1-F. Conceptual Framework

This study aims to contribute to the following literature: health promotion/education and behavioral economics. This study will employ the use of two theoretical approaches to explain the patterns of participation in the EWPs: The Self-care Deficit theory and two Behavioral Economics theories, Present Bias, and Nudging.

Hartweg explained that Dorothea Orem’s Self-care Deficit Theory recognizes that the individual aims to provide self-care but is often lacking in the resources necessary to achieve

this goal. Furthermore, the individual might neglect to consider these areas of self-care where a deficit is present. Much of this theory can be found in the gap in the literature as healthcare workers are so focused on the health of others that they might forget to view themselves as a patient as well. (Hartweg, 1991) It is critical that healthcare employees conduct a thorough and honest assessment as to what deficits might hinder their ability to achieve holistic health to ensure that they are able to provide appropriate and effective care for their patients. Through this overarching theoretical framework, it is possible to recognize that the needs will vary for the individuals but also that there will be patterns that emerge in the same way as noted among the reasons why healthcare employees do not participate in the wellness programs.

One concept of behavioral economics is present bias which means that individuals give more valued weight towards payoffs that are closer in time than further away. In other words, individuals prefer immediate gratification to a delayed one when making decisions.

(O'Donoghue & Rabin, 1999). Another behavior economic theory would be Thaler's idea of nudging. Where it involves using subtle prompts or changes in the environment to influence people's behavior in positive ways. Nudges are designed to make it easier for individuals to make better decisions without limiting their freedom of choice. I will cover this section further in chapter 2.

1-G. Summary of Methodology

This study will employ a retrospective program evaluation data generated by Advocate Aurora, looking at participants and non-participants of the Advocate Aurora Healthy Living programs. By examining the participation of two groups, those who choose Foodsmart and those that do not, along with evaluating their BMI changes throughout the year.

All the participant data comes from Advocate Aurora's wellness vendor Asset Health. Asset health provides admins with access to all their wellness portals to view all activity taken by participants, incentives earned, and recorded biometrics. Including all weight/BMI stored there as well as all Healthy Living programs participation (Foodsmart, WW, Noom, etc..).

I will be assessing Foodsmart participants BMI changes compared with the other healthy living programs along with each of the following variables: age, gender, urban/rural employee, position, and location. The dependent variables are participation and BMI.

Descriptive statistics help us understand the details of our sample so a Paired t-test will be used to compare the mean of employees BMI pre-intervention and post-intervention.

Chi Square test will be used to determine whether employee's participation is affected by gender.

A Two sample T-test will be used to compare average of weight gained post intervention and the average of weight lost post intervention.

1-H. Limitations and Dissertation Overview

The drawback of this approach is that there will be no random assignment of participants to a group and there will be no control group. In addition, as Healthy Living programs are only for those employees on the corporate medical plan, the research will miss those employees who do not have Advocate Aurora health insurance. Moreover, there could be missing data that could affect the outcomes. And finally, this research will focus specifically on healthcare employees so it wouldn't be reflective of the general public.

Chapter 2: Literature Review and Conceptual Framework

2-A. Introduction and Contribution to Literature

There is a strong scientific premise for this research. The following are some strengths and weaknesses in prior research done.

According to Gorty, wellness programs have positive implications for the healthcare employees when participation is high, and the outcomes are measured and communicated. They further noted that membership ranges from 30-40%, indicating a need to further incentivize participation. Among the outcomes measured, there were not any significant changes in obesity rates between participants and non-participants. But one of the positive impacts was a decrease in the number of healthcare workers who used tobacco products. In addition, opportunities to engage in cardiovascular activities at work was one of the most well-received wellness programs, as it offered the participants an opportunity to move about the workplace and take a breath away from the rigorous work associated with their positions. Along with co-worker support and health literacy topics to improve nutrition and reduce unhealthy behaviors. (Gorty et al, 2016)

Moreover, according to an evaluation of wellness programs implemented at a nursing home facility to determine if the programs were beneficial based on the needs of these healthcare employees. The research noted that a high number of participations in these wellness programs were low-wage healthcare employees specifically women that could affect the results of a study. Due to many of them have families and second jobs that might affect their ability to make healthier behavior changes especially out of the workplace. Considering their work/family balance, personal free time, and their community. Therefore, EWPs should

not be limited to employee's involvement at work, but also should include community outreach, social involvement and consider work-life balance (Kernan et al, 2020)

Notably, in larger facilities where the programs were incentivized or well-communicated, there were some improvements relating to overall body mass and a reduction of tobacco use. However, these benefits were not significant enough to indicate the successful implementation of a wellness program for low-wage healthcare employees. They indicated a need to improve access and involvement in these programs at all levels of the healthcare system due to the significant demands of these positions and the implications for patient outcomes. (Kernan et al, 2020)

Furthermore, Edman explored the wellness program option of health coaching as individualized approaches to healthcare for employees. According to Edman, health system employees with chronic illnesses often let their own healthcare needs go to be available for their patients and colleagues. However, this has multiple negative implications for patient outcomes which can range from absenteeism to medical error. The research found that individualized health coaching sessions had positive impacts on body mass index, stress levels, and healthy lifestyle changes associated with cardiovascular risk factors. Notably, such a system requires scheduling and labor cost considerations, but this research found that there were numerous positive implications that justified these costs. In addition, Edman noted that this model requires a careful assessment of the needs of each healthcare employee to ensure that their individualized wellness program is appropriate and effective. (Edman et al, 2019)

Specifically, to Advocate Aurora, Dr. Fink assessed the impact of an incentivized employee wellness program on participation and weight. The results in this dissertation were

that there was a weight reduction in the obese population of employees at Advocate Aurora and that participation was unequal among demographics. (Fink, 2014) Dr. Fink also extensively researched obese employee participation patterns in the wellness program at Advocate Aurora. This research study retrospectively examined whether there were demographic differences between those who participated in an employee wellness program and those who did not. (Fink et al, 2016) In addition, identifying the selection of employees' choice in weight management activities. The data showed that participation was higher among females, whites, ages >50 years, and non-nursing staff. Participation varied significantly based on demographic variables and self-directed 5% weight loss was the most popular weight management activity selected. (Fink et al, 2016)

Geng and Maeng evaluated a similar program to Advocate Aurora at the Geisinger Health System (GHS). Like Advocate Aurora, GHS requires biometric screenings for blood pressure, body mass index, glucose, and cholesterol levels to be eligible for financial incentives. That study's objective was to determine the baseline employee characteristics associated with MyHealth Rewards participation and goal achievements. Their research showed that employees' baseline characteristics predicted the employee participation and goal achievement patterns in subsequent years. Indicating that participants' characteristics should be considered when implementing an employee wellness program. (Geng and Maeng, 2017)

Furthermore, according to an observational longitudinal study of 653 adults, between January 2015 to February 2021, to examine the benefits of digital nutrition interventions, specifically Foodsmart. The objective is to examine characteristics of people with dyslipidemia. Dyslipidemia refers to elevated total cholesterol, low-density lipoprotein cholesterol (LDL-C), or

triglycerides, or low levels of high-density lipoprotein cholesterol (HDL-C) The study evaluated how the participants' lipid profile changes over time as they incorporate Foodsmart's tools of education, meal planning and food ordering. The study showed that users of the Foodsmart digital platform showed improvement in their lipids over time. 54.1% (353/653) of participants had dyslipidemia at baseline, and of those, 36.3% (128/353) showed improvements in their lipid levels to normal by the end of follow-up. Participants with dyslipidemia at baseline were more likely to be older, male, and have a higher weight and BMI. Baseline obesity and Nutriscore were associated with a higher likelihood of achieving normal lipid levels. Between the start and end of using the Foodsmart platform, total cholesterol, cholesterol ratio, LDL-C, and triglycerides all significantly decreased, and HDL-C significantly increased. (Hu et al, 2021)

Similarly, another observational longitudinal study was conducted to examine weight loss and predictors of weight loss among individuals with obesity who are users of a digital nutrition platform, that integrates tools to provide nutrition recommendations and changes in the food purchasing environment grounded in behavioral theory. 8977 adults with obesity who used the digital Foodsmart platform, created by Zipongo, Inc, DBA Foodsmart between January 2013 and April 2020 were retrospectively analyzed by user characteristics and their associations with weight loss. Over a median (IQR) of 9.9 (0.03-54.7) months of enrollment, 59% of participants lost weight. Of the participants who used the Foodsmart platform for at least 24 months, 33.3% achieved 5% weight loss. This study found that a digital app that provides personalized nutrition recommendations and changes in one's food purchasing environment appears to be successful in meaningfully reducing weight among individuals with obesity. (Hu et al, 2020)

Consumer preferences for the use of an innovative menu solution in public canteen services in the UK, Greece, France, and Denmark were investigated. Participants from both control and test groups were first introduced to the Foodsmart app through a video clip as well as verbal explanations. The control group filled a questionnaire evaluating their preferences for the use of a technical menu solution in public food services straight away. Whereas the test group had the opportunity to experience the app adapted to a daily canteen menu in real-time before completing the questionnaire. The data collected was examined in both country-specific and collected manners. Participants in all four countries valued the canteen food quality the most, especially food hygiene, sustainability, safety, and freshness. Their preferences for other features such as app functions, information provision, and ethical issues varied in different countries. The knowledge gained from this study provides valuable lessons for the future design of a food-quality-focused digital menu solution in canteen services adapted to the specific country and population context to promote informed consumer food choices. (Chen et al, 2021)

Gaps in the Literature:

One of the most significant areas that is lacking in the current literature is a consensus as to how to align the health needs of healthcare employees to the offerings of the wellness programs in such a way as to encourage participation. Healthcare workers primarily indicate a lack of time for participation but also note that there are concerns about privacy and autonomy when the organization oversees the wellness program. Additionally, while there are obvious concerns relating to mental health and patient care, most of the healthcare workers asserted that their health was acceptable for providing care. In other words, the needs that are being expressed by the healthcare organizations are not aligned with the needs identified by the

healthcare employees. To increase participation in these programs, it is essential to understand what types of programs are perceived as beneficial among the healthcare employees. Without this knowledge then the costs associated with implementing these programs cannot be justified as the appropriate benefits will not manifest.

When it comes to drawbacks of this research there's a lack of direct access to the clients who participate in these employee wellness programs. Thus, the research will be based on quantitative data and an assessment of this data. Furthermore, data samples are smaller for rural employees that could lead to a bias in the data. Lastly the Covid 19 pandemic has placed a strain on employees and health care systems that may have led to less focus on employee wellness.

2-B. Description and Critique of Scholarly Literature

2-B1. Obesity in the Midwest:

Obesity patterns in the Midwest have resulted in a breadth of research aiming to identify the core relationships leading to the high prevalence of this public healthcare concern. According to this research, socio-demographic influences and disparities have been significantly linked to the prevalence of obesity within the Midwest regions (Patten et al., 2020). Sung and Etemadifar (2019) noted that the prevalence of obesity in the Midwest surpasses that of other regions across the nation with all other factors remaining consistent. In fact, they explained that a lower socioeconomic status leads to a higher prevalence of obesity. Pattern et al. noted that mood disorders can have the same impact. However, while the socioeconomic status was more prevalent in rural areas, the impact of the mood disorders had a greater association with obesity in the urban regions of the Midwest. Furthermore, the health outcomes were

significantly worse in the rural areas, despite a higher prevalence of mood disorders in urban regions of the Midwest. Implications of this study demonstrated the importance of a holistic approach to weight management and the improvement of health outcomes across the different socio-demographic influences. The researchers noted that obesity should be considered both in context with and separate from socioeconomic status based on the rate of mood disorders in a given location within the Midwest.

Lotfata (2022) integrated socioeconomic models along with other factors within the Midwest regions to better understand the prevalence of obesity, accordingly. The researcher identified a range of influences that compound to increase the prevalence of obesity in the Midwest. For example, individuals who have access to a private motor vehicle are less likely to experience obesity while those who live in a multigenerational home or in a home with a disabled family member and are without access to private vehicle are more likely to be identified as obese. According to Lotfata, the presence of tobacco use in the home is also a significant risk factor for obesity among all members of the family who reside within the home. The emphasize during the study was the variations of air quality in the Midwest which could affect physical activity levels and overall quality of health. The researcher noted that increased weight management programs in regions where air quality is lower should be considered as a policy for public health professionals and agencies. (Lotfata, 2022)

To narrow the issue of obesity in the Midwest to the implications within the healthcare profession, an exploration of the literature specific to this population was conducted. According to Mohanty et al., healthcare professionals are at a greater risk for metabolic disorders due to the higher prevalence of obesity within the profession. Furthermore, researchers found that, in

a cross-sectional study conducted in England, “obesity prevalence was high across all occupational groups including nurses, (25.1%) other healthcare professionals, (14.4%) non-health-related occupations (23.5%) and unregistered HCWs who had the highest prevalence of obesity (31.9%)” (p. 2570). Due to this high prevalence among healthcare workers, Mohanty et al. asserted that significant health awareness programs should be implemented to address the causes of obesity and present the risk factors associated with this health concern. The researchers explained that the range of healthcare issues that could be resolved by addressing obesity was significant enough to warrant any investment into such programs. Although this study was not specific to the Midwest region of the United States of America, the findings were relevant to the overall target population of healthcare workers. (Mohanty et al, 2019)

Brum et al. aimed to understand the causes for such a high prevalence of obesity among healthcare workers and found that those who worked long night shifts and workers who reported having minimal time to sleep were at a greater risk of obesity than their rested peers. Interestingly, while in the general population a lower socioeconomic status is often associated with a higher prevalence of obesity, Brum et al. found that the night shift healthcare professionals received a higher salary than their dayshift counterparts, placing them in a higher socioeconomic status bracket. Yet, this population contradicted the findings within the general population as the prevalence of obesity remained much higher. According to researchers, this demonstrated that the cause of the higher rate was specific to the hours of the shift work as well as the amount of sleep that the healthcare professionals received each day. Furthermore, they noted that quality of life measures was reported similarly in both day and night shift

healthcare employees, further suggesting that the primary cause of the increased prevalence of obesity was related to night shift work and less sleep. While this does not explain the overall increased prevalence of obesity across all healthcare professionals, it does provide insight as to the different influences on obesity within the target population. (Brum et al., 2020)

Noting a range of potential influences, Kelly, and Wills conducted a systematic review of the literature to determine if there was significant evidence to support a primary form of intervention to address the high prevalence of obesity among healthcare professionals.

Although the system level health promotion programs provided the greatest benefits in overall health, the researchers explained that there was no strong evidence to support any single intervention over the others. In fact, Kelly and Wills explained that the lack of evidence was due to the fact that the studies did not allow for adequate integration into the workflow. Therefore, although the healthcare professionals appeared to approve of the programs, the brevity of the studies did not provide adequate evidence to support a comprehensive recommendation. This systematic review of the literature provided significant insight as to the importance of a comprehensive change management plan and adequate time to ensure that the programs that are included in the research have been fully integrated into the working environment. As such, the review did not indicate that the programs would not be successful, but rather that more research should be conducted. (Kelly and Wills, 2018)

Through the review of the literature, it was noted that the Midwest, as a general assessment, has a much higher prevalence of obesity than other areas of the United States of America. It was then noted that healthcare professionals are more likely to be obese than other professionals. This was further aligned with healthcare professionals who work night shift and

do not get adequate amount of sleep. The implications of limited evidence to support an appropriate intervention offered further support for the current line of inquiry.

2-B2. Wellness programs:

Cheon et al explained that the concept of workplace wellness programs emerged through an understanding that the employees' overall well-being would ultimately affect their engagement and performance in the workplace. Additionally, researchers noted that the investment in the employees' health communicated a greater sense of value, further creating a sense of buy in relating to the overall mission and vision of the company. They added that improved health among the employees would result in a lower cost of healthcare as well as a lower turnover rate, lessening the costs associated with recruiting and onboarding new employees. Noting that the investment into the programs would be offset by these savings across the organization and the increase of productivity, they evaluated the success of the programs in achieving health outcomes and improvements across the organization. According to the study, the most effective wellness programs were not specific to a diagnosis or direct health outcome, but rather focused on overall health through the improvements in nutritional knowledge and intake. In fact, they found that these programs achieved improvements in four primary biomarkers to include systolic and diastolic blood pressure, glucose management, and cholesterol. According to Cheon et al, these areas of improvement in health measures have significant impacts on the health of the employees and the overall organizational outcomes. (Cheon et al. 2020)

Eskander et al. found that wellness programs that addressed holistic health were also beneficial for both the organizations and the employees. For instance, the researchers noted

that wellness programs that incorporated mental health strategies such as meditation led to an overall awareness of personal health and well-being, leading to other changes in health-based lifestyle behaviors. They noted that many wellness programs focus on directly providing the employees with a plan or a set of informational guidelines but explained that it is important to incorporate theories associated with learning and lifestyle choices in order to achieve the greatest impact from the investments in these programs. Careful design and implementation strategies, according to researchers, are necessary in order to transition the program from conceptualization to application and intended outcomes. Furthermore, they explained that programs should be guided based on these intended outcomes that are supported through research and observations. For instance, if burnout or absenteeism is at the core of the organizational concerns, then the evidence should support a program to address these areas based on the current health statuses within the organization's employee population. (Eskander et al. 2021)

To further substantiate the need to incorporate evidence into the development of an employee wellness program, according to a study by Harvard Business review, from 185 employees and their spouses who participated in cardiac rehabilitation and physical training 57% of those who were classified as high-risk moved into the low-risk category by the end of 6 months. Leading to lowering medical claims cost by \$1,421 per participant. Additionally, within 6 years, missing workdays declined by 80% and turnover decreased. Lowering workers comp insurance premiums by 50%. Concluding that healthier employees cost organizations less. (Berry et al., 2014)

Rezai et al. examined the costs associated with developing and implementing these projects. Noting these costs, it is critical that the program achieves the desired outcomes associated with the organizations and employees' needs. According to researchers, the investments in wellness programs have overall demonstrated significant benefits for all stakeholders, indicating that all organizations should implement some degree of emphasis on these programs. However, they noted that programs that are intended to improve multiple aspects of health might be overreaching, indicating a need to perform an organizational based assessment of the needs. (Rezai et al. 2020) This does not negate the findings of Eskander et al. who explained the importance of holistic health. However, it does acknowledge that emphasizing a health issue that is not prevalent might not be effective within an organization. (Eskander et al. 2021)

2-B3. Advocate Aurora wellness programs:

Advocate Aurora launched its Employee Wellness Program back in 2016 by asking employees to be weighed in to qualify for a decrease in their annual insurance premium. Advocate Aurora is trying to incentives participation in EWPs to help improve employee's health and reduce the overall healthcare cost. And by offering different EWPs, the chances of decreasing obesity go up and the overall health of employees improves, thus decreasing healthcare cost.

All EWPs are applicable to employees and spouses/partners who are enrolled in the health insurance plan. It does not include dependents; these employees and spouse/partner complete an online health assessment questionnaire and earn \$100 of the available \$600 reward. Next, the individual goes to a biometric screening where the following biometric data is

gathered: Height, weight, body fat composition, blood pressure, lipid profile to include cholesterol, HDL, LDL and a calculated cholesterol/HDL ratio, and fasting blood sugar. If the BMI and body fat composition were elevated, the employee and/or spouse/partner would not earn any more incentive rewards unless a Healthy Living program was completed. These Healthy Living programs are Weight Watchers, Noom, Health Management Resources (HMR), Healthy Together (for low BMI), Healthy Habits, Glooko (diabetes). For those with a BMI of 30 or more at the beginning of the program, a repeat biometric screening needed to be done at the end. Depending on the BMI/body fat at the end of the program, additional rewards may be earned.

Weight Watchers (WW)

Weight Watchers begins with an online assessment. From this assessment, a personalized plan provides insight into a participant's overall wellness. The plan takes into account an individual's food preferences, activity level, sleep habits, and lifestyle. The plan identifies areas of strength and development opportunities with targets in four primary categories: Food, Activity, Sleep, and Mindset.

For Food, the participant is assigned to one of three categories: Blue, Purple, Green.

Green has a large SmartPoints budget and 100+ZeroPoints

Blue has a moderate SmartPoints budget and 200+Zero Points

Purple has a modest SmartPoints budget and 300 + ZeroPoints

To elaborate on the point system, a point budget is composed of Daily SmartPoints and Weekly SmartPoints. The SmartPoints budget is determined by age, gender, weight, and height. Each food and drink are assigned a SmartPoints value. Calories are the baseline. Saturated fat and sugar increase the SmartsPoint value, while protein decreases it.

Up to 4 unused SmartPoints can be rolled over into the bank of “weeklies”. These points are tracked in a WW app that the participant uses. The Weekly SmartPoints are there if needed for food breaks such as a birthday celebration. The Weeklies can be used all at once, not at all, or in portions. They are not carried over to the next week.

ZeroPoint foods are a list of foods that are healthy such as fruits, vegetables, lean meats, and whole grains. These foods are assigned no points. There is no need to weigh, measure or track them. In addition to these nutrition goals, water goals are established for the individual.

WW members have access to WW menus and recipes. Each recipe indicates the number of points assigned to that recipe. For example, a lean meat recipe may have 2 points, while a hamburger recipe would have 7 points. The assigned points can be used anyway the member chooses; no food is off limits.

WW members automatically earn “Wins” for building healthy habits. There are six different ways to earn Wins. They are:

Tracking breakfast, tracking lunch, tracking dinner, tracking activity, completing a sleep reflection, or manually tracking sleep in the app and, Weighing in.

Fitness goals are in three main categories: Strength, Aerobic, Stretching. Fitness goals are again based on age, gender, height, and weight. Fitness videos and articles are available to the participants. Sleep or completion of a sleep reflection is also tracked. Each week, a check-in card appears on the app for the weigh-in day. The check in tracks weight, provides reflection on the week, shows progress reports in all categories, and allows for a future goal to be set.

Up to 200 wins can be earned each week. These wins can then be redeemed for rewards such as gift cards, kitchen supplies, fitness gear, etc.

Wins can be earned depending on the category. For instance, a participant can earn five wins per day for physical activity, five wins for a sleep reflection, and five wins for meeting meal goals. The largest category is weight loss where one can earn 25 or 50 wins with the weight check-in. There are also bonus wins if your habits are tracked consistently.

In the Healthy Living Support program at Advocate Aurora, Weight Watchers is available at no cost to participants if enrolled in and attends 10/12 weekly Wellness Workshops either in person or virtually. On completion of the program, \$300 is added to the employee's paycheck. For those with a BMI of 30 and greater, an additional \$200 can be earned if there is either a 5% weight improvement, BMI less than 30 or body fat percentage is within the health range for that individual on a repeat biometric screening.

Healthy Habits

Advocate Aurora has partnered with InSpera Health to offer an in-person, online program called Healthy Habits. The focus of this program is on changing behaviors in four areas: Getting more active, making healthier food choices, stress management and sleep improvement. There are two main paths: Healthy Habits Essentials and Healthy Habits Honors. Healthy Habits Essentials is a four-month program that creates a foundation in establishing healthy habits. Healthy Habits Honors is a 12-month program that provides additional support around these four areas to make change sustainable. Advocate Aurora requires a 3-month minimum engagement.

The program provides members an individualized readiness for change assessment, guided online health education courses, health improvement coaches and peer support. Members receive unlimited health improvement coaching. Each course consists of a weekly

education topic that includes a live session and skill building. The reward for completing Healthy Habits as part of the Healthy Living Program is available after the completion of 8 courses in the program, and at least 8 weekly weight and activity minutes logs, and 1 required coach meeting.

Noom

Noom is another Healthy Living program. Noom touts itself as the last weight loss program you'll ever need (Cassetty, 2021). As with most other wellness programs, the focus is on weight management, particularly weight loss.

