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A mixed methods study examining the barriers and facilitators to research utilization and evidence-based practice in adult weight management

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Abstract

Background
Obesity is a disease with many associated comorbidities and its prevalence in the U.S. continues to increase despite the majority of people with obesity attempting weight loss. Dietitians are responsible for using evidence-based practice to mitigate the effects of obesity, however, differences in practice philosophies, opinion leaders, misinformation, a sense of competence, and the complexity of nutrition research have been identified as barriers to implementing practice guidelines into daily practice. It is unclear how dietitians strike a balance between empirical evidence, anecdotal evidence, and patient-centered practice.

Aims
The primary aim of this mixed-methods study was to identify the barriers and facilitators of research utilization and evidence-based practice in adult weight management. The secondary aim was to identify how dietitians gather information about obesity and/or adult weight management as well as to understand what factors influence how they discern whether to adopt a new practice strategy.

Theory
A combination of Social Cognitive Theory and Diffusion of Innovations Theory provided a framework to understanding the barriers and facilitators to the adoption of various practice innovations in the field of obesity management.

Methods
The validated BARRIERS survey was disseminated to dietitians working at least part-time with people with obesity. Survey also contained additional miscellaneous questions regarding information gathering preferences and use of best practices. Semi-structured interviews were conducted to understand current obesity practices utilizing thematic analysis of the interviews.

Results
Survey data identified that Setting items (M = 23.89, SD = 6.83) were the greatest perceived barrier within the BARRIERS survey items. Years of experience were found to decrease the perception of Setting items with 0-5 years (M = 25.01, SD = 6.39) and 6-11 years for Setting was (M = 25.00, SD = 6.29) compared to 32 or more years (M = 20.60, SD = 6.38) indicating that years of experience help decrease the perception of Setting barriers. Qualitative results identified that time, degree of training, and reliance on opinion leaders are the greatest barrier to research utilization, implementation of best practices, and gathering information from refereed sources.

Conclusion
Dietitians report limited time resources derived from a number of factors and are compounded by limited training in statistical analysis and a sense of competence which leads to a reliance on opinion leaders to place research findings into context on their behalf. Dietitians should be cautious of reliance upon others in gathering information as misinformation may be a significant factor. Continuing education requirements and the use of podcasts are a significant contributor of increasing reliance on opinion leaders for daily practice guidance.

Introduction

Obesity was recognized as a disease by the American Medical Association[1] in 2013 and its prevalence in adults has been steadily increasing over several decades.[2] In addition to its impact on morbidity and mortality,[3] it is also an economic burden[4] and has been identified as a national security threat.[5] Individuals with obesity also suffer from social discrimination[6] and face an array of marketers promising to make weight loss easy.[7] An estimated 67% of U.S. citizens[8] with obesity attempted to lose weight between 2013 and 2016 despite evidence that most people are likely to regain the weight, potentially beyond their initial starting weight.[9] However, some are successful in maintaining weight loss long-term[10] and current guidelines suggest that even 3-5% weight loss can have clinically meaningful impact on long-term health outcomes.[11] Further, these guidelines also place the Registered Dietitian firmly within the multidisciplinary, intensive lifestyle therapy intervention recognized by the Academy of Nutrition and Dietetics as the "gold standard" for weight management and recommend primary care providers refer to a dietitian for Medical Nutrition Therapy when the multidisciplinary option is not available.[12] This places tremendous responsibility on dietitians working with this population to remain current with best practices, media influences, and popular trends. In modern healthcare, evidence-based practice (EBP) is considered essential for optimizing patient outcomes and ensuring that harms are minimized.[13] In addition to employing a patient-centered approach and utilizing empirical evidence, the Academy of Nutrition and Dietetics specifically lists the anecdotal observations of credentialed professionals in its own definition of EBP suggesting a blend of science and art are at play.[14] It has been shown that dietitians are not comfortable with searching for and critically appraising scientific literature[15] and nutrition science is often poorly communicated or even

intentionally misrepresented.[16] Dietitians widely value the idea of EBP but translation into practice seems to be limited.[17] However, in the primary care setting some researchers have had success translating research findings into practice resulting in significant long-term weight loss.[18] However, if dietitians are not participating in these multidisciplinary, intensive lifestyle therapy interventions there is no clear evidence that they are providing clinically meaningful, long-term weight loss success. Referral to a dietitian, as stated, is the secondary option recommended for obesity intervention but given the history of poor long-term outcomes and the vast variety of potential strategies to employ, it is unknown how dietitians perceive their own abilities to overcome these odds.

Bandura[19] posits that for a person to adopt a practice they must feel that they have the capabilities to do so even in the absence of incentives and during challenging times. The primary aim of this mixed-methods study was to identify the barriers and facilitators of research utilization and EBP in adult weight management. The secondary aim was to identify how dietitians gather information about obesity and/or adult weight management as well as to understand what factors influence how they discern whether to adopt a new practice strategy. Cumulatively, these aims sought to identify the barriers and facilitators to implementing EBP as defined by the Academy of Nutrition and Dietetics and examine the perceived efficacy of dietitians assessing and intervening obesity via one-on-one counseling.

Chapter 1: Significance/Literature Review

Obesity and Health

The World Health Organization (WHO) defines obesity as "abnormal or excessive fat accumulation that may impair health".[20] Obesity was recognized as a disease by the American Medical Association[1] in 2013 and its prevalence in adults has increased from 30.5% in 2000 to 42.4% in 2018.[2] Obesity is a significant contributor to increased morbidity and mortality, primarily from cardiovascular disease and diabetes but also other chronic diseases such as cancer, kidney disease, arthritis, depression, and sleep apnea.[3] It has an estimated economic impact in excess of $215 billion annually due to its direct impacts on health as well as its indirect impact on issues such as absenteeism, disability, and health insurance.[4] It has also been identified as a national security risk due to its negative impact on military readiness and recruiting.[5]

According to the CDC, between 2013 and 2016, 67% of people with obesity attempted weight loss.[8] Unfortunately, weight loss through dieting seems to have poor long-term success and can often result in regain higher than the initial starting weight.[9] Metabolic activity decreases after prolonged exposure to a significant reduction in energy intake[21] and these effects likely have significant inter-individual variability.[22] Further, neurological and hormonal defenses are in place to defend against weight loss which are exacerbated by increasing adipose tissue due to its impact on leptin and insulin resistance.[23] These evolutionary adaptations were developed to deal with a long history of food scarcity and are mismatched to an increasingly obesogenic environment which is a major contributor to obesity in Western nations.[24] Other factors such as socioeconomic status, built environment, and genetics also add to the difficulty of losing weight.[25] Weight loss seekers are exposed to a number of potential strategies and products but

most fail to produce reliable outcomes.[7] Research has shown that the difference between popular diets is clinically insignificant for weight loss after a 12 month follow up[26] and novel strategies such as time-restricted feeding or "intermittent fasting" do not appear to offer superior results to traditional caloric restriction[27] despite their popularity. The internet has allowed people to transcend their immediate environment and gain access to an unlimited supply of information, including misinformation. Major contributors of nutrition misinformation include a $40 billion per year supplement industry,[28] books on nutrition,[16] poor scientific[29] and media[30] literacy, direct to consumer genetic testing products,[31] and social media[32] which includes not only laypersons but also celebrities,[33] physicians,[34] and dietitians.[35] Dietitians are responsible for staying current with research literature as well as identifying and countering nutrition misinformation.[36] However, misinformation is not the only obstacle and dietitians must also consider the various opinions of other dietitians about whether obesity should be treated via weight loss or alternative approaches.[37] The remainder of this chapter will detail the challenges that dietitians must overcome in order to provide evidence-based, patient-centered practice.

The Obesity Practice Schism

Increasing awareness of obesity stigma and discrimination has further complicated the treatment of obesity. Minimization of harm goes beyond simply choosing a safe and effective intervention and should consider the entirety of the patient's experience.[13] Some dietitian opinion leaders have raised the question of harm from weight loss efforts comparing obesity stigma to that of homophobia, racism, and misogyny.[38] For example, Health At Every Size® (HAES®) principles seek to utilize evidence-based practice to end obesity stigma and promote the use of a weight-neutral approach to obesity interventions, in which, weight is not used to guide treatment

decisions. Per the HAES® website,[39] the central tenets of the organization is to (1) Respect people through "celebrating body diversity" as well as "differences in size, age, race, ethnicity, gender, dis/ability, sexual orientation, religion, class, and other human attributes", (2) Critical Awareness through "challenging scientific assumptions and valuing body knowledge and people's lived experiences", and (3) Compassionate Self-Care by "finding the joy in moving one's body and being physically active and eating in a flexible and attuned manner that values pleasure and honors internal cues of hunger, satiety, and appetite, while respecting the social conditions that frame eating options". These tenets have resonated with some dietitians but others have concerns about the potential downstream effects of this proposed paradigm shift.[37] Some disparage the use of weight in the assessment of patients (i.e. weight-neutral) citing the long history of weight bias and poor long-term outcomes for weight loss[38,40] while others recognize the impact of obesity stigma but also fear the ramifications of obesity.[41] Dietitians practice across a continuum of philosophies in regards to weight-neutral and weight-centric treatment of obesity.[37] In addition to generational differences,[42] there is also evidence of gender playing a role in practitioner preferences[43] which is significant considering 94% of dietitians identify as female.[44] These differences in obesity-related practice philosophies have been described as a "war" and even a "revolution".[37] However, it is more likely reflective of the lingering influence of the biomedical model of health within the field of nutrition and dietetics.[45] Many reductionist narratives exist about the cause of obesity being due to volitional patterns of overeating and general laziness.[46] These sentiments are representative of the biomedical model of health which encourages diseases to be "characterized in terms of the smallest isolable component having causal implications".[45] However, obesity is a complex disease[25] with behavioral, genetic, environmental, and socioeconomic contributors which must be considered

along with the stated goal of the individual. The biopsychosocial model proposed by Engel[45] encompasses the complexity of the disease and serves as a framework much better suited for clinical practice. Further, Huber et al[47] challenge the persistent emphasis of health being the pursuit of "complete" physical, mental, and social well-being and instead recommend redefining the concept of health as a dynamic schema that emphasizes the ability to adapt and self-manage life's many challenges. An individual's confidence in their own ability to adapt and overcome barriers to a desired goal is known as self-efficacy.[48] Self-efficacy is positively associated with a multitude of health outcomes, including obesity management.[48] A meta-analysis found motivation and self-efficacy to be the best predictors of weight management success.[49]

Obesity presents with many challenges and will require life-long effort for most. An important question to consider when recalling the WHO's definition of obesity[20]: at what point does excessive fat accumulation impair health? The biopsychosocial model emphasizes considering all biological, psychological, and social implications when considering the best intervention plan for the patient.[45] The remainder of this section will compare and contrast some of the biopsychosocial implications that dietitians must consider when designing a treatment plan, including the risk of harm.