The Noom app is a behavioral lifestyle approach that helps guide the participant to develop healthy eating habits. As with the other programs, the participant will answer a series of online questions to address current weight, health concerns, and lifestyle such as eating in vs eating out, and office work vs more active work. From here a coach is assigned and eating recommendations made. Coaching is also provided to help reach achievable goals and to keep the participant accountable. There are built-in tools to assist with tracking physical activity, food, blood pressure and blood sugar. Advice comes in the form of quizzes and quick tips. Noom divides food into three categories based on their nutrient count: red, green, or yellow (Watson, 2021). Noom focuses on calorie dense foods. No foods are off limits, but the app guides the participant toward choices that are lower in calories and higher in nutrition. It's suggested to limit the number of red foods because they are higher in calories and meant to be eaten in smaller amounts. Green foods contain the most nutrients and should make up the bulk of the participant's diet.

Health Management Resource (HMR)

Through Advocate Aurora, HMR is a 12-week program of structured nutritious, low calorie meal replacements, with additional healthy foods such as fruits and vegetables purchased independently. The meal program consists of low-calorie shakes, nutrition bars, multigrain hot cereal and meals provided by HMR. Meals and snacks are delivered to the participants.

HMR uses the "three-two-five" daily diet plan. That means a minimum of three HMR shakes, two HMR entrees and five 1-cup servings of fruits and vegetables. If the participant is hungry, he/she can eat more of these low-calorie foods and still lose weight. HMR foods can be mixed and matched. The replacement meals are encouraged to be available at home, work, and anywhere the participant goes. This will reduce the temptation to eat unhealthy foods.

Participants are encouraged to avoid fast food and coffee shops as well as any social activities where food is the center.

The goal of the meal replacement program is weight loss and lifestyle changes. Group coaching and online support along with an increase in physical activity are other objectives of the program. Recipes are accessible through HMR for an individualized cookbook. To obtain Healthy Living awards through Advocate Aurora, participants must participate in 10 out of 12 weekly group meetings, either in person or virtual.

HMR meals cost \$13 to \$15 per day. However, the participant is not shopping for food at a grocery store other than fruits and vegetables. Advocate Aurora will reimburse \$500 upon program completion.

For all the above programs, incentives are built into the Advocate Aurore Healthy Living program. All employees and their spouse/partners who complete an initial online assessment earn \$100 that is paid on their paycheck. Everyone is offered to take a biometric evaluation of height and weight for people with a BMI of 25 to 25.9, they earn an additional \$200. Once they complete a Healthy Living program, another \$300 is paid on their paycheck. For those individuals with a BMI 30 or above, they earn \$300 for completing a Healthy Living program. To earn additional rewards, a biometric screening

Foodsmart

In 2022, another Healthy Living program was added called Foodsmart. The genesis of this program is to address the increased population of both remote and traditional in-house employees. For the remote employee, company cafeterias are not as accessible to employees as in the past, especially since Covid 19 resulted in an increase in the population of tele-commuting employees. To address these needs, Foodsmart offers a tele-nutritional service. The primary objectives of Foodsmart are to first reduce barriers to healthy food and second, educate consumers on smarter nutritional choices to improve health outcomes.

Foodsmart provides tools where employees can meet with a registered dietician who completes a health and nutritional assessment then personalized meal plans are customized to a person's goals. The meals are turned into a grocery list that is linked with major retailers such as Walmart and Instacart. For those individuals who don't like to cook, ready-made meals are available through SunBasket and Plantable. Grocery lists and discounts are synced to the Foodsmart app on a client's phone. In addition, individualized cookbooks can be created with recipes the client prefers.

2-C. Theoretical/Conceptual Framework

The theoretical framework that directs this study is founded in the Self-care Theory presented by Dorothea Orem. According to the theory, individuals aim to maintain their health but are often without the adequate knowledge and resources to achieve such a goal (Denyes et al., 2001). Furthermore, Denyes et al. explained that the scientific nature of the nursing professional leads to the identification of these deficits and the most appropriate measures to ensure that the patients can meet these needs through evidence-based supports. Noting the significance of self-care, the role of the healthcare professional then becomes to fill the gap between current status and the status of resources and knowledge necessary to ensure the continuity of care beyond the patient status. (Denyes et al., 2001) According to Callaghan, this is achieved by educating and encouraging the patient in health promoting behaviors. While, in many instances, the gap between self-care and the need for external care exceeds the general factor of knowledge and encouragement, promoting such behaviors has repeatedly been proven to lead to improvements in overall health and well-being statuses. (Callaghan, 2003)

Martínez et al. conducted a concept analysis to help to integrate the theory into research and practice. According to the analysis, it is essential to first identify the gaps in current status and desired status. This is achieved in this study by identifying obesity as the current status and weight management as the desired outcome of the wellness program. (Martínez et al., 2021) Multiple factors were then identified as being relevant to achieving the desired outcomes of the program. Firstly, Martínez et al. established awareness as a critical point of any intervention. According to the researchers, all aspects of self-monitoring and self-control are dependent on the awareness of the implications of the current status. (Martínez et

al. ,2021) In other words, the program should communicate the health risks associated with obesity. Self-control is then identified as a factor associated with outcomes, noting that colleague support in wellness programs can help to better promote self-control. Self-reliance determines the willingness of the individual to promote their own health under the conceptualization of the theory. Through these factors, the self-care theory can be integrated into the development and as is the case of the current study, analysis of wellness programs.

Yip explained that the self-care theory provides insight as to how to improve health outcomes beyond the healthcare environment to include social and environmental factors. Yip further noted that the concept of self-care should be assessed through the availability of resources and support for integrating necessary changes. (Yip, 2021) From this area of literature, the development of conceptualization can be achieved. As noted by Denyes et al. there is a need to assess both resources and knowledge for the patient, which, in this case, is defined as the healthcare professionals. (Denyes et al. ,2001) Although knowledge of healthcare issues associated with obesity and recommendations is embedded into the profession, the application and support of that knowledge into a self-care routine is notably lacking. As socioeconomic status was not directly associated with obesity in the target population, then the resources necessary for self-care are not financial but rather in the necessary supports for a healthier lifestyle. This then draws on the need for support and encouragement to apply the knowledge of healthy lifestyle behaviors as a form of self-care. As such, the deficit to address in the healthcare profession relating to self-care and obesity is found in the need for support and empowerment to provide self-care to the self as the patient.

In addition to knowledge and resources, it is important to also include the notion of attitude or perceptions of the program. One concept of behavioral economics is present bias which means that individuals give more valued weight towards payoffs that are closer in time than further away. In other words, individuals prefer immediate gratification to a delayed one when making decisions. (O'Donoghue & Rabin, 1999). According to Middleton et al , this emphasis on the immediate gains has been applied to a variety of discourses, under the notion of task prioritization. (Middleton et al.,2018), For healthcare employees, Middleton et al. noted that task prioritization often comes through the expectation to focus all efforts on patient care to achieve immediate results in their health outcomes. (Middleton et al., 2018), While this indicates that the healthcare professionals are focused on the needs of the patients, it also means that they are less likely to prioritize their own needs for self-care.

Additionally, Middleton et al. explained that, even when self-care is evident, the behavioral changes are most aligned with immediate results rather than long term health. Although the healthcare professionals are knowledgeable about preventative strategies to improve long term health and well-being, the limited time allotted for self-care leads to the perception that quick results are preferable. (Middleton et al. ,2018), According to O'Donoghue and Rabin, however, instant gratification measures often lead to long term deficits. The goal, then, must be to integrate small changes and goals that will translate to long term health behavior changes rather than immediate results that will not yield the desired results. (O'Donoghue and Rabin ,1999)

The following model can then be used to align the inquiry into the effectiveness of identified health promotion programs:

- The healthcare promotion program should identify the associated deficits of support and empowerment to implement self-care practices that mitigate the prevalence of obesity.
- The healthcare promotion program should ensure that the knowledge relating to the patients' self-care is presented in such a way as to identify the healthcare professional as the patient.
- The healthcare promotion program should empower the healthcare professional to utilize the knowledge and support available to address the deficits in self-care.
- The healthcare promotion program should emphasize the importance of long-term outcomes over immediate results. (O'Donoghue and Rabin, 1999)

The primary emphasized area in this model relates to the ability of the healthcare professional to recognize both themselves as the patient and the need for self-care to perform their duties as a healthcare provider. The balance between the responsibility to the self and the duty to the profession must be communicated in such a way as to empower the healthcare professionals to improve their health outcomes.

Furthermore, when it comes to encouraging lifestyle changes to help support one's health and wellness, "Nudging" is a concept developed by Richard Thaler, a Nobel Prize-winning economist and professor at the University of Chicago. Thaler's idea of nudging involves using subtle prompts or changes in the environment to influence people's behavior in positive ways. Nudges are designed to make it easier for individuals to make better decisions without limiting their freedom of choice. By understanding how people make decisions, Thaler suggests that

nudges can be used to help people make better choices, such as saving more money, eating healthier, or being more environmentally conscious. (Arno and Thomas, 2016)

Nudging by Richard Thaler can be applied in taking care of someone's own health in various ways. One way is by using default options to encourage healthy behaviors. This is where a particular option is set as the default choice, and people have to actively choose something different if they want to deviate from it. For instance, setting healthy food options as the default in vending machines or offering healthy side dishes as the default option in restaurants can nudge people towards making healthier choices without limiting their freedom of choice. (Arno and Thomas, 2016)

Another way is by using social norms to encourage healthy behaviors. By highlighting what other people are doing, Thaler suggests that we can encourage people to make better decisions. For example, displaying posters or signs in public spaces that promote healthy habits like regular exercise, taking the stairs instead of the elevator, or drinking more water can encourage people to adopt these behaviors as they see others doing the same. Additionally, it can be used to encourage regular health check-ups and screenings. For instance, sending reminders to individuals about their upcoming check-ups or offering incentives for those who complete their screenings can nudge people towards taking a proactive approach to their health. (Arno and Thomas, 2016)

Finally, nudging can also be used to promote healthy habits in the workplace. Providing healthy snacks in the break room, encouraging standing, or walking meetings, and offering incentives for employees who take the stairs instead of the elevator are all examples of how nudges can be used to promote healthy behaviors in the workplace. Overall, nudging is a

powerful concept that has gained popularity in recent years. It can be a powerful tool for promoting healthy behaviors in individuals by making it easier for them to make healthier choices without limiting their freedom of choice. By understanding how people make decisions, we can design nudges that encourage healthy habits that help us make better choices leading to better health outcomes, resulting in more fulfilling lives (Arno and Thomas, 2016).

Chapter 3: Methods

3-A. Introduction

The purpose of Chapter Three is to provide an in-depth discussion as to the methods utilized within the study to address the primary research questions as follows:

Q1: What are the demographics of the new Advocate Aurora Foodsmart program participants compared to the other Advocate Aurora Healthy Living programs?

Q2: What is the success of the new Foodsmart program measured by BMI compared to the other programs?

This chapter provides the methods employed to achieve the aims of the study as defined:

Aim 1: To examine the demographics of employee participation in Advocate Aurora's employee wellness program Foodsmart (EWPs) compared to other programs.

Aim 2: To examine the success of weight loss amongst overweight/obese employees measured by BMI per participation in the new Foodsmart program to the other healthy living programs including Weight Watchers (WW), Health Management Resources (HMR), Healthy Habits and Noom).

Additionally, the methods selected are justified to meet the purpose of the study which is to evaluate the effects of Advocate Aurora’s healthy living program “Foodsmart” on weight loss amongst overweight/obese employees measured by BMI (Body Mass Index) in comparison with their other healthy living programs. The results of this research will help determine the value of employee wellness programs (EMPs) on employee’s weight loss, and overall health and well-being along with ways to encourage participation.

The significance of the chapter relates to the ability to replicate the study through the current data as well as for other wellness programs in the Midwest and across the United States. Furthermore, the chapter provides an overview of the processes that will be used to address the anticipated limitations of the study, which will further be expressed through the final chapters of the report.

The chapter begins by presenting the design of the study as a retrospective program evaluation. This description will allow for future researchers to utilize the same data for analysis or to apply the methods to other data in the same processes to strengthen or counter the findings of the current inquiry. This will then lead to the discussion of the predictor and criterion variables to provide greater insight as to the decisions made during the data selection processes. Procedures and statistical analysis methods are then justified through the association of current literature to provide a foundation for ongoing research. Finally, the chapter recognizes the limitations of the methodology and provides an assessment as to the planned approach to mitigate these limitations.

3-B. Participants and Setting

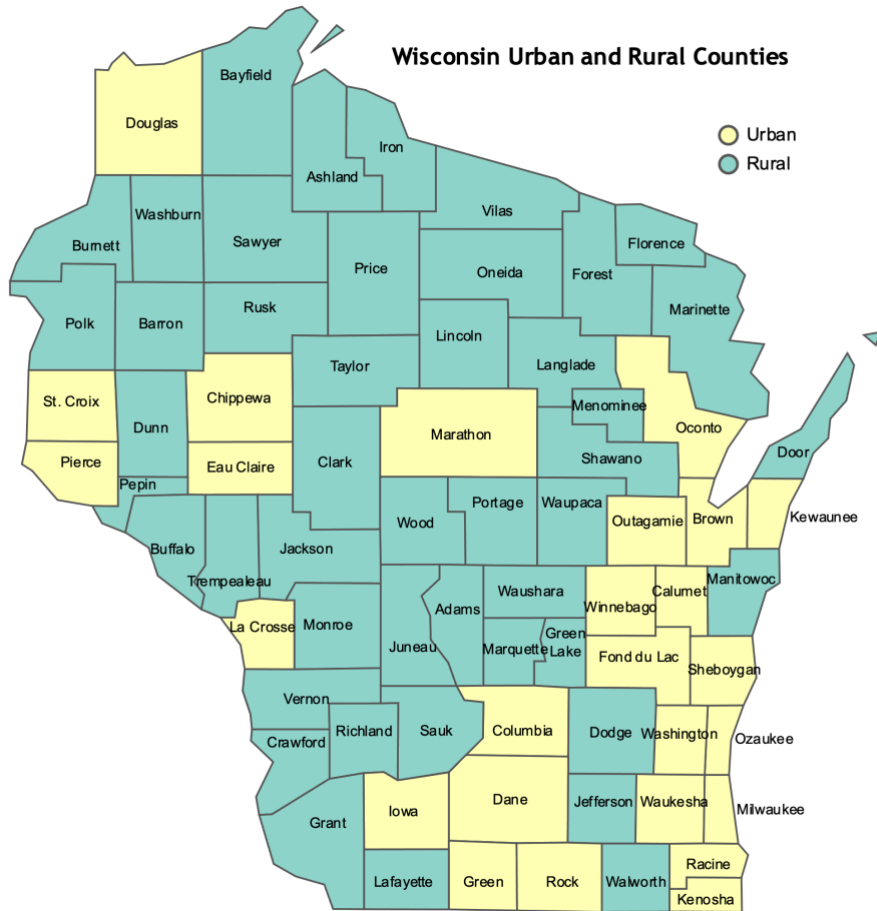
The population to be studied are Advocate Aurora employees who have completed an online assessment, biometric screening, and participation in a wellness program. The sample size will consist of those Advocate Aurora employees, ages 18 and over, who are on the employer's corporate health insurance plan and are full-time, part-time or contracted.

This analysis is multivariate as participation, weight, and wellness program selection of pre, and post intervention are being analyzed. The impact of the intervention will be assessed by comparing the average of employees pre and post BMI.

When obtaining the sample, I will apply several inclusions and exclusions to the sample. I will exclude employees under the age of 18, those who aren't covered by Advocate Aurora's insurance policy, employees who selected, signed up yet failed to complete the program, and those who are participating in "Glooko", "Healthy Together", and "Healthy Mom and Baby" programs. Employees with a normal BMI would not have the opportunity to participate in Foodsmart or any support program. They are only offered to those with a BMI of 25+, therefore, those with a BMI below 25 will be automatically excluded.

On the other hand, I will restrict the sample to active employees covered by the Advocate Aurora insurance who are 18 years old or older. I will also restrict my analysis of the rural and urban breakdown of employees to Wisconsin residents.

The urban and rural areas will be determined based on the zip code of participants following the guidelines of the Wisconsin Interactive Statistics on Health (WISH). The following map shows the classification of urban and rural areas.



Map.1 (WISH) Wisconsin Urban and rural counties 2022

The following tables are the data and demographic breakdown:

Gender	Male Female
Age	18-25, 25-35, 35-45, 45-55, 55-65 and ≥65years
BMI	18<, 18-25, 25-30, 30-35, 36-40 and ≥40
Position	Group1 Non-Clinical Group2 Clinicians
Zip Code	Urban Rural

Table.2 Data Demographic Breakdown

3-C. Design

This study will employ a retrospective program evaluation data, looking at participants and non-participants of the Advocate Aurora Healthy Living programs. By examining the participation of two groups, those who choose Foodsmart and those that do not, and evaluating their weight/BMI changes from 2022 to 2023.

All the participant data comes from Advocate Aurora's wellness vendor Asset Health. Asset health provides admins with access to all their wellness portals to view all activity taken by participants, incentives earned, and recorded biometrics. Including all height/weight/BMI/bodyfat metrics stored there as well as all Healthy Living programs participation (Foodsmart, WW, Noom, etc..). The wellness department is composed of primarily Registered Nurses, Registered Dieticians, and Health and Wellness employees.

I will be assessing Foodsmart participants and non-participants BMI changes for each of the following variables: age, gender, urban/rural employee location based on their zip code, and position. The dependent variables are participation and BMI.

Hess (2004) explained that the retrospective study design is most appropriate when the researcher must depend on existing data due to the nature of the inquiry or the time required to gain adequate empirical data would exceed the time allotted for the research. Although it was acknowledged that prospective studies are often deemed preferable, the retrospective study design is appropriate when the data utilized has been collected, stored, and retrieved with transparency. Furthermore, it is notable that a prospective study design would not adequately address the presented research questions and aims of this study, as the participation in the program would not yet yield adequate results to deliver comprehensive

findings. Notably, an empirical or prospective study should follow the current inquiry in order to gain more insight as to the effectiveness of the program and the rate of participation. However, for the current inquiry, based on the literature, the retrospective study design is most appropriate.

3-D. Predictor and Criterion Variables

Noting the inclusion of both Foodsmart participants and non-participants in the statistical analysis, the predictor and criterion variables are identified as the pre and post BMI measures based on the demographic factors identified. According to these variables, the primary outcomes will be measured through the changes in the BMI data. Participation status will then be applied to the variations of BMI to identify the significance of the program on the changes. Independent analysis can then be conducted for comparison of age, gender, urban/rural employee location, and position. The overall findings from the demographic variables will be calculated from the participation status data, accordingly. The selection of the variables was guided by the models presented by Braun and Oswald (2011) who explained that any number of variables could serve as a predictor variable, with the decision being guided by the purpose of the research and the research questions. For instance, changes in BMI from a set level would require the inclusion of the BMI as a predictor. In other words, if the goal was to determine if the program was more effective for individuals at a certain onset BMI, then the participation and demographic factors would not be indicated. Furthermore, Braun and Oswald (2011) explained that relative importance must be weighed to determine the associations identified in the statistical model. In the current study, the emphasis is placed on the participation variables. However, this does not mean that the demographic factors are not

considered. Instead, the relative importance of these variables is given less emphasis in the primary data sets.

I will be combining all data sets provided by Advocate Aurora Wellness Department to one data set for this dissertation. Employees data will include Gender, Age, BMI, Position, and Location by zip code (Rural/Urban) following the guidelines of Wisconsin Interactive Statistics on Health (WISH). Along with participants and non-participants of the Healthy living programs including Weight Watchers (WW), Health Management Resources (HMR), Healthy Habits, Noom and Foodsmart

The hypothesis is that this research will show that the individuals in the Foodsmart program tend to be a younger demographic compared to the other Health Living programs. A second anticipated outcome In the state of Wisconsin most Advocate Aurora EWP's participants reside in Urban areas. And lastly, participation of overweight/obese employees helps decrease/maintain their weight.

3-E. Procedures

Data was provided by Advocate Aurora. All employee information was de-identified for analysis. All employee's dataset is stored in the Healthy Living Portal managed by Advocate Aurora's vendor "Asset Health". All biometric records and Healthy Living program options are accessible through there. The data set collected included gender, age, location, position, weight, and BMI.

Dataset for participants and non-participants in Advocate Aurora's Healthy living programs including Weight Watchers (WW), Health Management Resources (HMR), Healthy Habits, Noom and Foodsmart. BMI data will be broken into categories of >18, 18-25, ≤25-30,

31-35, 36-40 and ≥ 41 . Gender (Male and Female). Position into 2 groups, Group 1 Non-Clinical employees, Group 2 Clinical. Age will be grouped as 18-25, 25-35, 35-45, 45-55, 55,65 and ≥ 65 years. Location based on zip code (Rural/Urban) will be based on the guidelines of the Wisconsin Interactive Statistics on Health (WISH).

3-F. Statistical Analysis

Descriptive statistics help us understand the details of our sample so Paired t-test was used to compare the mean of employees BMI pre-intervention and post-intervention.

According to Fisher and Marshall (2009), descriptive analysis is most appropriate when analyzing comparative or continuous intervals between variables.

A Two sample T-test was used to compare average of weight gained post intervention and the average of weight lost post intervention.

Chi Square test was used to determine whether employee's participation is affected by gender.

The Chi Square test, according to Ugoni and Walker (1995), provides for categorial analysis of multiple variables by identifying the frequencies of variable placements.

3-G. Methodological Limitations

The drawback of this approach is that there will be no random assignment of participants to a group and there will be no control group. Moreover, There could be missing data that could affect the outcomes. In addition, as Healthy Living programs are only for those employees on the corporate medical plan, the research will miss those employees who do not have Advocate Aurora health insurance. Finally, this research will focus specifically on healthcare employees so it wouldn't be reflective of the general public.

Chapter 4: Findings

4-A. Organization

The current study focuses on evaluating the effectiveness of the "Foodsmart" program, a healthy living initiative by Advocate Aurora, in managing obesity among healthcare workers. This research is significant for its contribution to the fields of health promotion/education and behavioral economics, particularly within the context of the Healthy People 2030 initiative. Prior research has demonstrated the efficacy of health and wellness programs in various contexts, though a variety of factors impact such efficacy (Merrill & Sloan, 2014; Michas, 2021; Tsai et al., 2019). The primary purpose of the research is to examine the impact of the "Foodsmart" program on weight loss among overweight or obese employees, in comparison with other wellness programs offered by Advocate Aurora. This involves assessing changes in Body Mass Index (BMI) of the participants. The study aims to determine the effectiveness of Employee Wellness Programs in improving employees' overall health and well-being and to encourage participation. The study is structured around two main aims:

Aim 1: To examine the demographics of employee participation in Advocate Aurora's employee wellness program "Foodsmart" compared to other programs.

Aim 2: To examine the success of weight loss amongst overweight/obese employees, measured by BMI, per participation in the new "Foodsmart" program compared to other healthy living programs including Weight Watchers (WW), Health Management Resources (HMR), Healthy Habits, and Noom.

The research questions are designed to understand the relationship between health-care deficits, behavioral economics, and participation in wellness programs among healthcare employees. This quantitative research study will be conducted through the analysis of "Foodsmart" biometric data, as compared to Noom, HMR, Healthy Habits, and Weight Watchers. The study addresses the following research questions:

Q1: What are the demographics of the new Advocate Aurora "Foodsmart" program participants compared to the other Advocate Aurora Healthy Living programs?

Q2: What is the success of the new "Foodsmart" program, measured by BMI, compared to the other programs?

This approach helps in understanding the behavioral aspects influencing healthcare employees' participation in wellness programs and the effect of immediate versus delayed gratification in decision-making processes. The study employs a retrospective program evaluation of data generated by Advocate Aurora, comparing participants and non-participants of the Advocate Aurora Healthy Living programs. It will assess the BMI changes of "Foodsmart" participants and non-participants, considering variables such as age, gender, urban/rural employee location, and position. Descriptive statistics, paired t-tests, chi-square tests, and two-sample t-tests will be utilized for data analysis.