Metabolic Health in Obesity

In 2021, the USPSTF reported that overweight and obesity are the strongest risk factors for the development of prediabetes and type-2 diabetes and recommend utilizing a body mass index (BMI) of 30 kg/m^2 as a screening tool.[50] The American Diabetes Association Standards of Care similarly recommends utilizing BMI as a screening tool.[51] Additionally, The American Association of Clinical Endocrinologists and American College of Endocrinology (AACE/ACE)

guidelines[52] recommend using a BMI of 30 kg/m^2 as well as waist circumference (WC) measurements (less than or equal to 94 cm in men and 80 cm in women) when screening for obesity. The addition of the WC measurement offers greater insight into visceral adipose tissue development and is a stronger, independent predictor of risk across all BMIs.[52] When combined, BMI and WC measurements serve as reliable identifiers of clinically significant obesity[52] but do not offer information about an individual's metabolic health. Contrasting arguments exist about whether a person can be metabolically healthy obese,[53] i.e. obese by BMI standards, but blood pressure, blood glucose, and blood lipids are within normal limits. Bacon (HAES® founder) and Aphramor[54] argue that obesity is only associated with risk of metabolic disease progression and not causative. Bacon and Aphramor[54] posit that obesity may be an early symptom of diabetes rather than its primary cause arguing that when confounders like exercise, socioeconomic status, and others are removed "increased risk of disease disappears or is significantly reduced". However, the World Obesity Federation describes obesity as chronic relapsing, progressive disease process and asserts that risk of mortality gets progressively stronger the longer a person is exposed to obesity.[55] Metabolic disease progression is multifactorial, but cumulative obesity dose, or the duration of exposure to obesity, provides improved predictive ability of the development of diabetes even after adjusting for known contributors.[56] Another study found that rapid weight gain increases diabetes risk independent of baseline BMI and assert that cumulative obesity exposure and age of onset should be considered when assessing diabetes risk.[57] Similarly, early-onset prediabetes predicts a greater propensity of death from cardiovascular cause than does late-onset prediabetes.[58] Metabolically healthy obesity is likely a transient state and should not be considered a reliable indication of future metabolic health.[53,55,59–66] Further, the term "metabolic health" is deceiving because the progression of cardiometabolic disease is often

clinically silent. For example, the CDC estimates 34.1 million adults in the U.S. have diabetes and 7.3 million of them are unaware.[67] The American Diabetes Association recommends an A1C of 6.5% for the diagnosis of diabetes.[51] However, retinal lesions characteristic of diabetes are often found well before criteria for diagnosis are met.[68] Similarly, hypertension has earned the nickname "silent killer" due to its typical asymptomatic progression and is currently estimated to affect 45% of U.S. adults.[69] Whether cause or consequence, the strength of the association between obesity and cardiometabolic disease development should not be dismissed simply because confounders exist. Symptom onset is known to be a critical factor for individuals choosing whether to seeking care.[70] Given the asymptomatic nature of early-stage, obesity-related complications such as diabetes and hypertension, it is imperative that clinicians understand the importance of promoting coherence between the threat of illness and the appropriate treatment in order to decrease ambiguity and misinformed decision making.[70]

Another argument proposed by Bacon and Aphramor[54] is that the process of repeated weight loss and regain known as "weight-cycling" is more harmful than obesity itself. However, others assert that no reliable causal link between weight cycling and increased risk of morbidity has not been shown.[71,72] The debate around weight cycling stems from the lack of a universally accepted definition of the term and a heavy reliance on rodent models and cross-sectional evaluations of human data when attempting to study the proposed mechanisms associated with inflammation.[73] The two papers[74,75] cited by Bacon and Aphramor[54] when making assertions about weight cycling also reference this reliance on rodent models as well as limitations of human data when drawing conclusive statements. A 1994 meta-analysis from the National Task Force on the Prevention and Treatment of Obesityreported that no conclusive evidence suggests that the hazard of weight cycling outweighs the potential benefit of weight loss.[76] Today, the

United States Preventive Services Task Force (USPSTF) still recommends weight loss for a BMI over 30 kg/m^2 and asserts that harms from an intensive, multicomponent behavioral intervention are small to none.[77] Similarly, the Diabetes Prevention Program study 10-year follow up[78] suggest that reductions in diabetes risk may still exist even if some weight is regained. Finally, inflammation is associated with both ageing and obesity[79] and current evidence is unable to reliably demonstrate that weight cycling causes inflammation beyond that of obesity and normal ageing.[71,72] However, potential harms from weight cycling should not be dismissed due to methodological flaws attempting to draw causation of inflammation. A history of weight cycling may indicate that a patient is inclined to use more extreme strategies for weight loss[80] and rapid weight gain (a hallmark of weight cycling) is, nonetheless, associated with increased diabetes risk regardless of baseline BMI.[57] The psychosocial implications of obesity are discussed in greater detail in the following subsection.