In this study, the theoretical framework integrates three key concepts: the Self-care Deficit Theory, Behavioral Economics, and the principles of Present Bias and Nudging. This framework provides an improved understanding of the factors influencing healthcare workers'

participation in employee wellness programs and their subsequent impact on health outcomes. The Self-care Deficit Theory, developed by Dorothea Orem, plays a pivotal role in the study. This theory posits that individuals are naturally inclined to engage in self-care but may lack the necessary resources or awareness to do so effectively. In the context of healthcare workers, the theory is particularly relevant. These professionals often focus intensely on the health of others, potentially overlooking their own self-care needs. The theory suggests that a lack of self-care among healthcare workers can lead to decreased personal health and well-being, which may subsequently impact their ability to provide high-quality care to patients. In applying this theory to the study, the researchers aimed to identify the self-care deficits among healthcare workers. This involved examining the extent to which these employees participate in wellness programs and the barriers they face in maintaining their own health and well-being. The Self-care Deficit Theory guided the research in understanding the reasons behind low participation rates in EWPs among healthcare workers and in exploring ways to address these deficits.

Behavioral Economics, which intersects psychology, economics, and marketing, was employed to understand how healthcare workers make decisions regarding their health and participation in wellness programs. This aspect of the theoretical framework was crucial in identifying the psychological and economic factors that influence decision-making processes in the context of health and wellness. The study utilized the principles of Behavioral Economics to analyze how healthcare workers perceive the benefits of participating in EWPs. This involved examining the incentives and barriers within their decision-making environment and understanding the cognitive biases that might influence their choices. The framework helped in

assessing the effectiveness of various elements of EWPs, such as the ease of access, the perceived benefits, and the costs associated with participation.

Present Bias, a concept within Behavioral Economics, refers to the tendency of individuals to prioritize immediate rewards over future benefits. This concept was crucial in understanding the motivations of healthcare workers in participating in EWPs. The study investigated whether immediate incentives or rewards could increase participation in the "Foodsmart" program, as opposed to long-term health benefits that might seem less tangible.

Nudging, as proposed by Richard Thaler, involves subtle prompts or environmental changes that influence behavior positively without restricting freedom of choice. In this study, nudging was explored as a strategy to encourage healthcare workers to participate in EWPs. The researchers examined how small, strategic changes in the environment or program structure could make it easier for employees to choose healthier behaviors. This included assessing the impact of various types of nudges, such as reminders, simplifying enrollment processes, and offering immediate rewards, on the participation rates in the "Foodsmart" program.

The integration of these theories provided a multi-dimensional perspective on the challenges and opportunities in promoting health and wellness among healthcare workers. The Self-care Deficit Theory helped in identifying the specific areas where healthcare workers might be neglecting their health. Behavioral Economics offered insights into the decision-making processes influencing their participation in EWPs. Present Bias and Nudging concepts provided practical approaches to structure the EWPs in a way that appeals to the immediate needs and preferences of healthcare workers. By applying this theoretical framework, the study aimed to

achieve a better understanding of the factors that influence healthcare workers' participation in EWPs. This understanding was pivotal in evaluating the effectiveness of the "Foodsmart" program and in developing strategies to enhance the impact of EWPs on the health and well-being of healthcare workers. The integration of these theoretical concepts enabled a nuanced analysis of the complex interplay between individual behaviors, organizational structures, and health outcomes.

4-B. Discussion of Findings

4-B1 Participation based on Location: Wisconsin Urban vs Rural Classification

The classification of healthcare employees as urban or rural was determined by the zip codes of the employees'/participants of Advocate Aurora Hospital healthcare EWPs (in five wellness programs: Foodsmart, Weight Watchers (WW), Health Management Resources (HMR), Healthy Habits, and Noom.) in the state of Wisconsin.

Based on the guidelines of the Wisconsin Interactive Statistics on Health (WISH). There were 25 urban counties and 46 rural counties as shown in the table and map below.

Urban Counties			Rural Counties		
Brown	Iowa	Pierce	Adams	Iron	Portage
Calumet	Kenosha	Racine	Ashland	Jackson	Price
Chippewa	Kewaunee	Rock	Barron	Jefferson	Richland Rusk
Columbia	La Crosse	St. Croix	Bayfield	Juneau	Sauk
Dane	Marathon	Sheboygan	Buffalo	Lafayette	Sawyer
Douglas	Milwaukee	Washington	Burnett	Langlade	Shawano
Eau Claire	Oconto	Waukesha	Clark	Lincoln	Taylor
Fond du Lac	Outagamie	Winnebago	Crawford	Manitowoc	Trempealeau
Green	Ozaukee		Dodge	Marinette	Vernon
			Door	Marquette	Vilas
			Dunn	Menominee	Walworth
			Florence	Monroe	Washburn
			Forest	Oneida	Waupaca
			Grant	Pepin	Waushara
			Green Lake	Polk	Wood

Table.3 Wisconsin Urban vs Rural Counties

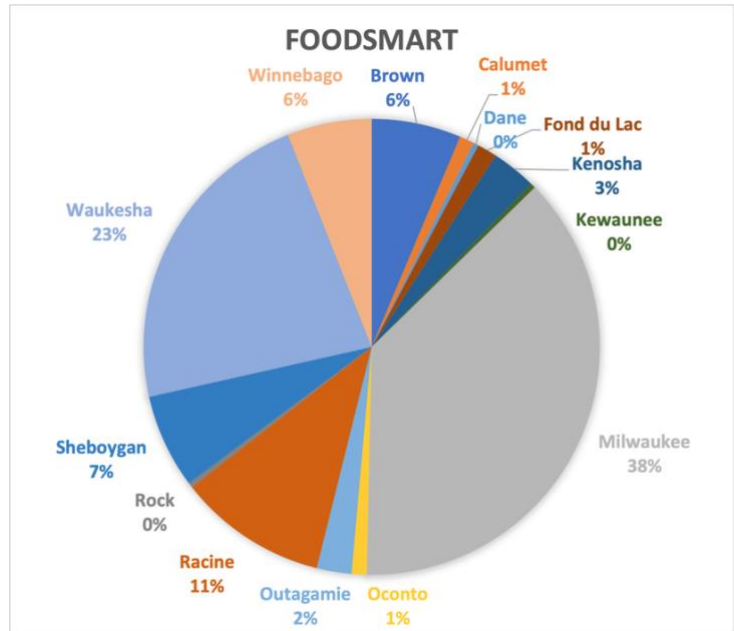
Urban Counties	Foodsmart	Healthy Habits	HMR	WW	Noom
Brown	18	3	3	58	125
Calumet	3			5	6
Dane	1			2	
Fond du Lac	4	2	1	13	15
Kenosha	9		5	49	74
Kewaunee	1	2		8	17
Milwaukee	107	5	32	277	584
Oconto	3			3	10
Outagamie	7			8	14
Ozaukee			11	34	103
Racine	30		9	63	138
Rock	1	2		3	3
Sheboygan	19	2	9	52	88
Washington		1	21	56	126
Waukesha	64	1	25	160	313
Winnebago	17		7	27	70
Urban Total	284	18	123	818	1686
Rural Counties	Foodsmart	Healthy Habits	HMR	WW	Noom
Dodge	3	3		11	15
Grant		3			
Jefferson	1	3	1	6	11
Lafayette				1	
Manitowoc	9		1	37	61
Marinette	6		2	7	26
Marquette				1	1
Oneida				1	
Shawano	1			7	4
Vilas		1		2	
Walworth	11	1	5	25	69
Waupaca				2	1
Waushara				2	1
Rural Total	31	11	9	102	189
Total	315	47	255	1738	3561

Table.4 Wisconsin Urban and Rural Employees' Count

Findings on Wisconsin Urban Employee Participation:

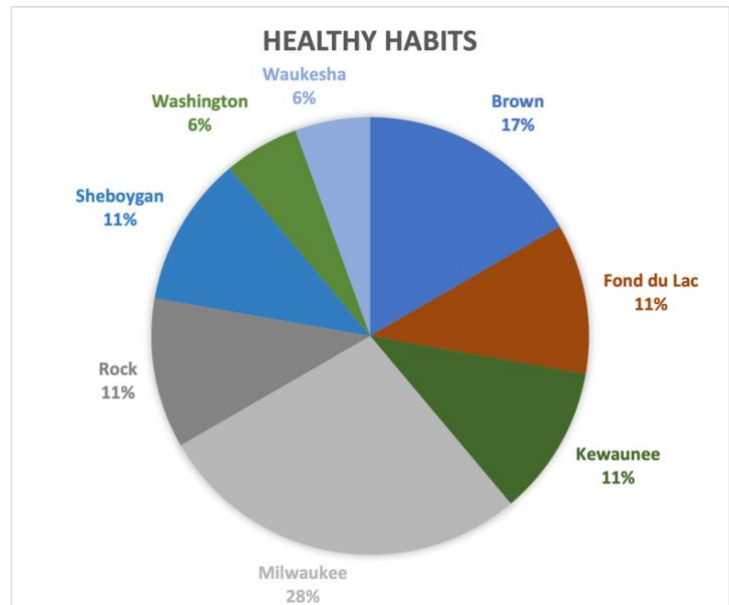
- *Participation in Foodsmart:*

The highest percentage of urban employees who selected Foodsmart were Milwaukee residents at 38%. This was followed by Waukesha residents at 23% , 11% in Racine, 7% Sheboygan, 6% Winnebago, 6% Brown, 3% Kenosha, 2% Outagamie, 1% Fond du lac, and 1% Calumet. See [Graph.1a](#)



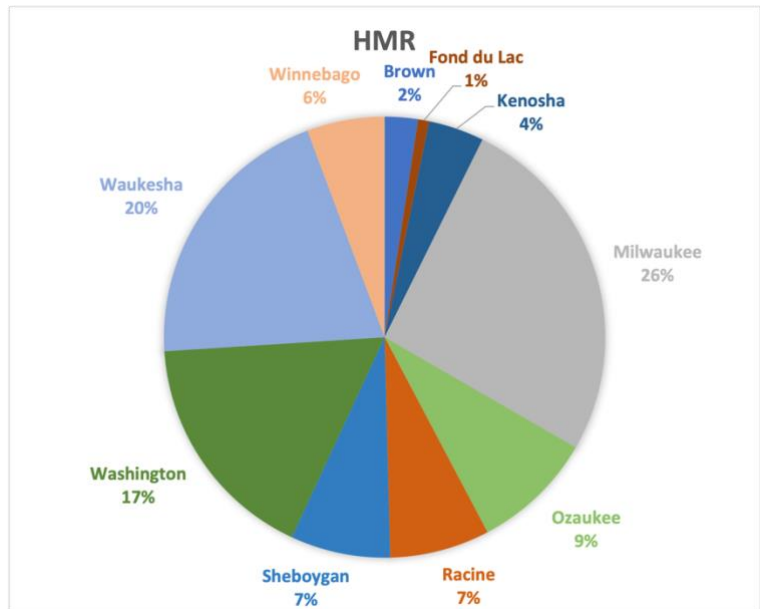
- *Participation in Health Habits:*

The results for urban employees who selected Health Habits were as follows: 28% resided in Milwaukee, followed by 17% in Brown county, and 11% in each of Sheboygan, Fond du lac, Kewaunee, and Rock counties. Six percent (6%) of participants resided in Washington and Waukesha counties, respectively. See [Graph.1b](#)



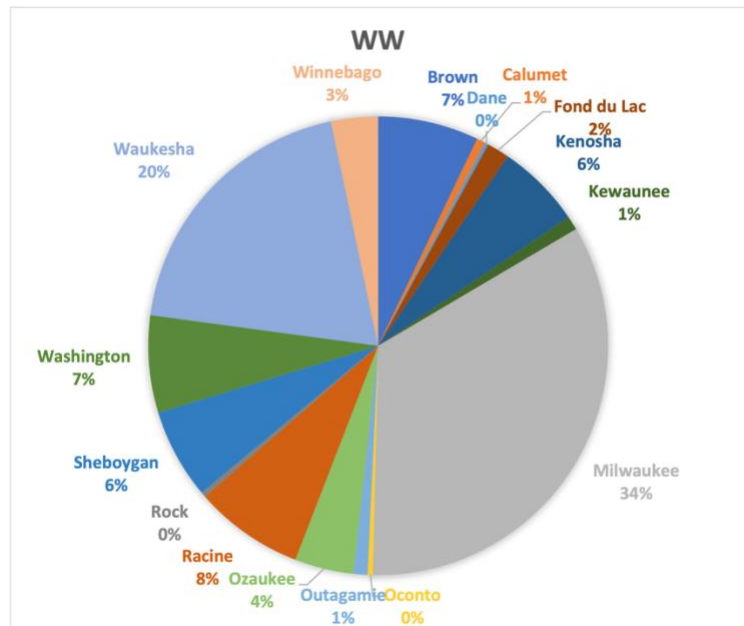
- *Participation in Health Management Resources (HMR):*

Majority of participants in HMR were from Milwaukee at 26%, followed by 20% in Waukesha, 17% Washington, 9% Ozaukee, 7% both Sheboygan and Racine counties, 6% Winnebago, 4% Kenosha, 2% Brown, and 1% in Fond du lac county. See [Graph.1c](#)



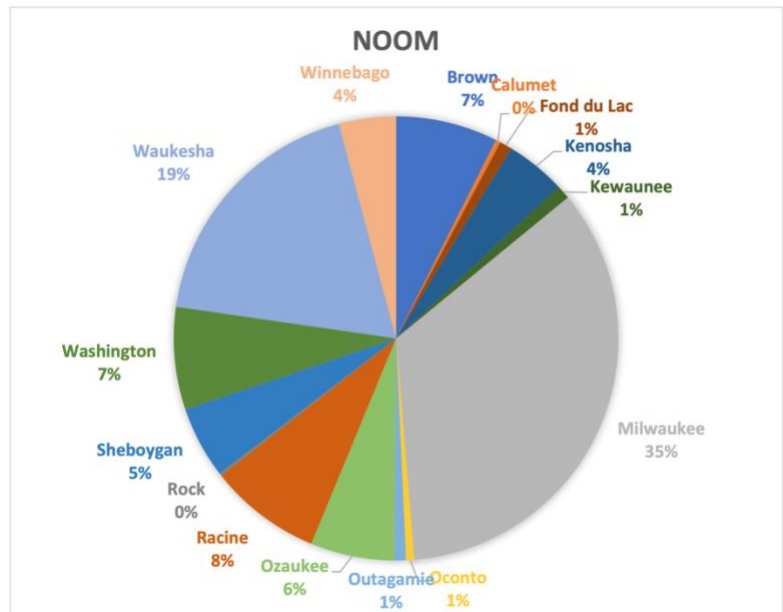
- *Participation in Weight Watchers (WW):*

The results for urban employees who selected WW were as follows: 34% in Milwaukee County, 20% Waukesha, 8% Racine, 7% Washington and Brown counties, 6% Kenosha and Sheboygan counties, 4% Racine, 3% Winnebago, 2% Fond du lac, and 1% in each Outagamie, Calumet, and Kewaunee Counties. See [Graph.1d](#)



- *Participation in Noom:*

The results for participation in Noom were as follows: 35% in Milwaukee county, 19% Waukesha, 8% Racine, 7% in both Washington and Brown counties, 6% Ozaukee, 5% Sheboygan, 4% in both Winnebago and Kenosha counties, and 1% in Outagamie, Kewaunee, Oconto and Fond du lac counties.



See [Graph.1e](#)

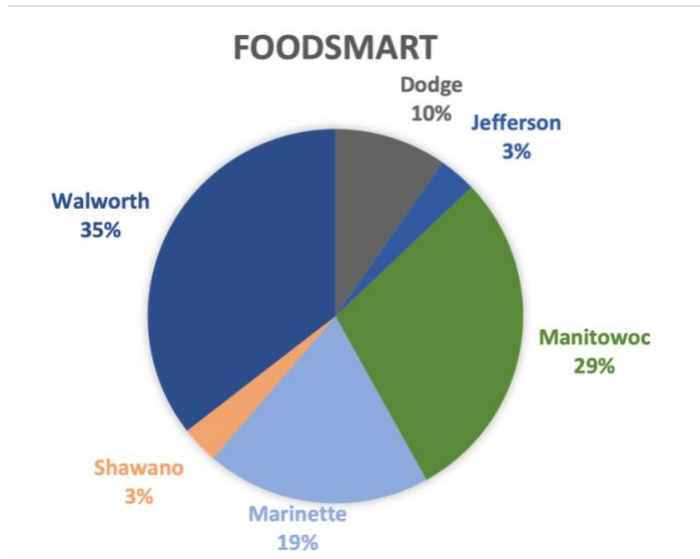
Taken together, Wisconsin urban employees demonstrated the highest participation in Noom (1686), followed by WW(818), Foodsmart (284), HMR (123), then Healthy Habits (18). This creates an opportunity for additional research into why urban employees preferred these specific programs, or what these programs offered that made them more appealing to Aurora Hospital Healthcare employees.

Findings on Wisconsin Rural Employee Participation:

Data on the programs selected by rural residents were analyzed and yielded the following results:

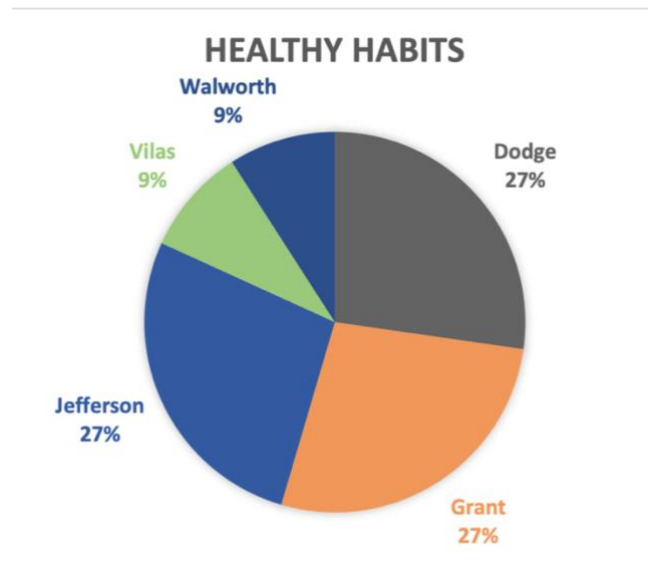
- *Participation in Foodsmart:*

The data revealed the following for rural employees who selected Foodsmart: 35% were from Walworth county, 29% Manitowoc, 19% Marinette, 10% Dodge, and 3% at both Shawano and Jefferson counties. See [Graph.2a](#)



- *Participation in Health Habits:*

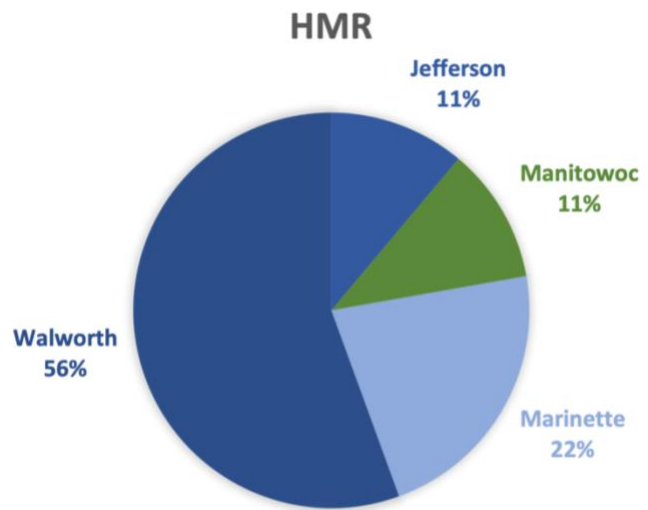
The data revealed the following for employees who selected Healthy Habits: 27% of participant were from Dodge, Jefferson, and Grant counties, followed by 9% from both Walworth and Vilas counties. See [Graph.2b](#)



- *Participation in HMR:*

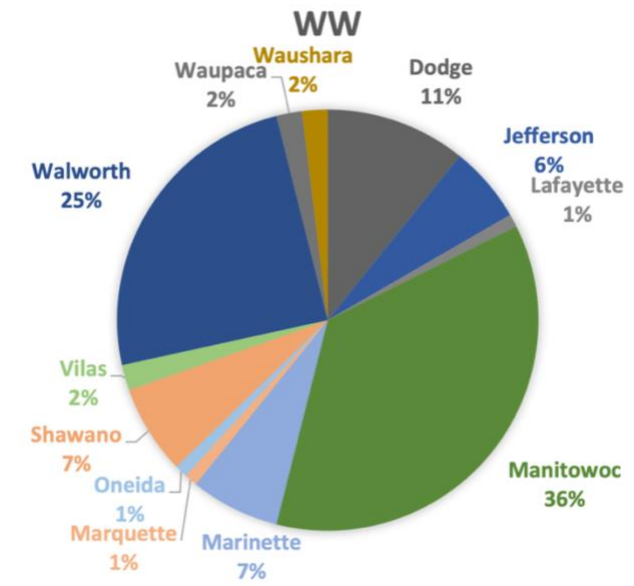
The majority of participants who selected HMR were from Walworth county at 56%, followed by 22% at Marinette, and 11% at both Manitowoc and Jefferson counties.

See [Graph.2c](#)



- *Participation in WW:*

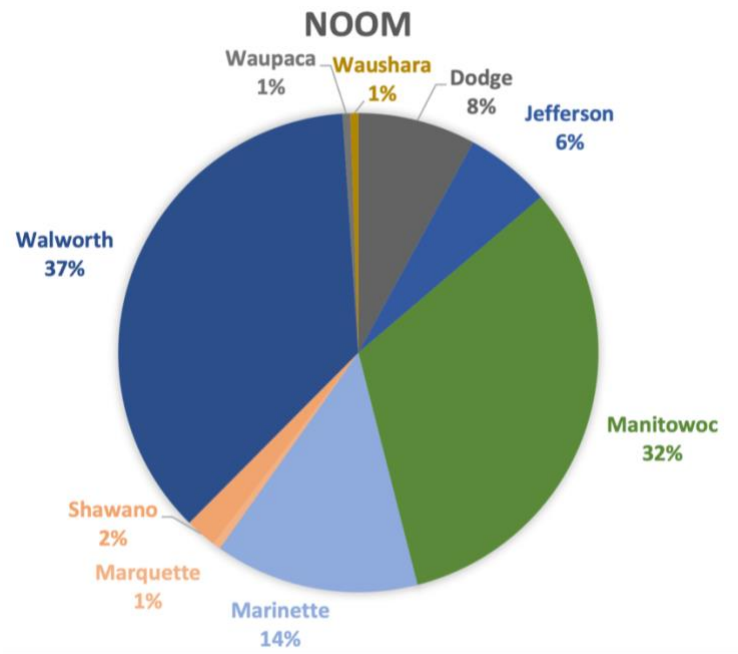
Most participants in WW were from Manitowoc at 36%, followed by Walworth at 25%, 11% Dodge, 7% at Marinette and Shawano counties, 6% Jefferson, 2% at Villas, Waupaca, and Waushara counties, and 1% Lafayette, Marquette, and Oneida counties. See [Graph.2d](#)



- *Participation in Noom:*

The data revealed the following for employees who selected Noom:

37% of participants were from Walworth county, followed by 32% Manitowoc county, 14% at Marinette, 8% Dodge, 6% Jefferson, 2% Shawano, and 1% at Waushara, Waupaca, and Marquette. See



Graph.2e

Taken together, there was higher participation in Noom (189), followed by WW at (102), Foodsmart at (31), Healthy Habits at (11), and HMR at (9). This finding is significant and creates the opportunity for further research into the factors that influence employee’s choice of EWPs and why Noom and WW far outpace other programs in terms of rural employee participation.

Outcomes in Urban versus Rural Participation:

Employee wellness programs have become increasingly popular among both large and small firms as a means of improving employee health and productivity while lowering health care costs for employers. Workplace wellness programs commonly focus on issues such as mental well-being, smoking cessation, stress management, as well as modifiable risk factors of disease such as physical exercise and nutrition (Song & Baicker, 2019; Otenyo & Smith, 2017).

Abundant research evidence has been found in support of the outcomes of employee participation in employee wellness programs (EWP). These programs have been proven to deliver high returns on investment (ROI), with the ROI from comprehensive, well-organized EWPs being as high as 6 to 1 (Berry et al., 2020). The outcomes from EWPs include improvements in employee productivity, increased performance, lowered levels of stress among employees, decreased absenteeism, fewer sick days, as well as lowered health and insurance costs (Berry et al., 2020; Otenyo & Smith, 2017). Organizations that invest in EWPs report higher rates of retention, higher levels of employee satisfaction, and higher employee morale, compared to those that do not invest in EWPs (Otenyo & Smith, 2017).

From the evidence in the literature, it can be assumed that since there is a higher participation in EWPs among employees who reside in urban areas compared to rural areas, that there is a corresponding higher return on investments for EWPs in the urban areas compared to the rural areas. This means that there would be lower levels of absenteeism, higher morale, higher performance, higher general health, and lower healthcare costs among urban employees compared to those who live in rural areas, since urban participation in EWP is higher.

The findings from the present study indicate that employees in urban areas of Wisconsin exhibit higher engagement in employee wellness programs than their counterparts in rural counties. It is worth highlighting that, in general, Advocate Aurora has a larger workforce residing in urban areas than in rural areas. The data further reveals that both urban and rural employees demonstrated increased participation in Noom compared to other employee wellness programs.

4-B2 Participation based on Age:

AGE BAND - MEMBER COUNTS						Min	Max	Range	STDEV	Median	Mean	NORM.DIST	Variance
Age Band	Completed FoodSmart	Completed Weight Watchers	Completed Noom	Completed Healthy Habits	Completed HMR								
[A] < 18	0	0	0	0	0	0	0	0					
[B] 18 - 25	2	2	17	1	0	0	17	17	7	2	4	0.05312023	50.3
[C] 25 - 35	114	143	549	72	31	31	549	518	210	114	182	0.0018063	43933.7
[D] 35 - 45	170	341	877	96	49	49	877	828	338	170	307	0.00108881	113977.3
[E] 45 - 55	155	437	871	120	63	63	871	808	335	155	329	0.00103923	112535.2
[F] 55 - 65	137	578	794	120	69	69	794	725	326	137	340	0.00100833	106452.3
[G] 65+	17	134	182	29	18	17	182	165	77	29	76	0.00386512	5913.5
Total	595	1,635	3,290	438	230								

Table.5 Age Band Member Counts

The data from Table 5, above, offers a view of program completion rates across various age bands and different wellness programs, namely FoodSmart, Weight Watchers, Noom, Healthy Habits, and HMR. The analysis reveals notable trends and patterns in program participation related to age demographics. In the age band under 18, there is no participation across any of the programs, indicating either a lack of enrollment from this age group, due to the low numbers of employees from this age group. For the 18-25 age band, participation is minimal, with only a slight engagement in Noom (17 members) and marginal numbers in FoodSmart, Weight Watchers and Healthy Habits. This low participation could be due to various factors, such as this age group having less interest or perceived need for such programs, or possibly due to them having fewer health concerns related to weight and lifestyle. The participation significantly increases in the 25-35 age band. This group shows the highest engagement in Noom (549 members), followed by Weight Watchers (143 members) and FoodSmart (114 members). The higher participation rates in this age group could be attributed to increased health consciousness or the onset of health issues related to weight and lifestyle in this age bracket.

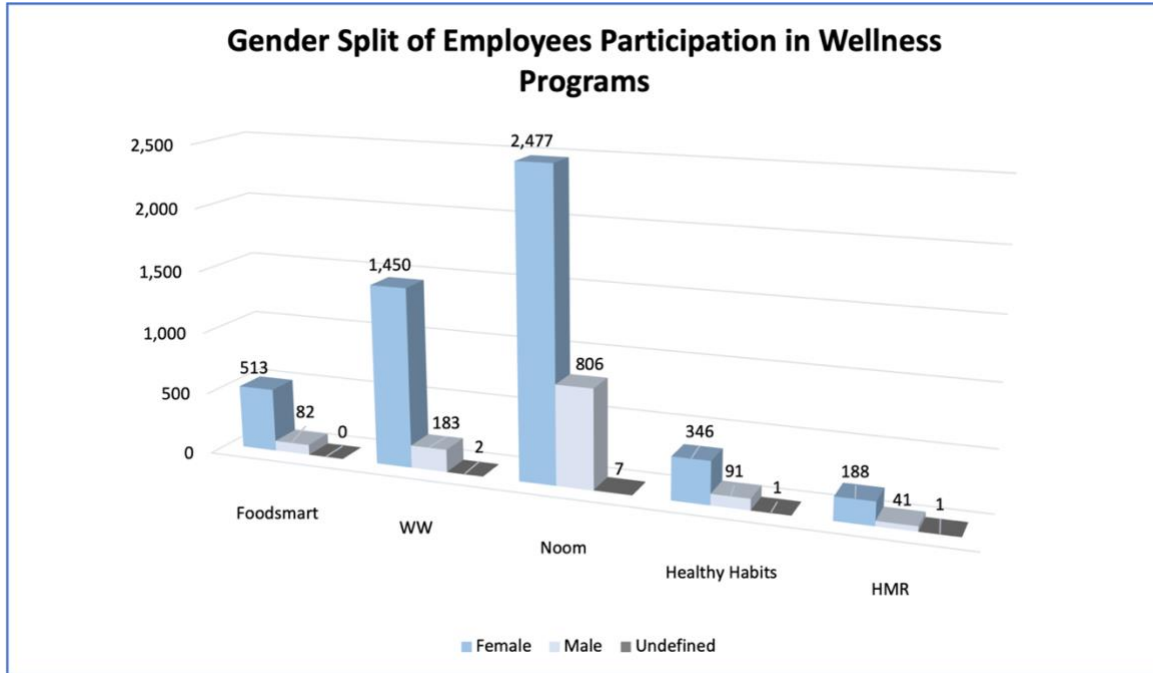
In the 35-45 age band, the participation remains high, with the highest numbers again in Noom (877 members), followed by Weight Watchers (341 members) and FoodSmart (170 members). This trend suggests a continued interest or need for wellness programs as individuals move towards middle age, possibly due to more pronounced health concerns or increased awareness about the importance of maintaining a healthy lifestyle. The 45-55 age band shows a slight decrease in Noom participation (871 members) but an increase in Weight Watchers (437 members) and FoodSmart (155 members) participation. This could indicate a shift in program preference or the effectiveness of different programs for this age group. In the 55-65 age band, there is a noticeable increase in participation in Weight Watchers (578 members), which becomes the most popular program in this age group. And a slight decrease in Noom (794 members) and FoodSmart (137 members). This might be due to Weight Watchers' program structure, which may be more appealing or suitable for this age group. For the age band 65 and above, the participation is lower compared to other age bands but still significant, with the highest numbers in Noom (182 members) and Weight Watchers (134 members). This suggests continued interest in wellness programs, albeit at a reduced level, possibly due to differing health priorities or physical capabilities in this age group.

AGE BAND - % OF PROGRAM TOTAL					
Age Band	Completed FoodSmart	Completed Weight Watchers	Completed Noom	Completed Healthy Habits	Completed HMR
[A] < 18	0.0%	0.0%	0.0%	0.0%	0.0%
[B] 18 - 25	0.3%	0.1%	0.5%	0.2%	0.0%
[C] 25 - 35	19.2%	8.7%	16.7%	16.4%	13.5%
[D] 35 - 45	28.6%	20.9%	26.7%	21.9%	21.3%
[E] 45 - 55	26.1%	26.7%	26.5%	27.4%	27.4%
[F] 55 - 65	23.0%	35.4%	24.1%	27.4%	30.0%
[G] 65+	2.9%	8.2%	5.5%	6.6%	7.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6. Age Band as %

Table 6 above depicts the percentage distribution of program participation across age bands and aligns this information with the member counts, where each program's popularity varies with age. For instance, Noom maintains a consistent appeal across all age bands, suggesting its wide acceptability or effectiveness across different ages. Weight Watchers shows increased popularity in the older age groups (55-65 and 65+), while FoodSmart has a more consistent but modest participation across all age groups. High variance in certain age bands, especially in the 35-45 and 45-55 categories, indicates a wide range of participation numbers, suggesting diverse engagement levels within these age groups. The data provides valuable insights into how different age demographics engage with various wellness programs. The variations in participation across age bands highlight the need for tailored approaches in wellness programs catering to the specific needs and preferences of different age groups. This understanding is crucial for designing effective and appealing wellness programs that can cater to a wide range of age groups, enhancing overall participation and effectiveness.

4-B3- Participation based on Gender:



Graph.3 Gender Split of Employees Participation in EWPs

In Graph 3 Female participation is significantly higher across all programs, with a total participation of 4974. (513) in Foodsmart, (1,450) in WW, (2,477) in Noom, (346) in Healthy Habits, and (188) in HMR. White male participation is notably lower, with the highest percentage being in Noom. With a total participation of 1,203. (82) in Foodsmart, (183) in WW, (806) in Noom, (91) in Healthy Habits, and (41) in HMR. Notably, the percentage of undefined gender is minimal in all programs.

The data shows a noteworthy gender disparity in participation, with female members being more likely to participate in EWPs, which is discussed further in the following section. This could be due to various factors, including program marketing, gender differences in health awareness, or program content and delivery methods that might be more appealing to women.

4-B4 Participation based on Position:

CLINICAL/NON-CLINICAL - MEMBER COUNTS					
Clinical/Non-Clinical	Completed FoodSmart	Completed Weight Watchers	Completed Noom	Completed Healthy Habits	Completed HMR
Clinical	392	1,076	2,133	272	138
Non-Clinical	90	229	361	66	29
UNKNWON	42	125	178	36	35
Total	524	1,430	2,672	374	202

CLINICAL/NON-CLINICAL - % OF PROGRAM TOTAL					
Clinical/Non-Clinical	Completed FoodSmart	Completed Weight Watchers	Completed Noom	Completed Healthy Habits	Completed HMR
Clinical	74.8%	75.2%	79.8%	72.7%	68.3%
Non-Clinical	17.2%	16.0%	13.5%	17.6%	14.4%
UNKNWON	8.0%	8.7%	6.7%	9.6%	17.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table 7. Clinical/Non-Clinical Member Counts and %

Table 7 offers a detailed insight into the participation in various Employee Wellness Programs based on the clinical or non-clinical status of the members. The programs in focus include FoodSmart, Weight Watchers, Noom, Healthy Habits, and HMR. The analysis of this data reveals significant trends in program participation, shedding light on the preferences and engagement levels among different employee groups.

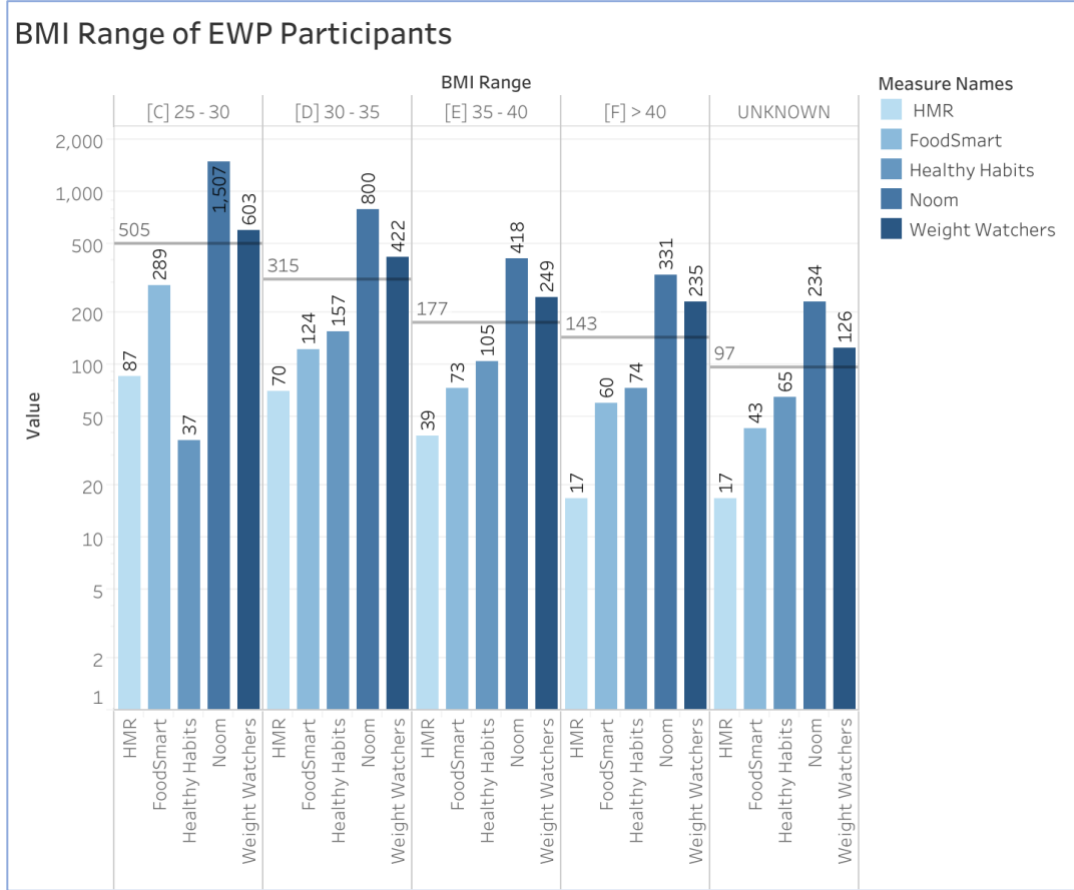
In terms of overall participation, the clinical group consistently shows the highest engagement across all programs. For FoodSmart, 74.8% of participants are clinical, followed by 17.2% non-clinical, and 8.0% unknown. A similar trend is observed in Weight Watchers, with 75.2% clinical and 16.0% non-clinical participation and 8.7% unknown. Noom shows the highest clinical participation at 79.8%, compared to 13.5% non-clinical and 6% unknown. Healthy Habits has 72.7% clinical and 17.6% non-clinical participants and 9.6% unknown, while HMR shows a slightly different distribution with 68.3% clinical, 14.4% non-clinical, and 17.3% unknown. These high participation rates among clinical staff in all programs suggest that clinical employees might have a greater inclination towards health and wellness programs. This could be

attributed to their healthcare background, which potentially makes them more health-conscious and aware of the benefits of such programs. Additionally, the nature of clinical work, often characterized by high stress and physical demands, might motivate these employees to engage more actively in wellness initiatives. On the other hand, the lower participation rates of non-clinical staff indicate that these programs might be less appealing or accessible to them, or they might have different wellness needs and preferences. The reasons behind this lower engagement could be multifaceted, including lack of awareness, perceived relevance, or differing lifestyle and health priorities. But it's important to note that Advocate Aurora is primarily made-up of clinical workers. Over 90% of the active teammate population are clinical workers. And that by itself would be a reason for the high participation among clinical staff in comparison to non-clinical. Furthermore, having unknown or missing data in a dataset introduces uncertainty and can impede accurate analyses, making it challenging to draw definitive conclusions. Filling these gaps through appropriate imputation techniques is crucial for enhancing the reliability and completeness of the dataset.

Noom, being the program with the highest clinical participation, might have elements that particularly appeal to this group. Its approach, content, or flexibility could resonate more with the clinical staff's lifestyle and work schedules. Conversely, the relatively lower but still significant engagement in HMR among clinical staff suggests that this program might have aspects that are less aligned with their preferences or needs. The percentage distribution of program participation across clinical and non-clinical staff highlights the importance of considering employee roles in the design and implementation of wellness programs. Programs like

The data analysis suggests that while clinical employees are more engaged in wellness programs, there is a substantial opportunity to increase participation among non-clinical staff. This could be achieved by understanding and addressing the barriers they face in accessing or engaging with these programs. Tailoring the programs to meet their specific needs, creating targeted communication strategies, and ensuring that the program benefits are clearly articulated and accessible to all employee groups are strategies that could enhance engagement. The data provides valuable insights into how different employee groups within a healthcare setting engage with various wellness programs. The high participation rates among clinical staff across all programs underscore their inclination towards health and wellness initiatives, possibly influenced by their professional background and work demands. The lower engagement among non-clinical staff highlights a need for program adaptation and targeted strategies to enhance their participation. Understanding these dynamics is crucial for designing effective, inclusive, and appealing wellness programs that cater to the diverse needs of all employees, thereby enhancing overall health and well-being in the workplace.

4-B5 Participation based on BMI:



Graph.4 BMI Range of EWP Participants

BMI RANGE - MEMBER COUNTS														
BMI Range	Completed FoodSmart	Completed Weight Watchers	Completed Noom	Completed Healthy Habits	Completed HMR	Min	Max	Range	STDEV	Median	Mean	NORM.DIST	Variance	
[A] <18	6	0	0	0	0	0	6	6	2.68328157	0	1	0.03001737	7.2	
[B] 18 - 25	0	0	0	0	0									
[C] 25 - 30	289	603	1,507	37	87	37	1,507	1,470	602.911934	289	505	0.00062071	363502.8	
[D] 30 - 35	124	422	800	157	70	70	800	730	303.374027	157	315	0.00107949	92035.8	
[E] 35 - 40	73	249	418	105	39	39	418	379	156.771171	105	177	0.00204385	24577.2	
[F] > 40	60	235	331	74	17	17	331	314	133.541379	74	143	0.0024581	17833.3	
UNKNOWN	43	126	234	65	17									
Total	595	1,635	3,290	438	230									

Table.8 BMI Range - Member Counts

Table 8 illustrates the participation of members in various Employee Wellness Programs based on their Body Mass Index (BMI) ranges. The programs include FoodSmart, Weight Watchers, Noom, Healthy Habits, and HMR. This analysis is crucial for understanding how BMI

influences the choice and effectiveness of these wellness programs. Although there are 6 noted participants in the <18 BMI range, I will exclude them from this study. According to Advocate Aurora, employees with a normal BMI would not have the opportunity to participate in Foodsmart or any of the above support programs. They are only offered to those with a BMI of 25+.

In the BMI range of 25-30, which is considered overweight but not obese, there is significant participation across programs, with the highest in Noom (1,507 members), followed by Weight Watchers (603 members) and FoodSmart (289 members). This high level of participation in this BMI range suggests that individuals who are slightly overweight are keen on engaging in wellness programs, possibly to prevent further weight gain or to reduce their weight to a healthier range. For the BMI range of 30-35, considered as Class 1 Obesity, the participation in Noom is again the highest (800 members), followed by Weight Watchers (422 members) and FoodSmart (124 members). This trend continues in the BMI ranges of 35-40 (Class 2 Obesity) and over 40 (Class 3 Obesity, also known as "severe" or "morbid" obesity), with Noom having the highest participation, followed by Weight Watchers and FoodSmart. The consistent preference for Noom in higher BMI categories could indicate that its program structure or content is particularly appealing or effective for individuals with higher levels of obesity. The data also shows a substantial number of participants with unknown BMI. This gap in data could impact the understanding of the full spectrum of program effectiveness across different BMI ranges. Accurate and complete BMI data is essential for a deep analysis and understanding of program impact.

Interestingly, the highest participation across all BMI categories is in the Noom program, suggesting its broad appeal or effectiveness. Weight Watchers also shows significant participation, particularly in higher BMI ranges, indicating its relevance to individuals seeking weight loss or management solutions. FoodSmart, Healthy Habits, and HMR have lower but still notable participation, suggesting they cater to specific preferences or needs within the employee population. The analysis also provides statistical measures such as Mean, Median, Standard Deviation, and Variance for each BMI range. These metrics offer insights into the distribution and variability of program participation within each BMI category. For example, the high variance in the 25-30 BMI range indicates a wide range of participation numbers, suggesting diverse engagement levels within this category. From a health and wellness perspective, the high participation in wellness programs among individuals with a BMI of 25 and above is encouraging, as it suggests a proactive approach to managing weight-related health issues.

The data provides valuable insights into how BMI influences participation in wellness programs. The high engagement in programs like Noom and Weight Watchers among individuals with higher BMI values underscores the need for these programs and their potential effectiveness in addressing weight-related health concerns. The lower engagement in other programs and among individuals with lower BMI values highlights opportunities for program adaptation and communication strategies to increase their appeal and accessibility. Understanding these patterns is crucial for designing effective wellness programs that cater to the diverse needs of all employees, thereby enhancing overall health outcomes in the workplace.

4-B6 Participation Effects on Weight:

Program	Members***	Lost Weight			
		Count	% of Total	Total Lbs Lost	Average Lbs Lost
FoodSmart	595	153	25.7%	1,649	10.8
Weight Watchers	1,635	480	29.4%	5,105	10.6
Noom	3,290	857	26.0%	8,746	10.2
Healthy Habits	438	91	20.8%	1,197	13.2
HMR	230	52	22.6%	565	10.9

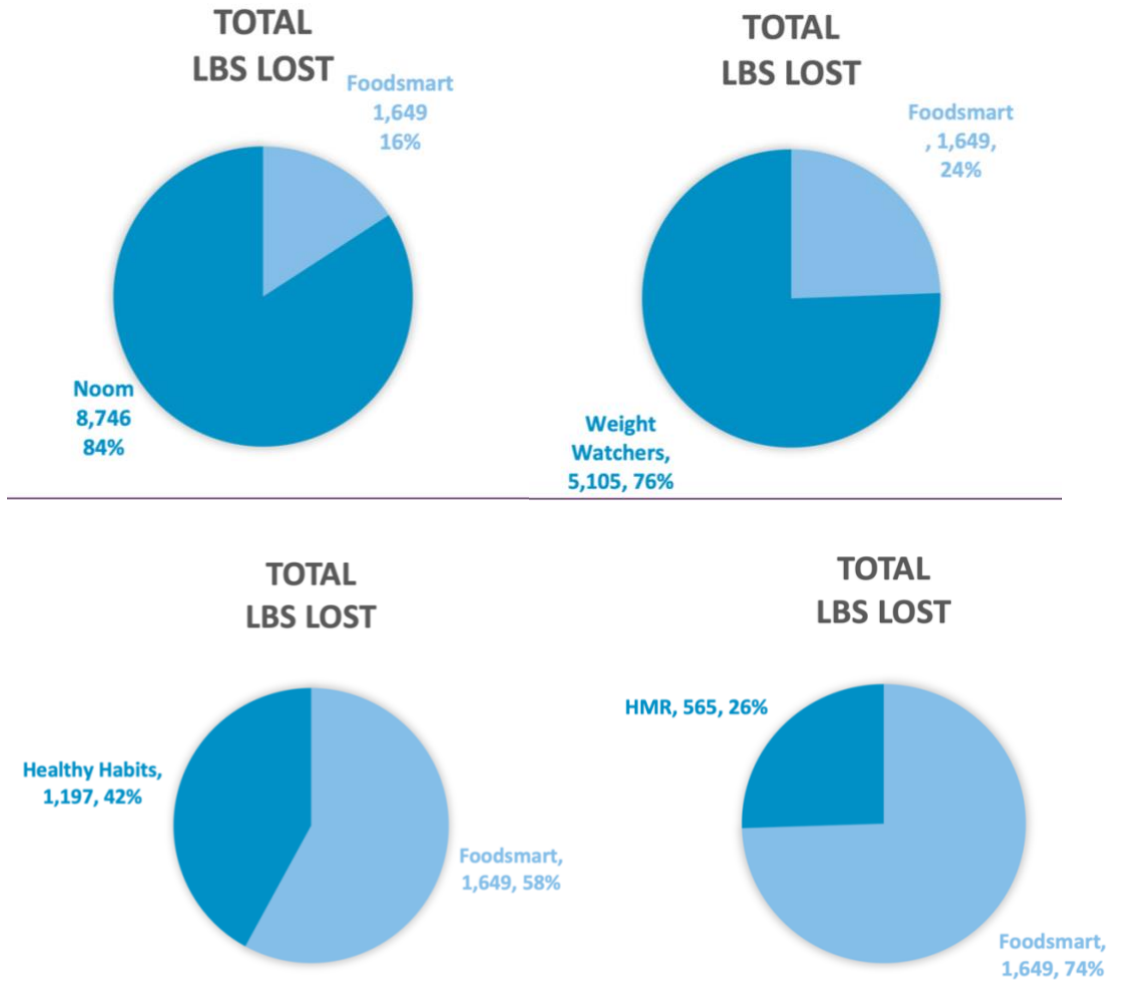
Table.9 Weight Loss Count and % by Program

Table 9 provides an insightful analysis of weight loss outcomes across different Employee Wellness Programs , namely FoodSmart, Weight Watchers, Noom, Healthy Habits, and HMR. The focus is on the number of program members who lost weight, the percentage of total participants this represents, and the average pounds lost per participant. In the FoodSmart program, out of 595 members, 153 (25.7%) lost weight, with an average of 10.8 pounds per person. This indicates a moderate success rate and a reasonable average weight loss, suggesting that the program is effective for a quarter of its participants. The relatively high average weight loss per person who succeeded in losing weight points towards the effectiveness of the program for those it works for. Weight Watchers, with a larger participant base of 1,635 members, saw 480 (29.4%) of them losing weight, each losing an average of 10.6 pounds. This program has a slightly higher success rate compared to FoodSmart, both in terms of the percentage of participants who lost weight and the total pounds lost. The consistency in the average weight loss across these two programs indicates a general trend in how much weight participants can expect to lose.