Psychological and Social Implications

Weight stigma occurs frequently in Western society with studies showing blatant dehumanization of people with obesity.[6] Weight discrimination may contribute to increasing morbidity and mortality risk.[81] Many people with obesity internalize feelings of discrimination and may be more likely to suffer from depression, body image concerns, and low self-esteem.[82] Ideals of achieving perfection are ubiquitous in Western society and perfectionist standards have been shown to promote aversive self-awareness and negative affect which may lead to self-sabotaging behaviors.[83] Socially prescribed perfectionism is defined by an individual's perception that others have expectations of them to meet or exceed high-standards.[84] The interaction of socially prescribed perfectionism and goal disengagement are predictive of

depressive symptoms and maladaptive coping strategies.[84] Maladaptive coping strategies are defined as a rigid adherence to unattainable standards and typically present with excessive self-criticism.[84] The pursuit of perfectionist standards and the use of maladaptive coping strategies offer an explanation as to why disordered eating prevalence increases with BMI.[85] Further, frequency of weight cycling is also associated with more extreme weight loss approaches such as laxatives, diet pills, and diuretics when compared to those who have never weight cycled.[80]

Clinicians may unwittingly add to such stigma through use of improper or dated terms. A study found that common weight-related terms (e.g., obesity, fat, BMI, and weight) can significantly impact self-efficacy and the perception of illness.[86] Obesity was the term reported to promote the highest degree of self-efficacy and understanding of illness. The term "fat" resulted in the lowest understanding of obesity and self-efficacy. Further, a large observational study found that a formal diagnosis of obesity was more likely to result in greater than 5% weight loss at 9-12 months than when no formal diagnosis was made, even when controlling for potential confounders.[87] These findings suggest that the clinical nature of the term obesity may promote a better understanding of illness and greater likelihood of pursuing proper treatment. The use of improper terminology reaches beyond stigmatizing people with obesity, it may also contribute to a decrease in understanding the degree of illness that the individual is facing.[86] Conversely, Bacon and Severson[88] assert that using the term "fat" is preferred in order to strip away any pejorative connotations and to promote "fat acceptance".

Race and Cultural Impacts on Perception of Obesity

Amongst Registered Dietitians, slightly more than 72% are self-reported as white leaving other races severely underrepresented in nutrition science and clinical practice.[44] Culturally

appropriate health education has been shown to improve blood glucose control in minority groups with type-2 diabetes.[89] It is also important to consider the effects of race and culture on perceived barriers, illness perception, and treatment preferences. One study showed that being nonwhite was associated with higher resistance to social pressure and more confidence in self-restraint during different emotional states.[90] The study also suggests that higher self-efficacy scores do not always correlate with weight loss in nonwhite samples.[90] However, this data should be considered with caution because high levels of confidence about future lifestyle changes may be reflective of inexperience rather than actual ability.[91]

Illness perception is also shown to vary among races with white participants showing a greater likelihood of self-reporting obesity compared to nonwhite participants.[90] White participants were also more likely to associate obesity with its respective comorbid conditions.[90] The lack of perceived susceptibility to obesity-related complications among nonwhite populations may be owed to socio-cultural influences such as differing standards of beauty and dietary habits.[92] Obesity awareness is inversely correlated with the prevalence of obesity within one's own ethnic or gender group.[92] This suggests that a person's perceived peer group may set the standards for their own definition of obesity. If all members of their peer group are obese, that individual may be less likely to self-identify as obese leading that person to feel less susceptible to its potential comorbidities. In addition to feeling less susceptible, individuals may also hold different preferences for how they choose to treat the underlying illness.[92,93]

Patient Preferences Continuum

As previously mentioned, gender influences the practice preferences amongst dietitians[43] and it has shown to be a factor for patient outcomes as well.[93] Men do not participate in obesity

management programs to the same degree that women do and one qualitative study found that men sometimes feel out of place and even patronized by what they perceive to be a female-dominated industry.[94] Further, the men reported being uncomfortable with group sessions citing excessive discussions[94] which is in stark contrast of a qualitative study identifying that women appreciate the social support aspect of groups and prefer a sense of community.[95] Patients are just as unique as the clinicians that serve them and the idea that one must choose between stigmatizing a patient and aiding in weight loss efforts is a false dichotomy. Dietitians must be able to competently assess patients through a biopsychosocial lens and, more importantly, discern which domain produces the greatest cause for concern. For example, a patient suffering from a history of weight cycling or presenting with signs of disordered eating would not likely benefit from a highly structured and restrictive dietary intervention.[96] Conversely, a patient may suffer nocebo effects from a well-meaning clinician setting negative expectations for outcomes.[97] Huber et al[47] recommended health to be defined as adaptive and dynamic, but the same must also be true of the clinician. Advocating for people with obesity to be free from discrimination is admirable, but the HAES® approach is primarily studied in middle-aged white women and is not a panacea for psychosocial issues.[98] One study found that highly internalized weight bias was not improved by a HAES® program or a traditional (control) program.[99] Further, Cognitive Behavioral Therapy[100] (CBT) is an equally effective strategy for dietitians to consider when addressing psychosocial issues associated with obesity. Finally, HAES® lacks empirical evidence to support its use as a public health initiative and may unintentionally promote discriminatory behavior against those seeking to lose weight as well as the clinicians that facilitate it.[98] Proper patient assessment and EBP serve as the key to maximizing outcomes while minimizing harms in obesity management.