Noom, with the largest participation (3,290 members), had 857 (26.0%) members losing weight, with an average loss of 10.2 pounds per person. Although the percentage of participants who lost weight is similar to that of FoodSmart, the lower average weight loss suggests that while the program is broadly effective, it might lead to slightly less weight loss per individual. Healthy Habits, though having a smaller participant pool (438 members), showed that 91 (20.8%) lost weight, but the average weight loss was higher at 13.2 pounds. This higher average might indicate that while fewer participants lose weight, those who do tend to lose more. This could be due to the program's structure, content, or participant engagement levels. In the HMR program, out of 230 members, 52 (22.6%) lost weight, with an average loss of 10.9 pounds per person. Like Healthy Habits, a lower percentage of participants experienced weight loss, but the average pounds lost per successful participant is relatively high.

Each program demonstrates a varying degree of effectiveness in terms of weight loss. Weight Watchers shows the highest percentage of members losing weight, while Healthy Habits leads in terms of average weight loss per successful participant. The variation in weight loss success rates and average pounds lost suggests that program fit, and participant engagement levels play significant roles. Some programs might be better suited to certain individuals based on their lifestyle, preferences, or specific health goals. The average weight loss across programs ranges between 10.2 to 13.2 pounds, indicating a general trend in the effectiveness of EWP's for weight management. This suggests that while individual results vary, participants can expect a moderate level of weight loss if the program is a good fit for them.

The data underscores the importance of selecting the right wellness program based on individual needs and preferences. It also highlights the potential need for programs to be tailored or personalized to increase their effectiveness. While the focus of this data is on weight loss, it is important to consider the broader health impacts of these programs, including improved fitness levels, better eating habits, and enhanced overall well-being. The success rates and average weight loss might also reflect motivational factors, such as the level of support and encouragement provided by the program, which can significantly influence participant success. The analysis of weight loss in different EWPs shows that each program has its strengths and areas for improvement. Understanding these patterns is crucial for individuals choosing a wellness program and for organizations looking to offer effective wellness solutions to their employees. Tailoring programs to meet individual needs and preferences, providing motivational support, and focusing on long-term health benefits are key factors in enhancing the effectiveness of these wellness initiatives.



Graph.11 Total Lbs. Lost in Foodsmart vs Other Healthy Living Programs

From the previous graphs we can compare the total lbs. lost among Foodsmart participants in comparison to Noom, Weight Watchers (WW), Healthy Habits and HMR. With Noom having the highest employee participation count at 3,290, it's no surprise that the total lbs. lost is 8,746 lbs. compared to 1,649 lbs. among Foodsmart participants. Followed by WW with a total of 5,105 lbs. lost compared to 1,649 lbs. from Foodsmart participants. When it comes to participants of Healthy Habits, 1,197 total lbs. were lost, which is 452 lbs. less than the total lbs. lost among Foodsmart participants. Lastly HMR participants lost a total of 565 lbs.,

which is 1,084 less lbs. than FoodSmart participants. The total of lbs. lost among participants of all programs was 17,262 lbs.

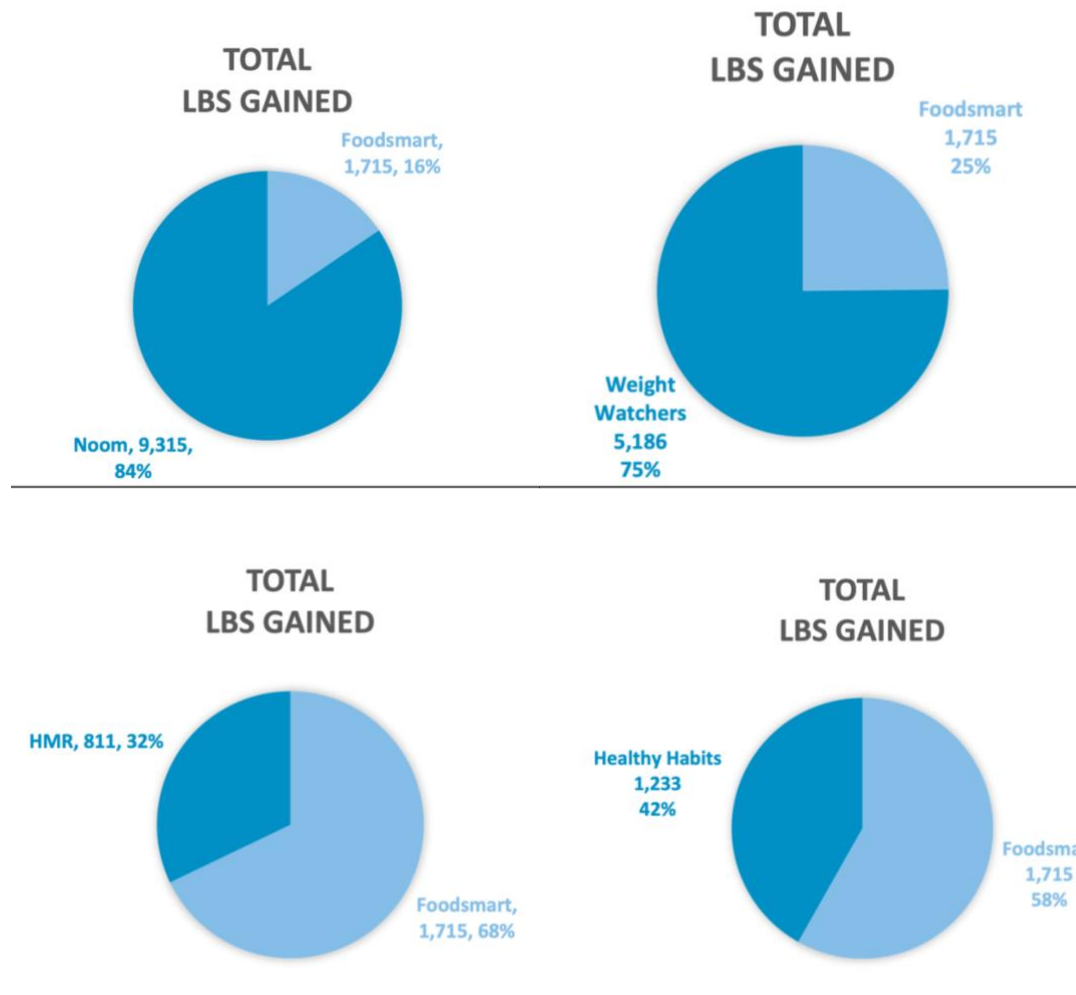
Program	Members***	Gained Weight			
		Count	% of Total	Total Lbs Gained	Average Lbs Gained
FoodSmart	595	175	29.4%	1,715	9.8
Weight Watchers	1,635	588	36.0%	5,186	8.8
Noom	3,290	1,047	31.8%	9,315	8.9
Healthy Habits	438	136	31.1%	1,233	9.1
HMR	230	69	30.0%	811	11.8

Table.10 Weight Gain Count and % by Program

Table 10 presents data on weight gain among members of various Employee Wellness Programs, including FoodSmart, Weight Watchers, Noom, Healthy Habits, and HMR. This analysis is crucial in understanding the flip side of the wellness programs, focusing on those who gained weight during their participation. The total lbs. gained among all program participants was 18,260 lbs. In the FoodSmart program, out of 595 members, 175 (29.4%) gained weight, with an average of 9.8 pounds gained per person. This significant proportion of members gaining weight suggests challenges within the program in effectively managing or reducing weight for nearly a third of its participants. The relatively high average weight gain indicates that when the program does not work as intended, the impact on weight can be considerable. Weight Watchers, with a larger participant base of 1,635 members, saw 588 (36.0%) of them gaining weight, each gaining an average of 8.8 pounds. This program has the highest percentage of participants who gained weight compared to the others. Despite its effectiveness in helping a segment of its participants lose weight, as seen in the previous data, it also poses a risk of weight gain for a significant portion of its members when not followed effectively. Noom, which had the largest participation at 3,290 members, had 1,047 (31.8%)

members gaining weight, with an average gain of 8.9 pounds per person. Like Weight Watchers, while Noom is effective for many, it also leads to weight gain in a sizable fraction of its participants. The lower average weight gain as compared to FoodSmart might suggest that the extent of weight gain in Noom is somewhat controlled. Healthy Habits had 438 participants, with 136 (31.1%) gaining weight, averaging at 9.1 pounds. This program shows a similar trend to FoodSmart and Noom, where a significant portion of the participants ends up gaining weight, albeit at a slightly lower average than FoodSmart. In the HMR program, 69 out of 230 members (30.0%) gained weight, with the highest average weight gain of 11.8 pounds per person among the programs. This high average might be indicative of certain aspects of the program that may contribute to substantial weight gain in those for whom the program is not effective.

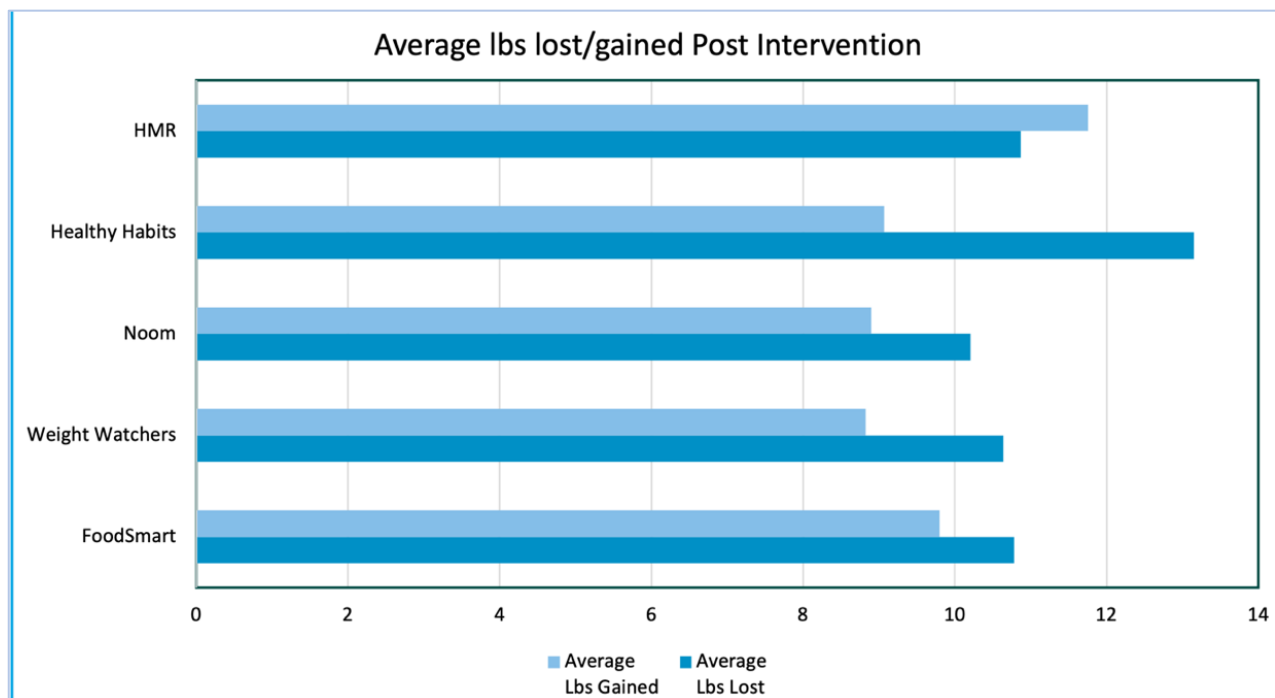
The following graph 12 preticularly presents the total lbs. gained among Foodsmart participants compared to the other wellness programs. With Noom having the highest total lbs. gained of 9,315 lbs., compared to Foodsmart participants who had 1,715 total lbs. gained. Followed by Weight Watchers (WW), with a total of 5,186 lbs. gained among their participants. When it comes to members of Healthy Habits, 1,233 of total lbs. was gained which was less than the total lbs gained from Foodsmart participants. Lastly, HMR members of 69 employees had 811 total lbs gained in from 230 total participants in that program. It's important to note that all the previous numbers are reflective of the diffrence in the total number of participation per each wellness program.



Graph.12 Total Lbs. Gained in Foodsmart vs Other Healthy Living Programs

All programs carry a risk of weight gain for a significant number of participants if not followed adequately. This highlights the need for careful selection and monitoring of individuals in these programs to ensure that they are benefiting and not adversely affected. The variation in weight gain across programs suggests that individual differences in physiology, lifestyle, and program engagement play crucial roles. What works for one participant might not work for another, leading to varying outcomes. While previous data showed the weight loss aspect, this data brings a balanced view, showing that these programs also have a considerable percentage

of participants who gain weight. This balance is important for a realistic understanding of the potential outcomes of these programs. The findings suggest a need for more personalized approaches within these programs. Customizing strategies based on individual needs, monitoring progress, and adjusting as necessary could be key to reducing the incidence of weight gain. The data underscores the importance of providing adequate education and support within these programs. Participants need to be well-informed about healthy lifestyle choices and have access to support systems that can help them in their wellness journey. Weight gain in a significant percentage of participants raises questions about the long-term sustainability and effectiveness of these programs. It suggests the need for continuous evaluation and improvement of program components. The results reveal that while EWP are beneficial for some, they also pose a risk of weight gain for a notable percentage of participants. This dual outcome underscores the complexity of weight management and the need for personalized, adaptable, and supportive wellness programs. It also highlights the importance of ongoing monitoring and evaluation to ensure that these programs meet the diverse needs of all participants and contribute positively to their long-term health and well-being. See the following graph 5 for the average of lbs. lost compared to the average lbs. gained post intervention.



Graph.5 Average lbs. Lost/ Average lbs. Gained Post Intervention

Program	Members***	Maintained Weight		Unknown Weight Change	
		Count	% of Total	Count	% of Total
FoodSmart	595	19	3.2%	248	41.7%
Weight Watchers	1,635	28	1.7%	539	32.9%
Noom	3,290	99	3.0%	1,287	39.2%
Healthy Habits	438	12	2.7%	199	45.4%
HMR	230	3	1.3%	106	46.1%

Table.11 Maintained Weight and Unknown Weight Change

The data from Table 11 offers insights into the proportion of participants in various Employee Wellness Programs who maintained their weight and those with unknown weight changes. The programs include FoodSmart, Weight Watchers, Noom, Healthy Habits, and HMR. This analysis is important for understanding the overall impact of these programs beyond just weight loss or gain. In the FoodSmart program, out of 595 members, only 19 (3.2%) maintained

their weight. This low percentage suggests that the program significantly impacts weight, leading to either loss or gain in most of its participants. The small proportion of members maintaining weight might indicate that the program is highly active in instigating change, but it raises questions about its suitability for weight maintenance. Weight Watchers had a similarly low proportion of weight maintenance, with only 28 out of 1,635 members (1.7%) maintaining their weight. Given the larger participant base, this low percentage is notable and suggests that the program is more geared towards weight change rather than maintenance. Noom, with the largest number of participants (3,290), saw 99 members (3.0%) maintaining their weight. Like the other programs, the small proportion of members who maintained their weight underscores the program's focus on weight change. Healthy Habits and HMR had the lowest percentages of weight maintenance, with only 2.7% and 1.3% of their participants maintaining weight, respectively. This suggests that these programs, too, are more oriented towards weight change.

A significant finding from the data is the high percentage of participants with unknown weight change across all programs. In FoodSmart, a substantial 41.7% of the participants had an unknown weight change. This indicates a gap in data collection or monitoring within the program, which could impact the understanding of its effectiveness. Weight Watchers had 32.9% of participants with an unknown weight change. This considerable proportion suggests challenges in tracking or reporting weight changes, which is crucial for evaluating the program's impact. Noom had 39.2% of participants with an unknown weight change. Given Noom's large participant base, this represents a significant number of individuals for whom the program's impact on weight is unclear. Healthy Habits and HMR had the highest percentages of unknown

weight changes, at 45.4% and 46.1% respectively. These high proportions indicate a critical need for better monitoring and data collection mechanisms within these programs.

The low percentages of participants maintaining weight across all programs suggest that these EWP's are more effective in instigating weight loss or gain rather than maintaining weight. This could be reflective of the programs' designs, which might be more geared towards active weight management. The high percentages of participants with unknown weight changes in all programs point to significant gaps in data collection and monitoring. This lack of information is a major limitation in evaluating the true impact of these programs. It suggests a need for improved tracking mechanisms and participant follow-up to ensure holistic data collection. The findings indicate that participants enrolling in these programs should expect active weight management rather than maintenance. This should be clearly communicated to potential participants to align their expectations with the likely outcomes. The data suggests a need for these programs to incorporate more customization and flexibility to cater to individuals seeking weight maintenance. This could involve personalized plans or specific modules within the programs focused on maintaining weight. The low weight maintenance rates and high unknown rates also raise questions about the long-term impact of these programs. The findings highlight the importance of continuous program evaluation and improvement. Understanding why a large portion of participants have unknown weight changes and addressing this issue is crucial for the credibility and effectiveness of these wellness initiatives. The data here reveals that while EWP's are effective in instigating weight change, they are less so in maintaining weight. The high proportion of unknown weight changes underscores the need for improved data collection and monitoring to accurately assess these programs' effectiveness. Understanding

and addressing these aspects is vital for enhancing the impact and relevance of EWPs in diverse weight management goals.

Program	Members***	Moved to a Healthy Range	
		Count	% of Total
FoodSmart	595	28	4.7%
Weight Watchers	1,635	50	3.1%
Noom	3,290	141	4.3%
Healthy Habits	438	6	1.4%
HMR	230	10	4.3%

Table.12 Members Moved to a Healthy Weight Range

Table 12 evaluates on the effectiveness of various Employee Wellness Programs in terms of moving participants to a healthy weight range. The programs under consideration are FoodSmart, Weight Watchers, Noom, Healthy Habits, and HMR. This analysis is crucial for evaluating the impact of these programs on achieving a fundamental goal of weight management: transitioning individuals to a healthier weight category. In the FoodSmart program, out of 595 members, 28 (4.7%) moved to a healthy weight range. This percentage, while modest, indicates that a portion of the participants successfully reached a healthier weight through the program. The effectiveness of FoodSmart in facilitating this important transition is evident, though the impact is limited to a relatively small group of the total participants. Weight Watchers, with a larger participant base of 1,635 members, saw only 50 (3.1%) moving to a healthy weight range. Compared to Foodsmart, Weight Watchers has a lower percentage of success in this regard. This could indicate that while Weight Watchers is effective for weight loss or gain, as seen in previous data, its ability to shift participants into a healthier weight category is somewhat limited. Noom, with the largest number of participants

(3,290), had 141 members (4.3%) moving to a healthy weight range. This percentage is slightly higher than Weight Watchers but still indicates that only a small fraction of participants achieves this key goal. Given Noom's broad reach, this result suggests that while the program may be effective in instigating weight change, transitioning to a healthier weight range is a more challenging outcome to achieve. Healthy Habits had a notably lower success rate, with only 6 out of 438 participants (1.4%) moving to a healthy weight range. This is the lowest percentage among the programs analyzed. It raises questions about the program's effectiveness in helping participants achieve one of the most critical objectives of weight management. HMR, with 230 participants, saw 10 members (4.3%) moving to a healthier weight range. This percentage is on par with Noom and higher than Weight Watchers and Healthy Habits, suggesting a relatively better effectiveness of HMR in achieving this specific goal.

The data demonstrates that while all programs have some level of effectiveness in moving participants to a healthier weight range, the overall success rates are low. This highlights a challenge in achieving one of the most important goals of weight management through these programs. The variance in percentages among the programs suggests that different EWPs have different levels of effectiveness in facilitating this transition. Factors contributing to these variances could include program design, participant engagement, support mechanisms, and the specific methodologies used. For individuals considering participation in these programs, understanding the realistic likelihood of moving to a healthier weight range is important. This can help in setting appropriate expectations and selecting the program that aligns best with their specific health goals. The modest success rates across programs indicate a

need for more personalized approaches within EWPs. Tailoring strategies based on individual health profiles, motivations, and lifestyle factors could be key to enhancing effectiveness in this regard. Moving to a healthier weight range has significant long-term health benefits. The low percentages underscore the importance of focusing on sustainable weight management strategies within these programs.

The data suggests that weight management programs need to be part of a broader, more complete wellness strategy. This could include nutrition education, physical activity, psychological support, and other health-promoting behaviors. The findings highlight the need for continuous evaluation and improvement of EWPs. Understanding the barriers to achieving a healthy weight range and addressing them is crucial for the effectiveness of these initiatives. The data also suggests that though EWPs show some success in moving participants to a healthier weight range, the overall effectiveness is modest. This underscores the need for enhanced strategies within these programs to improve their impact. Focusing on personalized approaches, sustainable health behaviors, and continuous program evaluation can enhance the likelihood of achieving this key health goal, thereby contributing to the long-term well-being of participants.

Program	Members***	Body Mass Index		
		Average BMI 2022	Average BMI 2023	BMI Change
FoodSmart	595	31.8	31.6	-0.2
Weight Watchers	1,635	33.4	33.6	0.2
Noom	3,290	32.2	32.3	0.1
Healthy Habits	438	35.7	35.9	0.2
HMR	230	32.5	32.3	-0.2

Table.13 BMI Changes Among Participants

Table 13 offers an analysis of the average Body Mass Index (BMI) changes among participants in various Employee Wellness Programs - Foodsmart, Weight Watchers, Noom, Healthy Habits, and HMR. This analysis is pivotal in understanding how these programs impact the overall weight status of their participants, as indicated by changes in BMI from 2022 to 2023. In the Foodsmart program, the average BMI of the 595 members decreased slightly from 31.8 to 31.6, showing a change of -0.2. This marginal decrease suggests that the program had a small but positive impact on reducing the average BMI of its participants. Considering that a BMI of 30 and above is categorized as obese, the decrease, though slight, is a step towards a healthier weight range for these participants. Weight Watchers, with a larger participant base of 1,635 members, showed an average BMI increase from 33.4 to 33.6, resulting in a change of 0.2. This increase, albeit small, indicates that on average, participants in the Weight Watchers program slightly increased in weight status, moving further into the obese category. Noom, with the largest number of participants (3,290), showed a slight increase in average BMI from 32.2 to 32.3, a change of 0.1. Like Weight Watchers, this indicates a marginal increase in average weight status, though the change is minimal. Healthy Habits participants had the highest average BMI at the start (35.7) and showed an increase to 35.9 in 2023, a change of 0.2. This program, therefore, not only started with a group of participants who were on average in a higher obesity category but also saw a slight increase in their average BMI. HMR, with 230 participants, showed a decrease in average BMI from 32.5 to 32.3, a change of -0.2. This decrease is similar to that observed in the Foodsmart program and indicates a small improvement in the average weight status of the participants.

The data shows varied impacts of the EWP on BMI changes. Foodsmart and HMR demonstrated a small decrease in average BMI, suggesting some success in weight management. In contrast, Weight Watchers, Noom, and Healthy Habits saw a slight increase in average BMI, indicating a potential challenge in achieving weight reduction goals. The changes in BMI, both increases and decreases, are small in magnitude. This suggests that while these programs impact participants' weight status, the extent of this impact is relatively modest. The decreases in BMI observed in Foodsmart and HMR, although small, are positive indicators of the potential effectiveness of these programs in weight management. Conversely, the increases in BMI in the other programs, while slight, highlight a need for further investigation into program methodologies and participant engagement strategies. The increases in BMI in some programs underscore the challenges faced in managing weight through wellness programs. Factors contributing to these challenges could include individual differences in metabolism, lifestyle factors, program adherence, and the complexity of behavior change in relation to diet and exercise. The varied responses to different programs suggest the importance of selecting a program that aligns with an individual's specific needs and circumstances. Personalization within these programs could potentially enhance their effectiveness. While BMI is a useful indicator of weight status, it does not provide a complete picture of an individual's health. Factors such as muscle mass, body composition, and overall fitness levels are also important. Given the small changes in BMI, these programs may benefit from a long-term focus on sustainable health improvements, including lifestyle and dietary changes that go beyond mere weight loss. The findings suggest a need for more holistic approaches within these programs. Incorporating elements such as nutrition education, psychological support, and physical activity

tailored to individual capabilities and preferences could be more effective. The analysis of BMI changes in these EWP's reveals a complex picture. While some programs have shown a slight improvement in reducing BMI, others have seen an increase. These findings highlight the challenges in weight management and the importance of tailoring wellness programs to individual needs. Additionally, they underscore the need for a holistic approach to health and wellness that transcends the focus on BMI alone and considers the broader aspects of health and well-being.

4-C. Discussion of Analysis

Test 1: Average BMI Pre and Post Intervention / T-test Paired Two Sample of Means

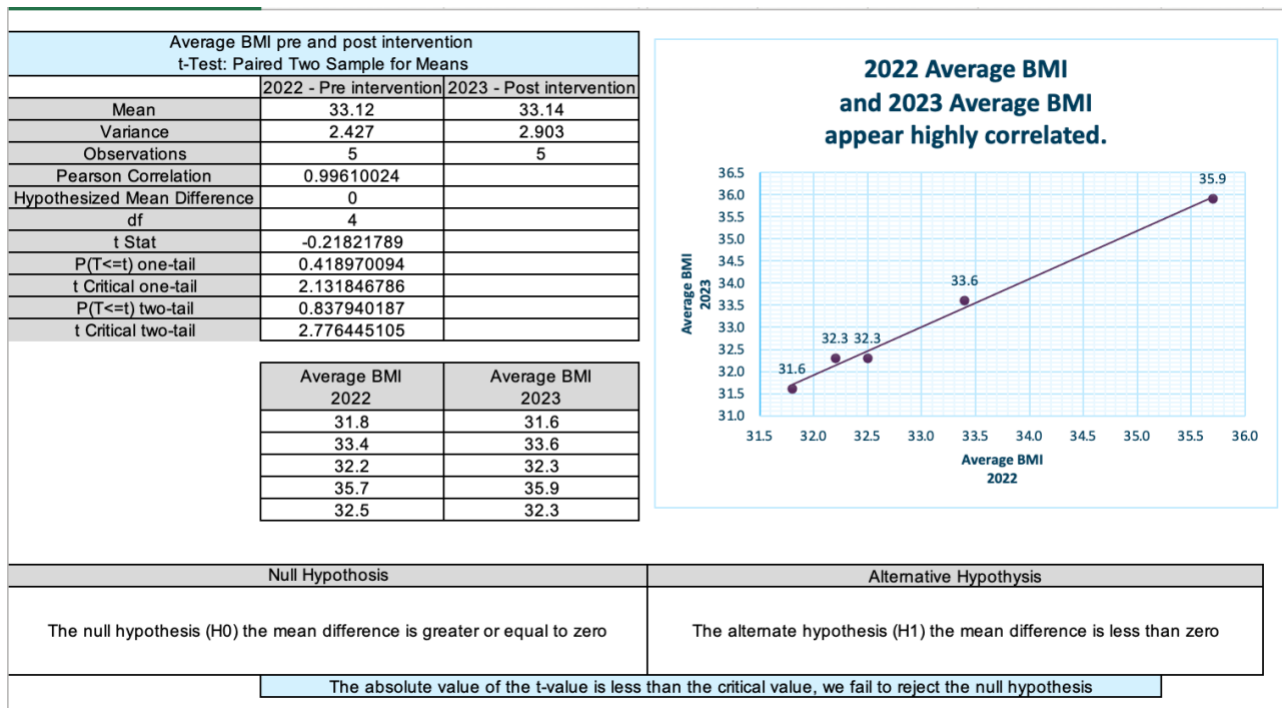


Figure.2 Test 1 Average BMI Pre- and Post-intervention T-Test

The t-test results presented above provide an analysis of the change in average Body Mass Index (BMI) of participants before and after participating in various Employee Wellness

Programs . The data covers the years 2022 (pre-intervention) and 2023 (post-intervention). Understanding the statistical significance of these changes is key to evaluating the effectiveness of these programs in managing weight. In terms of mean BMI values, there was a slight increase observed from the pre-intervention period to the post-intervention period. The average BMI in 2022, before the intervention, was recorded at 33.12. In 2023, following the intervention, the average BMI increased marginally to 33.14. This slight increase, though minimal, suggests that on average, there was a very small change in the BMI of the participants as a result of the intervention. The small magnitude of change raises questions about the effectiveness of the intervention in significantly impacting participants' weight status.

The variance in BMI values also showed a change from 2022 to 2023. Initially, in 2022, the variance was 2.427, but in 2023, it increased to 2.903. This increase in variance indicates a greater spread or dispersion in the BMI scores of participants post-intervention. A higher variance post-intervention suggests that the BMI scores of participants became more varied after the intervention, with some participants perhaps experiencing greater changes in their BMI (either increases or decreases) than others. This variability might imply differing levels of responsiveness to the intervention among the participants, reflecting how individual differences can impact the outcomes of wellness programs.

Analyzing the Pearson Correlation coefficient, which came out to be 0.99610024, reveals a strong positive correlation between the BMI values in 2022 and those in 2023. This high correlation coefficient suggests that individuals who had higher (or lower) BMIs before the intervention tended to maintain their relative position in the BMI distribution post-

intervention. In other words, if a participant had a relatively high BMI compared to others in 2022, they were likely to still have a relatively high BMI in 2023, and vice versa. This strong correlation underlines the consistency in BMI rankings of individuals over the period of the intervention.

The results of the t-test are crucial in understanding the statistical significance of the observed changes in BMI. The t Statistic calculated is -0.21821789 , with degrees of freedom (df) being 4. This t Statistic is a measure of the deviation of the sample mean from the hypothesized mean (in this case, a hypothesized mean difference of zero). The negative sign of the t-statistic indicates that the post-intervention mean is slightly lower than the pre-intervention mean, but the small magnitude of the t-statistic suggests that this difference is not substantial.

The p-value for a two-tailed test is 0.837940187 , which is significantly higher than the conventional alpha level of 0.05 used to determine statistical significance. This high p-value indicates that the difference in average BMI before and after the intervention is not statistically significant. In other words, based on this data and the resultant p-value, there is insufficient evidence to conclude that the wellness intervention had a significant impact on participants' BMI. The critical t-value for the test, 2.776445105 , further supports this conclusion, as the absolute value of the observed t-statistic is much smaller than this critical value, reinforcing the decision not to reject the null hypothesis. The p-value in a two-tailed test (0.837940187) is much higher than the standard alpha level of 0.05 . This high p-value indicates that there is no statistically significant difference in the average BMI of participants before and after participating in the EWPs. The null hypothesis posits that there is no difference (the mean

difference is greater or equal to zero) in average BMI before and after the intervention. Given that the absolute t-value is less than the critical t-value and considering the high p-value, we fail to reject the null hypothesis. This implies that the EWPs did not have a statistically significant effect on the average BMI of the participants.

While the statistical analysis shows no significant change, it is essential to consider the practical significance. The slight increase in average BMI (from 33.12 to 33.14) might not be statistically significant, but it suggests that, on average, there was no improvement in participants' BMI post-intervention. The increase in variance post-intervention suggests that there was a broader spread of BMI scores among participants after the program, which could indicate differing responses to the intervention. The results suggest that the EWPs, as a whole, were not effective in significantly reducing the BMI of participants. This could be due to a variety of factors including program design, participant engagement, or individual differences in response to the programs.

BMI is a single measure and does not account for other factors such as muscle mass, overall fitness, dietary changes, or health behaviors that might have improved even if BMI did not change significantly. The study period covers one year, and longer-term impacts on BMI and overall health might not be captured in this timeframe. The lack of significant BMI change highlights the need for more holistic and personalized approaches in wellness programs, focusing on a range of health and lifestyle factors. The t-test results indicate that there was no statistically significant difference in the average BMI of participants in the EWPs from pre- to post-intervention. This finding suggests that while these programs may have benefits, they did

not significantly change participants' BMI in the observed period. It underscores the need for ongoing evaluation and adaptation of these programs, considering the complexity of weight management and the diversity of participant needs and responses.

Test 2: Average of Weight Gained vs Average of Weight Lost / T-test: Two Sample

Assuming Unequal Variances

t-Test: Two-Sample Assuming Unequal Variances			Average of Weight gained vs Average of weight lost		
	Variable 1	Variable 2	Program	Average Lbs Lost	Average Lbs Gained
Mean	11.1275586	9.66727514	FoodSmart	10.8	9.8
Variance	1.34739077	1.51091945	Weight Watchers	10.6	8.8
Observations	5	5	Noom	10.2	8.9
Hypothesized Mean Difference	0		Healthy Habits	13.2	9.1
df	8		HMR	10.9	11.8
t Stat	1.93137887		Variance	1.34739077	1.51091945
P(T<=t) one-tail	0.04476497				
t Critical one-tail	1.85954804				
P(T<=t) two-tail	0.08952994				
t Critical two-tail	2.30600414				
Null Hypothesis			Alternative Hypothesis		
The null hypothesis (H0) the mean difference equal to zero			The alternate hypothesis (Ha) the mean difference doesn't equal to zero		
The absolute value of the t-value is less than the critical value, you fail to reject the null hypothesis					

Figure.3 Test 2 Average of Weight Gained versus Average of Weight Lost t-Test

The t-test results presented above on the difference between the average weight lost and the average weight gained in various Employee Wellness Programs are presented above. This analysis is key to understanding whether the weight changes experienced by the participants in these programs are significantly different in terms of weight loss versus weight gain. The analysis reveals a distinct difference in the mean values between the two variables. For Variable 1, the average pounds lost, the mean is 11.1275586, suggesting that, on average, participants in these programs lost over 11 pounds. In contrast, the mean for Variable 2, the

average pounds gained, is lower at 9.66727514, indicating that the average weight gain among participants was less than 10 pounds. The variances for these groups, 1.34739077 for Variable 1 and 1.51091945 for Variable 2, further underscore the differences in the distribution of weight changes among the participants. The higher variance in the weight gained group (Variable 2) suggests a greater diversity in the amount of weight gained by different individuals compared to the weight lost group. Both groups consist of the same number of observations ($n=5$), which represents the different EWPs. This equal number of observations provides a balanced comparison between the two groups, allowing for a more reliable analysis of the differences in weight changes across the programs.

The p-value obtained from the test is 0.08952994, which is marginally higher than the conventional alpha level of 0.05. This proximity to the threshold of statistical significance presents a borderline case. In the realm of statistical analysis, the alpha level of 0.05 is typically used as a benchmark to determine if a result is statistically significant. A p-value just above this threshold indicates that, while the results do not provide enough evidence to reject the null hypothesis definitively, they are suggestive enough to warrant further consideration.

The null hypothesis for this test posits that there is no significant difference between the average weight lost and the average weight gained in the EWPs, meaning that the mean difference is zero. Given the p-value, there is not sufficient statistical evidence to reject this hypothesis. However, the closeness of the p-value to the threshold suggests a potential trend that could be explored in further studies.

The t-statistic, standing at 1.93137887, and the degrees of freedom (df) at 8, form the crux of the analysis. The t-statistic is a measure of the difference between the two groups relative to the variation within the groups. A t-statistic of 1.93137887 indicates a tendency toward a significant difference between the average weight lost and gained, but not conclusively so.

The one-tail p-value of 0.04476497 suggests that if the hypothesis was specifically predicting the direction of the difference (e.g., that the weight lost would be greater than the weight gained), there would be a statistically significant difference with a probability of about 4.5% of observing such a difference by chance alone. However, in the context of a two-tailed test, which does not predict the direction of the difference, the p-value is 0.08952994. This p-value, though close to the conventional threshold of 0.05, does not meet the stringent criterion for statistical significance. Therefore, while there is a suggestive trend that the average weight loss may be greater than the average weight gain, the evidence is not strong enough to firmly conclude this for the general population of EWP participants. The findings from this t-test analysis provide intriguing insights into the effectiveness of EWPs in terms of weight management. The fact that the average weight loss is higher than the average weight gain is encouraging, as it suggests that these programs might be more effective in helping participants lose weight rather than gain it. However, the lack of statistical significance in the two-tailed test tempers this conclusion, implying that while there might be a trend, it is not strong enough to be considered conclusive across the board.

The higher variance in weight gain could indicate that individual responses to the programs are more varied when it comes to gaining weight. This could be due to a multitude of factors, including individual differences in metabolism, lifestyle changes, adherence to the program, and psychological factors. The analysis reveals that the average weight lost across the programs is slightly higher than the average weight gained. This suggests a trend where participants tend to lose more weight than they gain in these wellness programs, albeit not at a level of statistical significance. In terms of program effectiveness, this trend, while not statistically significant, points to a potential effectiveness of the EWPs in facilitating weight loss. The lack of a pronounced difference, however, means that this trend should be interpreted with caution. Despite the absence of conclusive statistical evidence, the direction of the mean differences holds practical significance. For participants and program administrators, the fact that there is a tendency towards weight loss rather than weight gain can be considered a positive outcome, indicating that these programs might be having a beneficial impact, even if it is not captured fully in the statistical analysis.

The unequal variances and the range of means observed across different programs highlight the variability in individual responses to these EWPs. This variability is a crucial aspect of weight management programs, as it underscores the importance of personalized approaches that cater to individual needs, preferences, and physiological responses. The current data does not provide insight into the long-term sustainability of the weight changes observed post-program participation. To assess the enduring impact of these programs, long-term tracking of participants' weight changes would be necessary. Such tracking would help understand whether the weight lost is sustained over time or if there is a tendency to regain weight. The

findings from this analysis reinforce the need for a comprehensive approach to wellness.

Weight change is just one metric of health, and a holistic approach to wellness should include other elements such as nutrition education, psychological support, and physical activity. These components can contribute significantly to overall health outcomes, going beyond the scope of mere weight metrics. The t-test results indicate that while there is a tendency towards more weight loss than gain in EWPs, the difference is not statistically significant. This suggests a nuanced effectiveness of these programs in weight management. The borderline p-value indicates a potential trend that merits further investigation, possibly with a larger sample size or over a more extended period. These findings highlight the complexity of weight management and the need for personalized approaches within wellness programs.

Metric	Completed ANY HL Program	Eligible but DID NOT complete a program	Completed FoodSmart	Completed Weight Watchers	Completed Noom	Completed Healthy Habits	Completed HMR	
Total Members	6,706	16,904	595	1,635	3,290	438	230	
Average Subscriber Salary	\$79,984	\$87,775	\$82,363	\$73,392	\$84,070	\$73,813	\$99,964	
Average Member Age	47.3	45.2	45.6	50.8	46.9	48.4	49.4	
Gender Split	Female	5,433	10,184	513	1,450	2,477	346	188
	Male	1,261	6,692	82	183	806	91	41
	Undefined	12	28	0	2	7	1	1
	% Female	81.0%	60.2%	86.2%	88.7%	75.3%	79.0%	81.7%
	% Male	18.8%	39.6%	13.8%	11.2%	24.5%	20.8%	17.8%
% Undefined	0.2%	0.2%	0.0%	0.1%	0.2%	0.2%	0.5%	

Table.14 Gender Splits Across Programs

The data from Table 14 offers an overview of the demographics and participation rates in various Employee Wellness Programs across a large member base. This analysis is crucial for understanding the characteristics of participants and their engagement with different wellness programs. The total number of members across all programs is (6,706). The specific participation in each program is as follows: Foodsmart (595 members), Weight Watchers (1,635 members), Noom (3,290 members), Healthy Habits (438 members), and HMR (230 members).

The average salary of participants varies across programs, with HMR participants having the highest average salary (\$99,964) and WW participants having the lowest (\$73,392).

This variation in salary could indicate differences in accessibility or appeal of the programs to different income groups. The average age of participants is fairly consistent across programs, ranging from 45.2 to 50.8 years. This consistency suggests that these wellness programs are similarly appealing to middle-aged individuals.

The percentage of undefined gender is minimal in all programs. A significant portion of the total members did not complete any program. Female non-participants are significantly higher at (60.2%) in comparison to male non-participants that was notably lower at (39.6%). This could indicate barriers to participation or completion, such as program fit, engagement levels, or external factors. For Foodsmart, high female participation (86.2%) and a relatively high average salary (\$82,363) suggest that the program may be more appealing to or accessible for higher-income female participants. The Weight Watchers program has the largest gender balance but still skews heavily towards female participants (60.2%). The lower average salary (\$73,392) compared to other programs could indicate broader accessibility. With the highest participant count, Noom shows a broad appeal but still has a higher female participation rate (75.3%). The average salary is mid-range (\$84,070), suggesting a moderate level of accessibility across different income groups.

The Weight Watchers program shows the highest female participation rate (88.7%) and the lowest average salaries (\$73,392), indicating that it might be more accessible or appealing to women in lower income brackets. HMR participants have the highest average salary (\$99,964)

possibly reflecting a program that is either perceived as premium or is more accessible to higher-income individuals. The gender balance is slightly more equal compared to other programs.

The data shows a significant gender disparity in participation, with female members being more likely to participate in EWPs. This could be due to various factors, including program marketing, gender differences in health awareness, or program content and delivery methods that might be more appealing to women. The variation in average salaries among participants of different programs suggests that income level may influence program choice or accessibility. Higher-income individuals might be more inclined or able to participate in certain programs. The consistency in average age across programs indicates that middle-aged individuals are the primary participants. This age group might be more concerned about health issues or more motivated to engage in wellness activities. The fact that a significant number of members did not complete any program points to potential barriers. These could include time constraints, lack of motivation, program relevance, or personal circumstances.

These findings have important implications for the design and marketing of wellness programs. There is a need for programs to be inclusive and appealing to a wider demographic, particularly in terms of gender and income. The data underscores the importance of personalized approaches in wellness programs. Tailoring programs to meet the diverse needs of participants could enhance engagement and effectiveness. The analysis reveals significant gender and income disparities in the participation of various EWPs. These disparities highlight the need for more inclusive and accessible wellness programs. Understanding and addressing

the factors that influence participation can help in designing more effective and appealing wellness initiatives that cater to a broader demographic.

Test 3. Female and Male EWP's Participation / Chi-Square Test

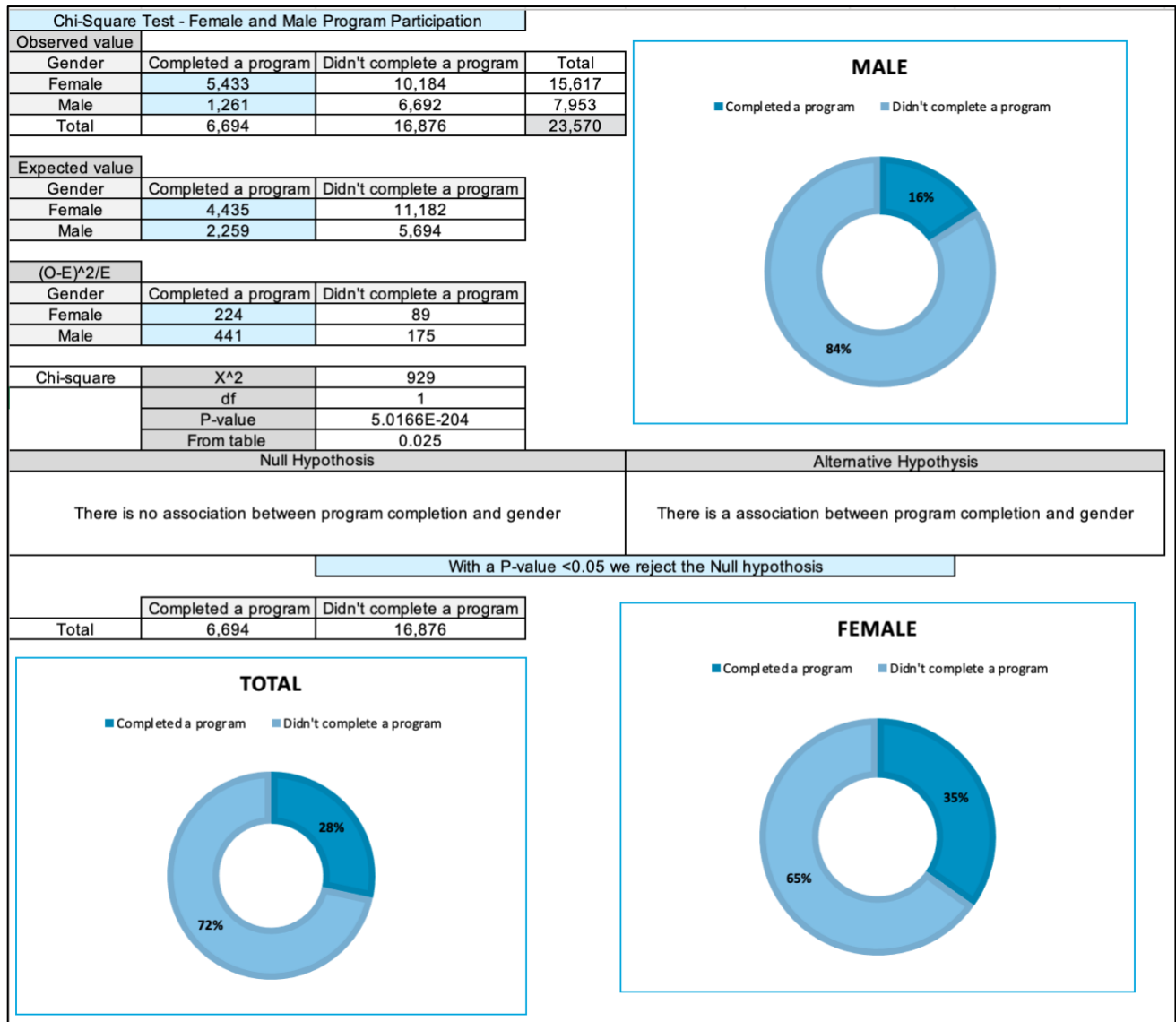


Figure.4 Chi-Square Test Results for Female and Male Program Participation

The chi-square test results on the relationship between gender and program completion in an Employee Wellness Program (EWP) are presented here. The key findings from this analysis

can be broken down into several aspects. The observed values indicate the actual number of males and females who completed and did not complete the program. According to the data, 10,184 females and 6,692 males didn't complete the program, while 5,433 females and 1,261 males completed it. This data suggests a gender disparity in program completion rates. The expected values, based on the assumption that gender does not influence program completion, show a different distribution. Under this assumption, it was expected that 4,435 females and 2,259 males would complete the program. The discrepancy between these expected and the observed values suggests that gender might play a role in program completion.