Dietitians understand the complexity of obesity management[101] and desire further education for best practices.[102] However, intention does not mean that implementation will follow.[48] The barriers and facilitators of EBP for obesity management are discussed in the next section.

Evidence Based Practice

The Academy of Nutrition and Dietetics, henceforth referred to as "the Academy", is the world's largest organization of food and nutrition professionals and represents over 100,000 credentialled nutrition professionals.[103] The definition of EBP proposed by the Academy is as follows: "Evidence-Based Dietetics Practice involves the process of asking questions, systematically finding research evidence, and assessing its validity, applicability and importance to nutrition and dietetics practice decisions; and applying relevant evidence in the context of the practice situation including professional expertise and the values and circumstances of patients/clients, customers, individuals, groups, or populations to achieve positive outcomes.".[14] One important caveat is the Academy's definition of "professional expertise" being "the RDN's cumulated related-experience, education, and professional skills. It includes both systematic (documented) and anecdotal observations".[14] It is important to recognize the limitations of empirical evidence and to allow the definition of EBP to encompass clinical judgement, especially where guidelines may not clearly apply to a specific context. However, this caveat leaves the door open for interpretation about what type of education and professional skills add value to patient care and, more importantly, what anecdotal observations are valuable versus those subject to mere confirmation bias. Secondly, it is not clear which takes precedence when an anecdotal observation conflicts (wittingly or unwittingly) with scientific evidence and, more importantly, the level of tolerance regarding these observations as they are shaped by personal

biases, self-perceptions, and narratives consumed by opinion leaders. Further, popular media sources frequently sensationalize and even intentionally misrepresent evidence found by legitimate research which leads to the erosion of public trust in the findings from nutrition research.[29,36] Recognizing this trend, the Academy published a position paper for combatting misinformation, in which, they assert that dietitians must be trained in critical research skills in order to help interpret emerging research findings and that it is the responsibility of every dietetics professional to remain current enough with scientific literature to accurately identify and counter misinformation and not contribute to it.[36] This section intends to review the literature surrounding the use of EBP, comfortability with interpreting research findings, theory to practice gap considerations, and general training of dietitians.

Complexity of Nutrition Research

Efforts of early nutrition research mirrored the philosophy of the biomedical model which emphasized the value of identifying single nutrient deficiencies, e.g. beriberi (thiamine), pellagra (niacin), anemia (iron), goiter (iodine), night-blindness (vitamin A), and rickets (vitamin D).[104] However, nutrition research was largely deemphasized in the 1940s because it was thought that all that needed to be discovered had already been accomplished.[105] However, in the 1960s calls for more research began[105] and Butterworth's[106] 1974 paper "The Skeleton in the Hospital Closet" shed light on what he considered "physician-induced" malnutrition due to lack of priority of nutritional care. Limitations of the biomedical model's reach are better understood in present day research efforts with more emphasis on overall dietary patterns as opposed to isolation of single nutrients. Further, nutrient deficiencies are not as prevalent as they were a century ago and developed countries are now suffering relatively new chronic disease burdens.

Nutrition research is unique to other fields, especially that regarding public health efforts such as obesity intervention. Obesity research is trending away from the reductionist focus of energy balance and matching the complexity of the disease as described previously.[104] Even the famously taught "hierarchy of evidence" is called into question in nutrition research, specifically the superiority of the randomized controlled trial (RCT) compared to observational studies.[107] RCTs are considered high-quality due to the influence of pharmaceutical research utilizing a double-blind, placebo-controlled approach which is nearly impossible for dietary studies. Large, well-designed RCTs are also expensive, and the findings are often limited to the context in which they are studied, making translation into practice difficult.[107] This does not discredit the RCT as a valuable method for nutrition research, but it is important to consider the context of a research topic before assuming its superiority to epidemiological research. The reliance on meta-analyses in nutrition research has also been called into question citing the high variability and heterogeneity between trials and lack of consideration for demographic and cultural differences among subjects.[108] Similarly, this doesn't discredit the findings from meta-analyses, especially those conducting proper analysis of the quality of the studies in question, but it should give pause to those taught the traditional hierarchy of evidence as an iron-clad model.