The chi-square statistic is calculated as the sum of the squared difference between observed and expected values, divided by the expected values. In this case, the calculations for females and males in both 'completed' and 'did not complete' categories show significant differences between observed and expected values. For instance, the squared differences for females who completed the program (228) and males who completed the program (441) are notably high. The chi-square statistic (χ^2) is 929, with a p-value of approximately 5.0166E-204, which is significantly less than the conventional alpha level of 0.05. This extremely low p-value indicates that the difference in program completion rates between genders is statistically significant and not due to random chance. The results lead to the rejection of the null hypothesis, which stated that there is no association between program completion and gender. The alternative hypothesis, which posits an association between program completion and gender, is accepted based on these results.

This finding implies that gender significantly influences the likelihood of completing the wellness program. Specifically, the data indicates that males are more likely to not complete the program compared to females, as evidenced by the higher than expected number of males who did not complete the program. There may be gender-specific factors influencing program participation and completion. These could include differences in health behaviors, preferences, time constraints, or perceived benefits of the program. The EWP might need to be tailored to address the unique needs and challenges faced by different genders. This could involve targeted outreach, gender-specific support structures, or modifications to the program design. The chi-square test results indicate a significant association between gender and program completion in the EWP. This suggests the need for gender-specific strategies in the implementation of such programs to ensure equitable participation and effectiveness. The results underscore the importance of considering gender as a critical factor in the design and evaluation of health promotion initiatives.

The first research question for this work is: *What are the demographics of the new Advocate Aurora Foodsmart program participants compared to the other Advocate Aurora Healthy Living programs?*

One of the most prominent demographic aspects is the gender distribution among participants. In the Foodsmart program, there is a significant female majority, with (81.0%) of participants being female and (18.8%) male. This trend is consistent across other programs, such as Weight Watchers (88.7%) female and only (11.2%) male, Noom (75.3%) female and (24.5%) male, Healthy Habits (79.0%) female and (20.8%) male. And HMR (81.7%) female and

(17.8%) male. The higher female participation rates across all programs suggest a greater inclination or interest among women in wellness and weight management programs. This gender disparity highlights the need for these programs to potentially tailor their content or marketing strategies to be more inclusive and appealing to male participants. Regarding age, the data suggests a relatively consistent average age range across different programs, with most participants being middle-aged. This consistency indicates that these wellness programs are equally appealing to individuals in this age demographic, possibly due to increased health awareness or the onset of health issues related to weight and lifestyle in middle age.

In terms of overall participation based on position, the clinical group consistently shows the highest engagement across all programs. With (4,011) clinical employees and (775) non-clinical and (416) unknown. But it's important to note that Advocate Aurora is primarily made-up of clinical workers. Over 90% of the active teammate population are clinical workers. And that by itself would be a reason for the high participation among clinical staff in comparison to non-clinical. Furthermore, with 416 employees with unknown classification, filling the gaps in the data through appropriate imputation techniques is crucial for enhancing the reliability and completeness of the dataset.

The average salary of participants in the Foodsmart program is notably high (\$82,363), indicating that the program might be more accessible or appealing to individuals with higher incomes. This trend varies across other programs, with HMR participants having the highest average salary (\$99,964), suggesting that some programs might be perceived as premium or more accessible to higher-income individuals. Conversely, programs like Healthy Habits and

Weight Watchers have lower average salaries (\$73,813 and \$73,392, respectively), which could indicate broader accessibility across different income groups.

When it comes to the location of participants, the findings from the present study indicate that employees in urban areas of Wisconsin exhibit higher engagement in employee wellness programs than their counterparts in rural counties. It is worth highlighting that, in general, Advocate Aurora has a larger workforce residing in urban areas than in rural areas. The total urban participation was (2929) compared to the total rural participation of (342) Wisconsin employees. The data further reveals that both urban and rural employees demonstrated increased participation in Noom compared to other employee wellness programs. In Wisconsin urban areas participation in Noom (1686) was the highest followed by WW (818), Foodsmart (284), HMR (123), then Healthy Habits (18). Similarly in Wisconsin rural areas participation was the highest in Noom (189) followed by, WW (102), Foodsmart (31) then Healthy Habits (11) and HMR (9).

Another important aspect is the completion rates of these programs. Foodsmart, along with other programs, shows a significant proportion of participants who did not complete the program. This indicates potential barriers to participation or completion, such as program fit, engagement levels, or external factors like time constraints or personal circumstances. The data does not provide insights into the long-term sustainability of weight loss or gain post-program participation. It suggests a need for long-term tracking to understand the enduring effects of these programs and underscores the importance of a deeper approach to wellness that includes nutrition education, psychological support, and physical activity.

The demographics of the Foodsmart program participants, when compared to other Advocate Aurora Healthy Living programs, show similarities in terms of age distribution, with a predominance of female participants, and a higher level of urban participation. With the clinical group consistently showing the highest engagement across all programs. However, there are differences in average income levels, indicating varying accessibility across income groups.

The second research question posed is: *What is the success of the new Foodsmart program measured by BMI compared to the other programs?*

The Foodsmart program exhibited a slight decrease in average BMI, moving from (31.8) pre-intervention to (31.6) post-intervention. This reduction, although minimal, suggests some level of effectiveness in weight management for participants in this program. However, it is crucial to consider the context of this change – the Foodsmart program's average starting BMI was already in the obese category (BMI of 30 and above). Thus, while the program did lead to a marginal decrease, the impact on overall health and weight status needs careful interpretation. Below is a comparison of the results to those of other programs:

- Weight Watchers: Participants showed an increase in average BMI, from 33.4 to 33.6. This indicates a slight worsening in terms of weight status among its participants, contrasting with the minimal improvement seen in the Foodsmart program.
- Noom: Similarly, Noom participants experienced a slight increase in average BMI, moving from 32.2 to 32.3. Like Weight Watchers, this suggests a small move in the wrong direction, in contrast to the Foodsmart program.

- Healthy Habits and HMR: These programs also showed an increase in average BMI post-intervention, with Healthy Habits moving from 35.7 to 35.9 and HMR from 32.5 to 32.3. Again, these results contrast with the slight reduction seen in the Foodsmart program.

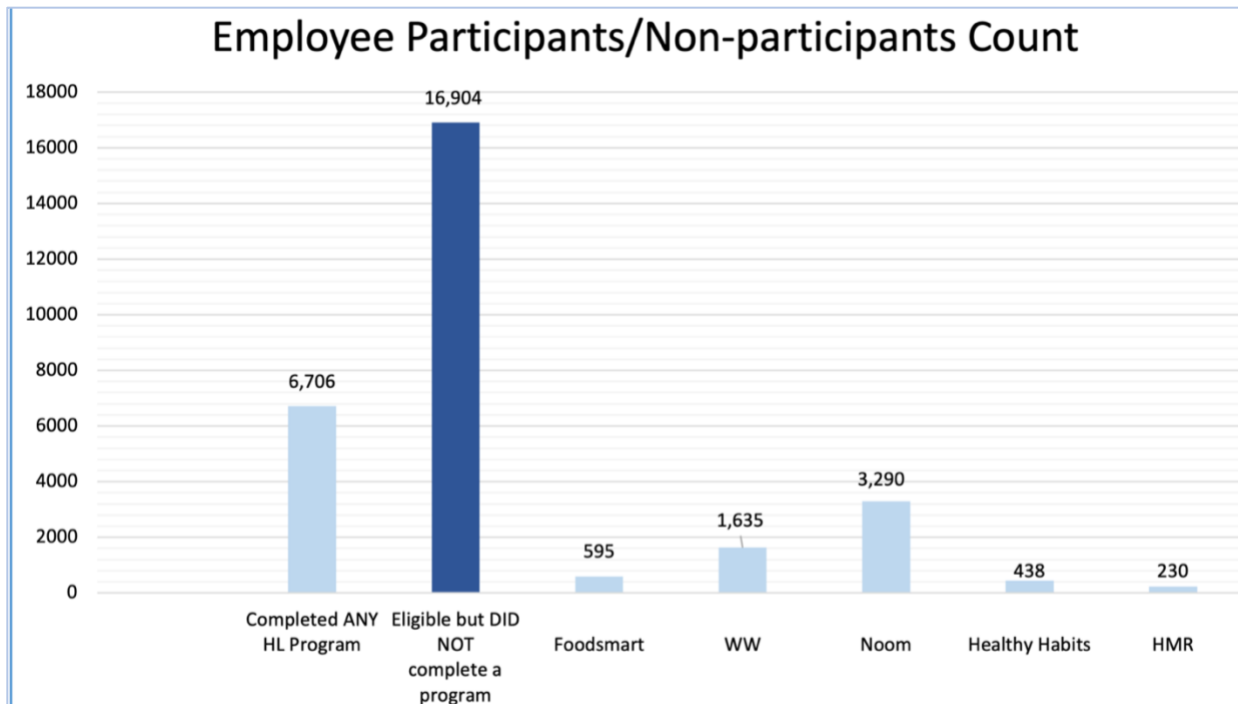
It is important to note that the statistical analysis (paired two-sample t-test) of the BMI changes for these programs indicated that these changes were not statistically significant. The t-test results, particularly the high p-values, suggest that the differences in average BMI before and after the intervention in the Foodsmart program and other programs were not large enough to be considered statistically significant. This implies that while there were observable changes in BMI, they were not strong enough to conclusively attribute them to the effectiveness of these programs.

Despite the lack of statistical significance, the direction of the BMI changes in the Foodsmart program – a decrease, albeit small – is noteworthy. In the context of health and wellness, even minor improvements in BMI can have positive implications for individual health, particularly when considering large populations. This contrasts with the slight increases observed in other programs, suggesting that the Foodsmart program might have certain aspects contributing positively to weight management. The data also highlights the importance of considering individual variability in responses to these wellness programs. The varied effectiveness across programs underlines the need for personalized approaches in weight management. Different participants may respond differently to the same program due to individual differences in metabolism, lifestyle, motivation, and adherence. Though the Foodsmart program demonstrated a slight reduction in average BMI compared to a slight

increase in other programs, the changes were not statistically significant. This suggests that while there may be a trend towards effectiveness in the Foodsmart program, it is not strong enough to be deemed conclusively successful in reducing BMI compared to other programs. This finding underscores the complexity of weight management in wellness programs and highlights the need for ongoing evaluation and adaptation to meet diverse participant needs effectively.

Chapter 5: Conclusions, Interpretations and Recommendations

5-A. Summary



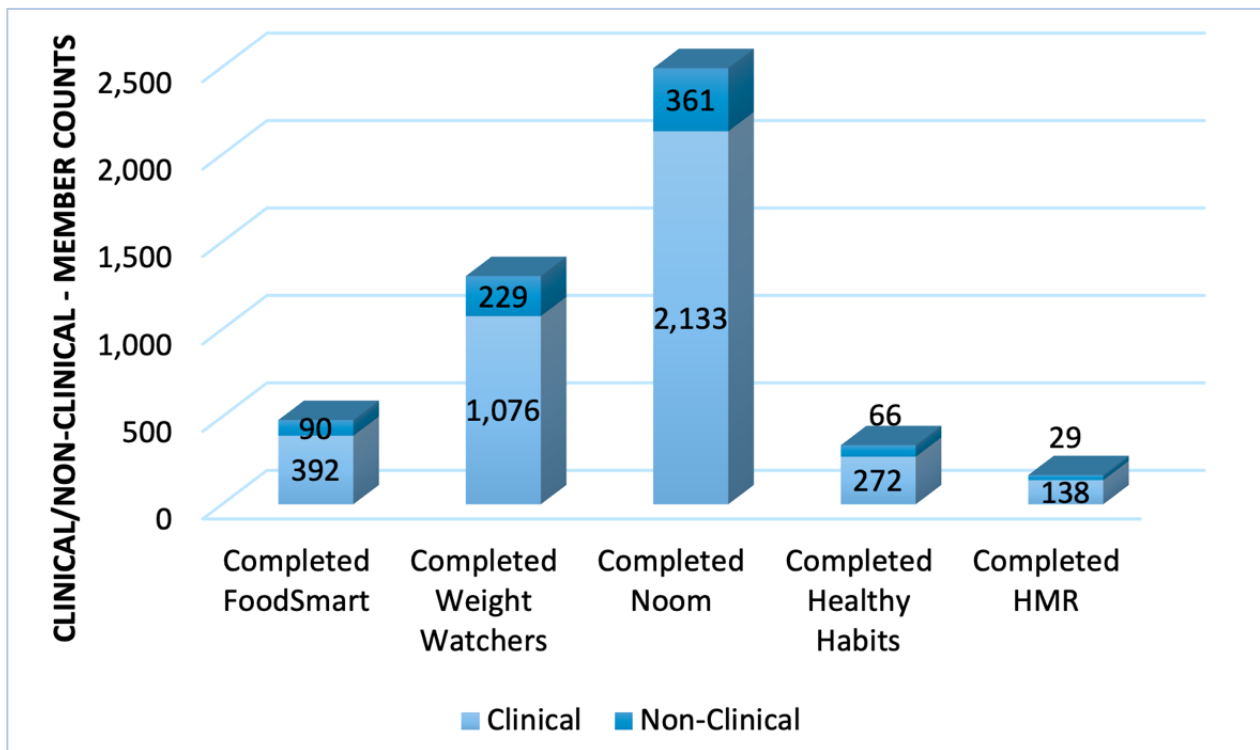
Graph.6 Employee Participants / Non-participants Count

The current study aimed to assess the demographics and effectiveness of the new Foodsmart program at Advocate Aurora, particularly in comparison with other Advocate Aurora Healthy Living programs. By analyzing various metrics, including Body Mass Index (BMI)

changes, gender distribution, location of participants, age, position and income levels, the study provides an overview of the participant demographics and the success of these programs in terms of weight management. There was a total of (16,904) employees who were eligible but did not complete a program. And a total number of (6,706) employees who completed across all programs. The specific participation in each program is as follows: Foodsmart (595 members), Weight Watchers (1,635 members), Noom (3,290 members), Healthy Habits (438 members), and HMR (230 members). See Graph.6

A significant finding across all programs, including Foodsmart, is the predominance of female participants. For instance, in the Foodsmart program, females constituted (86.2%) of the participants, a trend consistent with other programs like Weight Watchers (88.7%) female and Noom (75.3%) female. This gender disparity indicates a greater female inclination towards wellness and weight management programs. The participant age range was relatively consistent across the programs, with an average age of (47.3) concluding that most participants are considered middle-aged. This uniformity suggests that these wellness programs are similarly appealing to individuals in this age demographic, possibly due to increased health awareness or health issues related to weight and lifestyle in middle age. The average income of participants varied across programs. Foodsmart participants had a relatively high average income (\$82,363), indicating that the program might be more accessible or appealing to higher-income individuals. In contrast, programs like Healthy Habits (\$73,813) and Weight Watchers (\$73,392), with lower average incomes, might have broader accessibility.

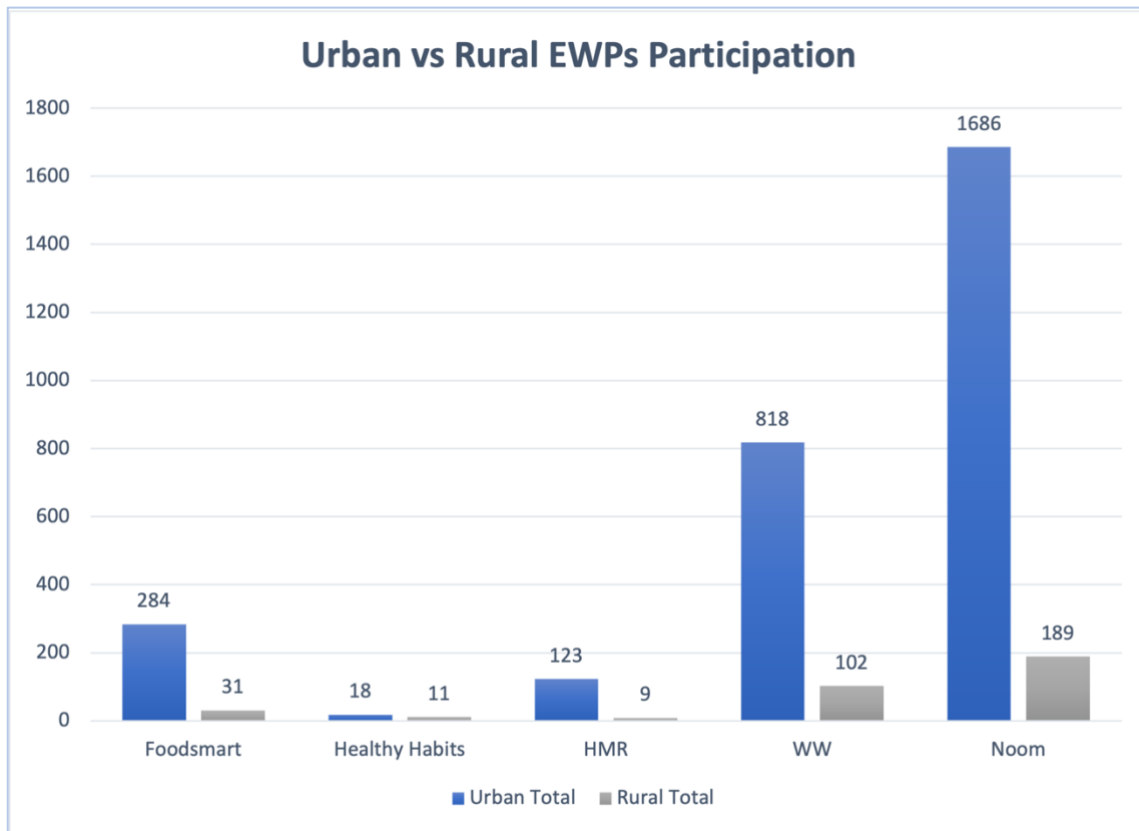
In terms of overall participation based on position, the clinical group consistently shows the highest engagement across all programs as seen in Graph.7. But as mentioned before, Advocate Aurora is primarily made-up of clinical workers. Over 90% of the active teammate population are clinical workers. And that by itself would be a reason for the high participation among clinical staff in comparison to non-clinical.



Graph.7 Clinical/Non-clinical Member Count

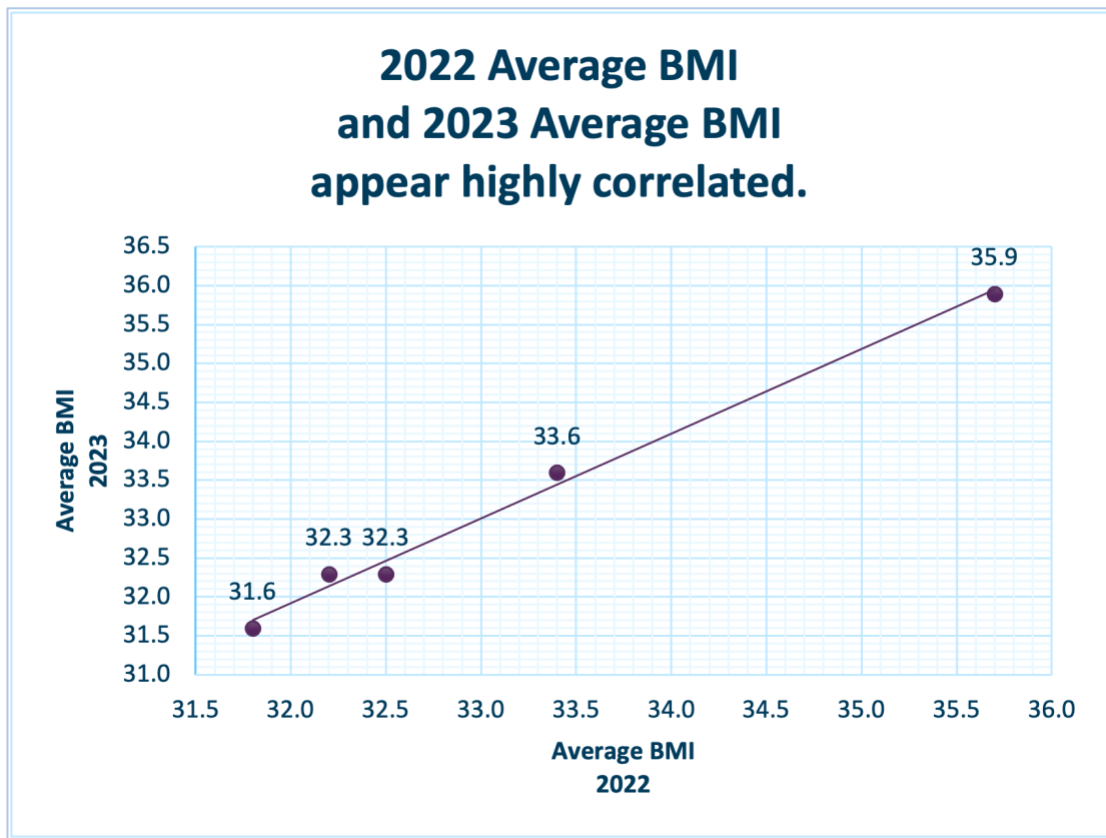
In addition, as seen in the following Graph.8, the data from the current study found that employees who reside in urban areas have higher levels of participation in employee wellness programs compared to employees who reside in rural counties in Wisconsin. Breaking it down, urban employees demonstrated the highest participation in Noom (1686), followed by WW (818), and then Foodsmart (284), HMR (123), and lastly Healthy Habits (18). This creates an opportunity for additional research into why urban employees preferred these specific

programs, or what these programs offered that made them more appealing to Aurora Hospital Healthcare employees. And when it comes to participation in rural areas there was higher participation in Noom (189), followed by WW at (102), Foodsmart at (31), Healthy Habits at (11), and HMR at (9). This finding is significant and creates the opportunity for further research into the factors that influence employee’s choice of EWPs and why Noom and WW far outpace other programs in terms of rural employee participation.



Graph.8 Urban vs. Rural EWPs Participation

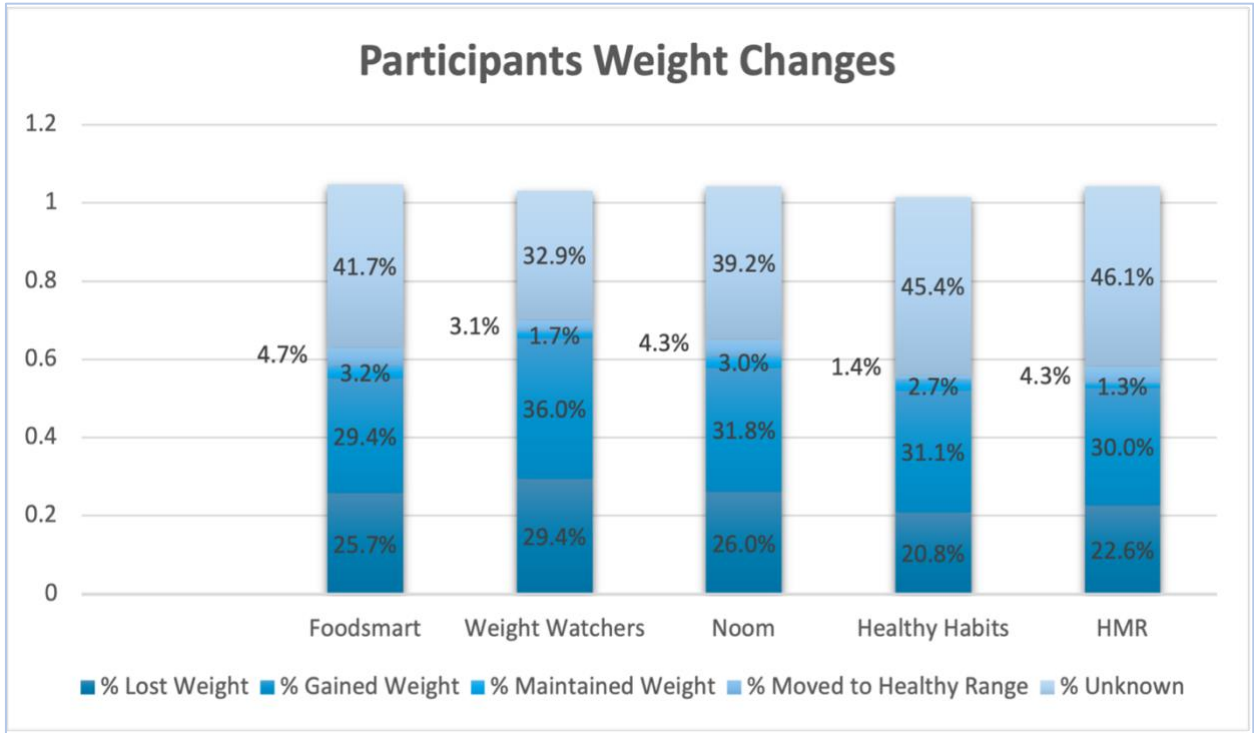
The Foodsmart program showed a slight decrease in average BMI from 31.8 to 31.6 post-intervention, suggesting a small positive impact on participants' weight status. This contrasted with other programs, such as Weight Watchers and Noom, which exhibited slight increases in average BMI post-intervention. Despite observable changes in BMI, the paired two-sample t-test indicated that these changes were not statistically significant. The high p-values across these programs suggest that the differences in average BMI before and after the interventions were not substantial enough to be attributed conclusively to the programs' effectiveness. Comparing the Foodsmart program with others, it demonstrated a minor improvement in BMI, while programs like Weight Watchers and Healthy Habits showed a slight worsening in terms of weight status. However, given the lack of statistical significance, these findings should be interpreted cautiously.



Graph.9 Correlation Between 2022 Average BMI and 2023 Average BMI of Participants

The study highlighted the practical implications of these programs for weight management. While statistical tests did not show significant differences, the direction of mean differences in the Foodsmart program (a reduction in BMI) could still hold relevance for participants and program administrators. The importance of individual variability was also underscored, suggesting the need for personalized approaches in weight management.

Furthermore, the data did not provide insights into the long-term sustainability of weight loss or gain, indicating a need for extended tracking to understand the lasting effects of these programs. The study revealed gender, age, location, and income disparities in the participation of various EWPs. While the Foodsmart program showed a slight improvement in average BMI compared to other programs, the changes were not statistically significant. This suggests a modest effectiveness of these programs in weight management, highlighting the need for more personalized and better approaches to wellness. Understanding these patterns is crucial for designing effective wellness programs that cater to a broad demographic and contribute positively to the long-term health and well-being of participants. See Graph.10 for EWPs effects on participants weights.



Graph.10 EWP's Effects on Participants Weights

Predicted Outcomes:

The first hypothesis is: *In the state of Wisconsin the majority of Advocate Aurora EWP's participants reside in Urban areas.*

This hypothesis was supported by the data. The data from this study revealed that employees at Aurora Hospital who reside in urban areas have a higher participation in employee wellness programs compared to those who live in rural areas. From the literature, higher participation in employee wellness programs would mean that the outcomes and benefits associated with EWP participation will be skewed in favor of the employees who live in urban areas. It would also imply that employees who live in urban areas may have a higher perception of the values of wellness programs, may work in an environment that is more supportive of employee wellness, or feel that the leaders demonstrate more commitment to

employee wellness programs in their work setting. Further research may examine these ideas to determine why there is a higher level of participation among urban employees compared to rural employees.

The second hypothesis is: *Participants of the Foodsmart program tend to be a younger demographic compared to the other Healthy Living programs.*

This hypothesis was not supported by the data. The findings showed a relatively consistent average age across the different EWPs, with most participants being middle-aged. The average age range was similar for the Foodsmart program (45.6) and other programs like Weight Watchers (50.8), Noom (46.9), Healthy Habits (48.4), and HMR (49.4). This consistency indicates that the Foodsmart program, much like the others, appeals similarly to middle-aged individuals, and there was no significant indication that the Foodsmart program attracts a notably younger demographic.

The third hypothesis is: *Participation of overweight/obese employees in EWPs helps decrease or maintain their weight.*

This hypothesis was partially supported, but with caveats. The data revealed slight changes in average BMI values for participants in these programs. For instance, in the Foodsmart program, there was a small decrease in average BMI from 31.8 to 31.6. However, other programs like Weight Watchers and Noom showed a slight increase in average BMI post-intervention. Statistical analysis using t-tests showed that the changes in BMI, both increases and decreases, were not statistically significant. This suggests that while there were observable changes in BMI, they were not strong enough to be conclusively attributed to the effectiveness

of these programs in reducing weight. However, it is important to note that even small changes in BMI can have health implications, especially when considering large populations.

Despite the lack of statistical significance, the minor trend towards weight loss in the Foodsmart program does suggest that participation in this EWP might help some overweight or obese employees in weight management. This is contrasted with the slight increases observed in other programs. The data also underlined the importance of individual variability in responses to these wellness programs. Different participants may respond differently to the same program due to individual differences in metabolism, lifestyle, motivation, and adherence. The study did not provide insights into the long-term sustainability of the weight changes observed post wellness program participation. Thus, while there may be a short-term impact on weight, the long-term effectiveness of these programs in helping overweight/obese employees manage their weight remains unclear. The study partially supported the hypothesis regarding the weight management benefits of EWPs for overweight/obese employees, showing a slight trend towards weight loss in the Foodsmart program. However, the lack of statistical significance suggests that these changes are not robust enough to make definitive conclusions.

5-B. Conclusions

The study conducted on the Advocate Aurora Employee Wellness Programs , including the Foodsmart program, was primarily aimed at understanding the demographics of participants and evaluating the effectiveness of these programs in managing weight, specifically measured by changes in Body Mass Index (BMI). Methodologically, the study employed a holistic and rounded approach, analyzing various data points such as participant gender, age,

position, location, income levels, and program-specific outcomes like weight and BMI changes, along with program completion rates. This multifaceted approach was essential to paint a full picture of the effectiveness and reach of these wellness programs. The review of this study within the broader literature and theoretical frameworks is crucial for understanding its implications. Previous studies, such as those by Gorty et al. have highlighted the positive implications of wellness programs, particularly for healthcare employees. They noted that while participation rates in such programs typically range from 30-40%, there is a need to incentivize participation further. They found that although there were no significant changes in obesity rates between participants and non-participants, there were positive impacts like decreased tobacco use and increased engagement in cardiovascular activities. (Gorty et al., 2016) This aligns with this study's findings, where the Foodsmart program showed a slight reduction in average BMI, suggesting potential but limited effectiveness in weight management.

Kernan et al. evaluated wellness programs in a nursing home setting and found that the high number of low-wage, female healthcare employees participating in these programs could affect the results, as many had additional responsibilities like families and second jobs, impacting their ability to engage in healthier behaviors. This mirrors the demographic trends observed in our study, where a significant proportion of participants, particularly in the Foodsmart program, were female, and the programs were more likely to be accessed by those with higher incomes. (Kernan et al., 2020) Edman et al. explored the wellness option of health coaching, finding that individualized approaches significantly impact healthcare employees, particularly those with chronic illnesses. This is in line with the suggestion from this study's results that individualized, tailored approaches might be more effective in wellness programs.

(Edman et al.,2019) Similarly, Fink assessed the impact of an incentivized employee wellness program, finding uneven participation among different demographics and a reduction in weight among the obese population. This is consistent with our findings where participation varied based on demographic variables and the overall effectiveness in terms of weight reduction was modest. (Fink, 2014)(Fink, 2016)

Geng and Maeng evaluated a similar program at the Geisinger Health System, where they found that baseline employee characteristics predicted participation and goal achievement in wellness programs. This resonates with our study, emphasizing the importance of considering participants' characteristics when implementing wellness programs. (Geng & Maeng, 2017) Furthermore, Hu et al. studied the effectiveness of digital nutrition interventions. They found significant improvements in these areas among participants, suggesting the potential effectiveness of digital platforms in wellness programs. (Hu et al., 2023)

The study's findings should be interpreted with an understanding that while there were observable changes in some metrics like weight and BMI, these changes were not always statistically significant. The study suggests a trend towards the effectiveness of programs like Foodsmart in weight reduction, but the results are not overwhelmingly conclusive. This aligns with the broader literature which suggests that while wellness programs have potential benefits, their success is influenced by various factors including participant demographics, program structure, and individual engagement levels. A key aspect of the study involved an examination of the demographic characteristics of EWP participants. The data revealed notable gender, age, location, position, and income disparities across the programs. A significant finding

was the predominance of female participants in these programs, including Foodsmart. For instance, in the Foodsmart program, females constituted a majority, indicative of a trend that was consistent across other EWPs. This gender disparity suggests a greater inclination or interest among women in wellness and weight management programs and raises questions about the accessibility and appeal of these programs to male participants.

Regarding age, the study showed a relatively consistent average age range across the different EWPs. Most participants were middle-aged, indicating that these wellness programs appeal similarly to individuals in this demographic. This regularity might be attributed to increased health awareness or health-related issues that become more prominent in middle age. Income levels among participants also varied across programs. The Foodsmart program had participants with relatively higher average incomes. This finding could suggest that the program might be more accessible or appealing to individuals in higher income brackets. In contrast, other programs like Healthy Habits and Weight Watchers, which reported lower average incomes, might have broader accessibility across different income groups.

When it comes to location, The data from this study revealed that employees at Aurora Hospital who reside in urban areas have a higher participation in employee wellness programs compared to those who live in rural areas. With a total urban participation of 2929 and total rural participation of 342. Research evidence does indicate that geographic location influences the design of EWPs. Scholars argue that organizations are likely to develop or incorporate wellness programs that reflect the geographic setting. (Otenyo and Smith, 2017) In a study on EWPs and the influence of geography, Otenyo and Smith found that the decision to implement

certain wellness services in an urban location is partially influenced by the geography rather than the wellness program or the characteristics of the organization. (Otenyo and Smith, 2017) From the literature, higher participation in employee wellness programs would mean that the outcomes and benefits associated with EWP participation will be skewed in favor of the employees who live in urban areas. (Otenyo and Smith, 2017) It would also imply that employees who live in urban areas may have a higher perception of the values of wellness programs, may work in an environment that is more supportive of employee wellness, or feel that the leaders demonstrate more commitment to employee wellness programs in their work setting. (Otenyo and Smith, 2017) Further research may examine these ideas to determine why there is a higher level of participation among urban employees compared to rural employees.

The assessment of BMI changes across the wellness programs provided insightful data on their effectiveness. The Foodsmart program exhibited a slight decrease in average BMI from 31.8 to 31.6, suggesting some level of success in weight management. This decrease, although minimal, contrasts with the slight increases in average BMI observed in other programs like Weight Watchers and Noom. However, it is critical to note that the statistical analysis, particularly the t-test results, indicated that these changes in BMI were not statistically significant. This suggests that while observable changes occurred, they were not substantial enough to be conclusively attributed to the effectiveness of these programs in reducing weight.

When these findings are compared with similar studies, interesting parallels and contrasts emerge. The work of Fink and others provides a useful benchmark for understanding obesity rates, and participation patterns in wellness programs. Fink's research, for instance,

highlighted uneven participation among different demographics and a reduction in weight among the obese population in wellness programs. (Fink, 2014) This aligns with the findings from the current study, where participation varied based on demographic variables, and the overall effectiveness in terms of weight reduction was modest. Furthermore, the observation of higher participation rates among females and individuals in certain age and income brackets is consistent with broader trends noted in wellness program research. Studies like those conducted by Kernan et al. and Geng and Maeng have also noted demographic influences on participation and outcomes in wellness programs. Kernan et al. (2020), Geng and Maeng (2017)

One significant limitation lies in the incomplete demographic data. While the study effectively captures gender, age, location, position, and income disparities among participants, it stops short of examining other demographic factors. For example, ethnic background can greatly influence health behaviors, access to healthcare resources, and responses to different wellness initiatives. Different ethnic groups may have varying health beliefs, practices, and challenges, all of which could impact their engagement and outcomes in employee wellness programs. (Fink, 2014) Similarly, the study does not explore educational background, a factor that could affect program participation. Individuals with higher education might have better access to health information, leading to greater awareness and motivation to engage in health-promoting behaviors. They might also have more opportunities to engage in wellness activities, both inside and outside the workplace. On the other hand, those with less education might face barriers in understanding health information, potentially leading to lower participation or less effective engagement in wellness programs. (Fink, 2014)

There is a tendency in wellness program research to focus primarily on physical health metrics. Metrics such as weight, BMI, blood pressure, and cholesterol levels are commonly used to measure program success. While these physical health indicators are undoubtedly important, this approach often overlooks the psychological and emotional aspects of health. Mental health outcomes, such as stress reduction, anxiety management, and improvements in mood and psychological well-being, are equally important components of overall health. The failure to measure these outcomes means that the study does not capture the potential benefits of the EWPs in enhancing participants' psychological well-being, which can be as significant as employee's physical health. Lack of taking care of mental and physical health of healthcare employees will have most of them leaving the organization following lack of access to comprehensive services. (Uphoff et al., 2021) Different factors lead to elevated pressure among healthcare professionals, including huge volumes of work, long shifts, fast pace, ethical conflicts, perceived work security, bullying at place of work, or lack of social support. The most significant mental distress can result in burnout, depression, anxiety ailments, sleeping conditions, and other sicknesses (Pappa et al., 2020). Burnout among healthcare employees, especially medical staff, has become a job risk. In result of that, about 47% of healthcare workers are planning to leave their job in the next 3 years. (Kelly J.,2022) Due to getting burnt-out, healthcare employees are leaving their professions creating a shortage (West, 2020). Therefore, addressing the mental health aspects of healthcare employees can assist in enhancing their health and productivity.

Additionally, the study does not explore lifestyle behavior changes apart from those directly related to weight. This includes physical activity and training levels unrelated to weight

loss, smoking, sleep patterns, and other health promoting behaviors. According to Espinosa-Salas and Gonzalez-Arias, these aspects of lifestyle change can have profound effects on overall health and wellness of employees. For instance, dietary improvements can lead to better health outcomes independent of weight loss, and increased physical activity can enhance cardiovascular health, regardless of its impact on BMI. (Espinosa-Salas & Gonzalez-Arias, 2023)

Another significant limitation is the lack of focus on the long-term sustainability of health improvements. The study is limited to the data from 2022 to 2023 therefore it doesn't reflect whether the changes observed, such as reductions in weight and BMI, are maintained over an extended period or if they are short-term gains. Long-term sustainability is a critical measure of the success of wellness programs, as temporary improvements do not influence essential changes in employees' overall well-being. Understanding whether participants can maintain healthier weights, continue to improve their lifestyle habits, and enhance mental well-being over time is essential in evaluating the effectiveness of wellness programs. (Lowensteyn et al., 2019) A comprehensive wellness program should ideally improve all aspects of an individual's health. For example, a program might not lead to substantial BMI reductions but could have a profound impact on mental health and lifestyle changes including increased physical activity, lower insomnia, and stress, which is equally important in the overall assessment of individuals holistic wellness. (Lowensteyn et al., 2019)

One of the key methodological limitations in this study is the reliance on Body Mass Index (BMI) as the primary measure of program success. BMI is a widely used metric due to its simplicity and ease of calculation. However, it offers a limited evaluation on an individual's

health. BMI does not differentiate between muscle and fat, which is important when assessing employee's health improvements. For example, an individual could gain muscle mass and lose fat because of engaging in strength training, which might not lead to a significant change in BMI but represents a positive health outcome. (Buss, 2014) Furthermore, BMI does not account for the distribution of body fat, which is an important factor in assessing health risks associated with obesity. Fat accumulation around the waist, is a significant risk factor for metabolic diseases, which BMI alone cannot show. Bray G. A. (2023) The focus on BMI overlooks these important health indicators such as muscle mass, overall fitness, or changes in body composition. (Buss, 2014) These factors are fundamental in providing a holistic view of an individual's health and well-being.

5-C. Future Research

Future research on wellness programs necessitates a shift towards longitudinal studies, which would help understand the long-term sustainability of employee wellness programs. While this study has provided valuable insights into the immediate effects of Advocate Aurora's employees healthy living programs, it falls short in assessing the lasting impact these programs have on participants' health. To truly measure the effectiveness of wellness programs, it is crucial to track participants over extended periods. Longitudinal studies allow researchers to observe the progression and maintenance of health outcomes over prolonged periods, offering an improved picture of the employee wellness programs' efficacy. (Caruana et al. 2015) For example, it could reveal whether initial weight loss is sustained or if participants regress to previous habits and weight status. Understanding influencing factors can provide valuable insights for implementing more effective and sustainable wellness programs.

Cultural diversity plays a critical role in shaping health behaviors, attitudes towards wellness, and responses to health interventions. Different cultures have their unique health beliefs, practices, and perceptions of wellness, which can significantly impact the effectiveness of wellness programs. Geng and Maeng evaluation of a similar program to Advocate Aurora showed that employees' baseline characteristics predicted the employee participation, and goal achievement patterns in subsequent years. Indicating that participants' characteristics should be considered when implementing an employee wellness program. (Geng and Maeng, 2017) Research in diverse cultural settings would provide valuable insights into how cultural norms, values, and beliefs influence the design and implementation of wellness programs. It would allow for the development of culturally sensitive and relevant interventions that are more likely to be effective and embraced by participants from various backgrounds.

Traditionally, wellness programs and the research surrounding them have primarily focused on physical health metrics such as weight, BMI, blood pressure, and cholesterol levels. While these are important indicators of physical health, they provide an incomplete picture of an individual's overall well-being. To truly understand the impact of wellness programs, research must explore the effects of these programs on mental health and holistic well-being. This involves evaluating how these initiatives influence not just the body but also the mind and overall quality of life. Eskander et al. found that wellness programs that addressed holistic health were valuable for both the organization and the employees. They noted that wellness programs that incorporated mental health strategies such as meditation led to an overall awareness of personal health and well-being, leading to other changes in health-based lifestyle behaviors. (Eskander et al. 2021) Future studies should examine how participation in wellness

programs can ease stress levels and improve healthcare employee's ability to cope with their work stressors. This could include evaluating interventions such as mindfulness practices, relaxation and meditation techniques, and stress management workshops.

Another important aspect is the effect of wellness programs on work-life balance. An imbalance in this area can lead to burnout, reduced productivity, and a host of mental health issues. (Mullen, 2015) Research should explore how wellness programs can help individuals achieve a healthier balance between their professional and personal lives. This could involve studying programs that offer flexible working arrangements, promote time management skills, or provide support for family and personal responsibilities. (Mullen, 2015) Future research should explore the role of wellness programs in promoting positive mental health work environment.

5-D Recommendations

Employee wellness the one-size-fits-all approach is increasingly becoming obsolete. The diverse nature of the modern workforce demands for a more personalized approach to employee wellness programs. (WELCOA, 2023) Edman noted application requires a careful assessment of the needs of each healthcare employee to ensure that their individualized wellness program is appropriate and effective. (Edman et al, 2019) The research found that individualized health coaching sessions had positive impacts on body mass index, stress levels, and healthy lifestyle changes associated with cardiovascular risk factors. (Edman et al, 2019) The study on Advocate Aurora employee wellness programs (EWPs) , including the Foodsmart program, has highlighted the need to tailor these programs to address the specific needs,

preferences, and backgrounds of diverse employee groups. This research has shown a predominant female participation in wellness programs. This trend suggests that current programs might be more appealing to women or that women might be more proactive about their health. To address this, wellness programs should be considering the interests, health concerns of all genders. For example, incorporating education resources that are on male-specific health issues, which might increase their participation. Age is another critical factor in personalizing wellness programs. Different age groups have different health needs and wellness priorities. Tailoring programs to accommodate to these varying needs could significantly enhance participation and effectiveness.

The second recommendation is the integration of mental health and holistic well-being within wellness programs. This study has predominantly focused on physical health metrics such as BMI, weight, and demographics of participants . However, to truly foster a healthy workforce, employee wellness programs must expand their focus to incorporate mental health and overall well-being. This shift is not only an enhancement but a necessity in today's high-stress work environments. To ensure a healthy community and setting, there is a need to promote and safeguard the mental and physical wellness of healthcare employees (Joseph, 2016). The need to move beyond solely physical health metrics arises from the growing recognition of the interconnection of physical and mental health. Mental health issues, if unaddressed, can lead to physical health problems, and vice versa. For instance, chronic stress can lead to poor physical health by increasing the risk of cardiovascular diseases, and diabetes. (WebMD, 2023) Furthermore, different factors lead to elevated pressure among healthcare professionals, including huge volumes of work, long shifts, fast pace, ethical conflicts, perceived

work security, bullying at place of work, or lack of social support. (Pappa et al., 2020). The most significant mental distress can result in burnout, depression, anxiety ailments, sleeping conditions, and other sicknesses (Pappa et al., 2020). By integrating mental health into wellness programs, organizations can tackle health in a holistic way, leading to more effective and long-lasting health improvements. This could involve two different levels of stress interventions, the individual-level or organization-level. (Holman et al., 2018) When it comes to the individual level relaxation, meditation sessions, coping skills training, resilience training, counselling, and mindfulness training are some possible options. On an organizational level, employers can also create a work environment that minimizes stressors, such as reasonable workloads by , peer supportive management practices, conflict management, improving communication and creating a positive workplace culture. (Holman et al., 2018) Integrating stress reduction strategies into wellness programs is therefore critical.

A focused approach to wellness must also focus on enhancing overall psychological well-being. This includes fostering a sense of purpose, happiness, and fulfillment at work. A strong sense of purpose has been found to provide a greater meaning to one's life and higher levels of happiness. (Holman et al., 2018) Programs could incorporate activities that promote social connection, recognition of achievements, and opportunities for personal and professional growth. This would build a stronger social support for employees, helping employees maintain meaningful social relationships, strengthening their purpose, and fulfillment at work. Providing a safe and inclusive work environment where employees feel valued and respected is crucial for psychological well-being. (Holman et al., 2018)

The third recommendation is the promotion of long-term engagement and follow-up strategies. The success of employee wellness programs is not solely measured by immediate health outcomes but significantly hinges on the long-term engagement of participants and the sustainability of health improvements. To achieve lasting benefits, wellness programs need to evolve beyond short-term initiatives and adopt strategies that foster long-term engagement and conduct regular follow-up assessments. Fink et al. identified the following factors that influence employee engagement in employee wellness programs, employees' perception of the value of the EWP, the commitment of the organization's leaders to employee wellness, employee's responsibility for their own wellness, the work environment, employer-offered resources for maintaining wellness, and incentives for participation. (Fink et al., 2019) By addressing these factors employers can ensure that the wellness programs are not just a temporary fix but a facilitator for long-term health and well-being improvements. Long-term engagement in wellness programs requires a multi-layered approach that goes beyond the initial excitement of new initiatives. By creating a culture of health within the organization where wellness is integrated into the everyday work life and culture of the company. This can be achieved by consistently promoting health and well-being as core values of the organization, ensuring that they are reflected in the company's policies, practices, and environment.(Fink et al., 2019)

To track the sustainability of health improvements achieved through wellness programs, regular follow-up assessments are crucial. These assessments should be comprehensive, measuring not just physical health outcomes but also mental well-being, lifestyle changes, and overall quality of life. Periodic health evaluations, such as biometric screenings, fitness

assessments, and mental health check-ups, can provide tangible data on the long-term impact of the programs. By employing SF-36 health assessment survey for employee's pre- and post-health assessment, employers can assess eight dimensions of the individual's well-being. Including, physical function, physical and emotional limitation, social function, bodily pain, general and mental health, vitality(energy and fatigue), and general health perceptions. (Ware et al., 1992) These evaluations could be conducted at regular intervals, such as annually or biannually, to monitor progress and identify areas that need more attention. This feedback can be used to make necessary adjustments and improvements to the programs. Adjustments and updates to the programs based on participant feedback and health outcomes are important for keeping the programs relevant and effective.

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