The Academy's EBP guidelines are crafted by an expert workgroup that seeks to identify and evaluate the relevant findings of nutrition research respective to the topic.[109] However, the public must often interpret research by relying on popular media sources in the form of soundbites and headlines. Confusion about research findings has led to erosion of public trust which is exacerbated by unqualified interpretations from self-titled "experts".[29] Although some have purportedly intentionally misrepresented findings,[16,29] research in general is highly nuanced and requires a great deal of training to critically assess with any degree of competence which

likely leads to unintended misrepresentation of findings as well. For example, it is common practice for professionals to only read the abstract instead of examining the paper critically in its entirety. However, a sampling of 44 articles from 6 major medical journals found that 18-68% (respective to the journal) of abstracts contained data inconsistent with the full-text and even data that could not be identified in the full-text at all.[110] Further, studies across healthcare sciences are reported to be largely underpowered,[111] often limited to participants from Western, educated, industrialized, rich, and democratic nations (specifically college students in the U.S.),[112] and have difficulties translating research into practice.[113] Nutrition science, in particular, suffers from problems with reproducibility and transparency.[114] Consequences of these barriers are the perception that nutrition science often "flip-flops" such as the changes in recommendations around egg consumption[115] or the dilution of legitimate findings from the perception that "everything we eat causes cancer".[116] Finally, disputes among researchers about methodology further contribute to confusion including calls for less reliance on nonrandomized studies[117] and those using satire to dispel such assertions, e.g. "the parachute argument".[118] A number of other examples exist and are beyond the scope of this review. A dietitian's ability to implement EBP may be limited by their ability to navigate the complexity and uniqueness of nutrition research, especially when formal guidelines have not been developed.

Research to Practice Gap

The gap between research and practice is well documented across healthcare services.[119] One proposed explanation for this gap is the assumption that effectiveness research always follows from efficacy research.[113] Tightly controlled studies such as randomized controlled trials and laboratory-based studies create an artificial environment that offers little external validity for

real-world clinical application. Practice-based research has been proposed as a means of improving the flow of information from bench to bedside.[120] Problems implementing nutrition EBP guidelines have been shown in critical care,[121] pediatric care,[122] and renal care,[17] but also in implementing the Nutrition Care Process.[123]

Nutrition Care Process

In 2003, the Nutrition Care Process (NCP) was formally adopted by the Academy which was then known as the American Dietetic Association.[124] Prior to the NCP, a number of nutrition care practices were utilized and taught by educators and outcomes research was difficult to implement due to the large heterogeneity in practices.[124] The NCP provides a standardized framework similar to the scientific method that consists of a "problem-identification" phase which is then followed by a "problem-solving" phase.[125] In the problem-identification phase practitioners collect evidence, determine a diagnosis based on that evidence, and then determine the etiology. The problem-solving phase determines a goal, creates and implements an intervention, and then monitors and evaluates the outcomes. This process has been evaluated and improved since inception and now incorporates the use of concise standardized language, promotion of professionals' responsibility for outcomes management, and support of a people-centered care.[126] The NCP is becoming more widely adopted across the world and dietitians appear to have a positive opinion of its implementation.[127] However, evidence of theory to practice gap exists with dietitians finding difficulty identifying measurable signs and symptoms to support a diagnosis (e.g. malnutrition)[127] and one study[128] finding that dietitians only agree about 38% of the time when asked to choose only one diagnosis. An Australian study[129] found that a "train-the-trainer" intervention had significant, sustained improvement in the use of the

NCP even after a 3 year follow up. Not surprisingly, the study also found that the perceptions of managers and supervisors play a large role in how or if the NCP is implemented.

The standardized nature of NCP framework has allowed for better outcomes reporting which has been used by the Academy to develop the Evidence Analysis Library (EAL).[109] The EAL utilizes an expert workgroup to synthesize translational research and outcomes research to produce EBP guidelines which address a specific topic to create major recommendations, a corresponding rating of strength of evidence, and areas of disagreement.[109] Given the difficulties of ensuring that EBP guidelines are followed and that the guidelines produce the expected outcomes, it is important to link EBP guidelines directly to the NCP which have been called "NCP chains".[123] These chains are proposed help guide the practitioner in exactly which phase of the NCP to utilize a specific EBP guideline by using concise language and comparative standards that can be evaluated in practitioner documentation. This allows better identification of exactly how EBP is used throughout the NCP and subsequently will result in better outcomes reporting which will support better EBP guidelines in the EAL. Currently, guidelines are updated about every 5 years in the EAL with the most recent guidelines for obesity published in 2014 and a 2019 update is pending at the time of writing. However, the most recent Academy position paper[130] for obesity treatment includes findings from the 2014 EAL guidelines and detail support for, but not limited to, the use of an academy developed physical activity toolkit, behavior change theory, CBT, and motivational interviewing (MI). Although these guidelines are available along with corresponding ratings of the strength of evidence, it is unknown the extent to which dietitians have read and implemented these findings into clinical practice. The Commission on Dietetic Registration offers certificates of training in adult and pediatric weight management while also offering the "Certified Specialist in Obesity and Weight

Management".[131] These training programs and board certifications may provide a roadmap to implementing best practices.

Use of Behavior Change Theory

The Academy asserts that dietitians should be able to assess motivation, readiness, and self-efficacy for weight management, based on behavior change theories and models, e.g. Social Cognitive Theory, CBT, and Transtheoretical Model.[132] Behavior change theory (BCT) provides the framework to help patients understand the barriers and facilitators to their own behaviors through the use of self-monitoring, goal setting, problem solving, cognitive restructuring, social support, and stimulus control to name a few.[133] CBT is shown to be an effective psychological treatment in weight loss, specifically for its contributions to motivation and self-efficacy.[49] MI is another skill proposed to reduce ambivalence to change through a collaborative and goal-oriented process.[130] Chronic diseases such as obesity require lifelong efforts to mitigate negative health effects and offering patients skills and competencies in managing their own care improves outcomes greater than just education alone.[134] Interventions with a theoretical underpinning and utilizing the strategies listed previously appear to perform better than those without theoretical underpinning.[135] The NCP specifically promotes the usage of behavior change theory in interventions but it is unclear the extent to which dietitians value or utilize it.

Guidelines for the Treatment of Overweight and Obese

In 2013, The National Heart, Lung, and Blood Institute (NHLBI) worked with the American College of Cardiology (ACC), American Heart Association (AHA), and The Obesity Society (TOS) to form an expert panel charged with producing guidelines[11] for the management of overweight and obesity in adults. The AHA/ACC/TOS guidelines[11] assert that the best

approach to weight management is an on-site, multidisciplinary, high-intensity comprehensive lifestyle intervention consisting of greater than or equal to 14 sessions in 6 months and should consist of diet, physical activity, and behavioral therapy. The guidelines acknowledge the Registered Dietitian as a qualified member of the multidisciplinary team for comprehensive lifestyle interventions and also recommend referral to a Registered Dietitian for dietary counseling when a multidisciplinary comprehensive lifestyle intervention program is unavailable.[11] It is the position of the Academy[130] that dietitians follow these guidelines which are considered the "gold standard"[12] for EBP in weight management.

There is considerable agreement from an international standpoint for the screening and management of overweight and obesity.[136] Further, the use of intensive behavioral programs have shown to be successful in long-term clinical trials such as the Look AHEAD Study[18] showing 45% of participants maintaining clinically significant weight loss after 4 years. In the last decade, translating these findings into the primary care setting have also shown promise[137–141] even in areas that are underserved with a high percentage of low-income and minority participants.[137] These findings, along with the findings from the National Weight Control Registry,[10] indicate that long-term weight loss maintenance can be achieved and serves as further evidence of the need to close the research to practice gap in dietetics regarding obesity.

Barriers to Dissemination of Evidence-Based Practice

Disseminating EBP encounters its own uphill battle. A "sense of competence" is frequently cited as a barrier to the dissemination of EBP to professionals in general[119] and dietitians are not immune to this phenomenon.[109,142] A sense of competence being a barrier to improving knowledge is not a new problem. The Dunning-Kruger effect[91] is a phenomenon in

which people tend to over-inflate their own level of competence due to a lack of in-depth knowledge about a particular topic. Unearned confidence in one's own knowledge or ability is lessened as the individual gains more knowledge and begins to understand the distance between their own degree of competency and that of true expertise. Evidence of this phenomenon exists amongst dietitians as they gain knowledge and experience. Bisanz et al[143] found that dietitians who had earned advanced credentialing for diabetes (e.g. CDE/BC-ADM) were more likely to report that they desired more help with behavioral and counseling strategies compared to generalists, 72.9% vs 59.2% respectively. Additionally, Lu and Dollahite[144] found that reported counseling self-efficacy is positively correlated with years of experience although actual competence was not measured. Finally, other barriers such as lack of critical research appraisal skills,[15,145] limited time resources,[122,145] decreasing confidence in EBP skills over time,[146] perceived limitations of EBP in specific practice environments,[145] a reliance on colleagues for information[122,145] exist amongst allied health care professionals along with the perception that EBP does not necessarily consider patient wishes or preferences.[147]

How Preceptors and Opinion Leaders Shape Dietetics Practice

The breadth of dietetics practice requires dietetic students and interns to divide their training amongst the respective domains, e.g., foodservice, clinical practice, community-based practice, etc. This creates a reliance on preceptors and professors to teach students EBP in their respective domains although the student may not have yet decided what type of practice they want to do as a professional. It is also unlikely that students would immediately know the degree to which their preceptors practice at the cutting edge of EBP during their time as an understudy. One study found that nearly all dietitians reported using EBP guidelines but only about half had

actually implemented them upon further examination.[17] Another study found that knowledge of guidelines does not necessarily lead to implementation[121] and dietitians have even reported having knowledge of EBP guidelines prior to their publication.[142] A 2005 study[15] examining the perceptions, attitudes, and knowledge (PAK) of EBP among dietitians found that dietitians report lacking the time and critical appraisal skills to properly read and implement research findings into practice. The study[15] also found that knowledge of common research terminology was poor which is consistent with the findings from Heiwe et al.[145] Additionally, 57% of participants reported never receiving formal training in search strategy[15] which is also similar to the findings from Heiwe et al.[145] Finally, 64% report never receiving formal training on the principles of EBP.[15] Unsurprisingly, dietitians that reported reading professional publications at least weekly had significantly higher PAK scores than those who only read monthly.[15] Dietitians report gathering information for professional practice from social media[148] and seem to rely on colleagues,[122,145] conferences,[149] and books[15] as well. It is important to consider these factors because preceptor habits shape future dietitians and subsequently the implementation of EBP. Evidence shows that dietitian training is limited to the degree of competence of their assigned preceptors during their internship with students reporting that they felt forced to replicate the practices of their supervisors.[150] Further, research has also demonstrated that confidence in one's ability to teach and implement EBP degrades after less than 5 years in practice and this effect is stronger in those without post-graduate education.[146] Students have described their internships as being a transformative experience from a "surface level" of knowledge as well as a challenge to their own beliefs about what is possible as a practitioner.[151] This should not imply, however, that experience is not valuable. The idea that patient care is simply following EBP guidelines is reductionist and the desires and preferences of the patient must be balanced in order to achieve

best outcomes.[147] Students are often overwhelmed during their professional training and an experienced, committed preceptor can shorten the learning curve when difficult situations arise.[152]

After the internship, dietitians must maintain 75 hours of continuing education credits every 5 years[153] which are generally achieved through conferences, webinars, and other means in which a speaker gives a lecture and the dietitian is credited hours based on the respective schedule. Although this can, in theory, improve access to EBP guidelines, the learner is largely at the mercy of the integrity of the speaker and their diligence to clearly delineate between their opinions and facts. The integrity of conferences such as the Food & Nutrition Conference & Expo, or "FNCE", have been called into question in recent years citing bias from corporate sponsorship influencing the content provided.[149,154] However, the Academy does have specific rules and regulations for conferences[149] and rules for continuing education credits,[155] especially when the speaker is discussing an unsettled or controversial topic. Throughout the training pipeline and into professional practice, there is strong evidence of a reliance on "opinion leaders" and trusted colleagues for the acquisition of new knowledge. Given the complexity of obesity development and the wide-ranging views about its treatment, it is imperative that dietitians develop and maintain the skills necessary to, within reason, keep up with the mass of information that is exacerbated by the vast reach of the internet. More importantly, dietitians must be able to discern what is in fact EBP and what is merely the latest trend while recognizing the limitations of empirical and peer-reviewed evidence as well as the limitations of anecdotal evidence, peer-to-peer reliance, and other sources of non-peer-reviewed evidence.

Limited research exists to establish the effectiveness of weight management interventions delivered by dietitians on health and nutrition related outcomes although most guidelines support

dietitians as qualified providers of this service.[156] In the instance that access to a multidisciplinary, high-intensity comprehensive lifestyle intervention is unavailable, the AHA/ACC/TOS guidelines recommend referral to a registered dietitian for weight loss and MNT for cardiovascular disease risk management.[12] To the author's knowledge, little is known about the implementation of these guidelines or the implementation of EBP when the multidisciplinary option is unavailable and one-on-one counseling for obesity-related issues is provided. Secondly, little is known about what factors dietitians consider when discerning whether to adopt a novel practice technique for obesity counseling.

Chapter 2: Theory

Contrary to popular belief, memories are not processed and stored one by one as if they were individual pieces of paper being stored in a filing cabinet. Rather, memory is a system in which items are stored as an interconnected system where some memories are directly connected to the context of others, e.g. the color red may be interconnected to a tomato.[157] Memory is also subject to the passage of time and is constantly updated with new information, e.g. a person getting a haircut updates the previous memory of the person.[158] To reduce cognitive labor, humans have a natural tendency to rely on others as an extension of their own memories and/or knowledge in a process known as transactional memory.[157] This is evident throughout society with the division of cognitive labor amongst various professionals such as physicians, lawyers, plumbers, and mechanics that generally are not familiar with the expertise of the others but rely on them for their respective knowledge. This is also seen in the training of various professionals relying on more senior members of a field to impart knowledge upon them. As mentioned previously, dietitians are heavily influenced by their professors in their schooling, their

preceptors in their internship,[151] and by continuing education conferences,[153] webinars, supervisors,[129] and peers as a practicing professional.[122] This is in line with the concept of transactional memory and likely contributes largely to the knowledge and implementation of EBP later in their career. Also mentioned previously, the barriers to interpreting scientific literature suggest a tendency to rely on transactional memory through social relationships with those known to them and those perceived to be valued opinion leaders which will be further discussed below.

In order to better understand the components that drive implementation of EBP into success or failure it is important to select a theory that embodies the training pipeline of dietitians and their lived experience navigating the complexity of obesity and its nuanced treatment methods. Nilsen[159] composed a taxonomy of theories, models, and frameworks which are divided into three subsections based on the aims of the research: (1) describing or guiding the process of implementation, (2) understanding and/or explaining what influences implementation outcomes, and (3) evaluating implementation. The second aim can be further broken into determinant frameworks, classic theories, and implementation theories. The present research seeks to understand and/or explain what influences implementation of EBP amongst dietitians and therefore will use a combination of classic theories which are detailed in the following sections.

Social Cognitive Theory

Bandura's Social Cognitive Theory (SCT) is founded on the individual's ability to exert intentional influence over their own functioning, otherwise known as an agentic perspective.[160] Central to SCT is the concept of reciprocal determinism, which is described as a dynamic, triadic causation between a person, their environment, and behaviors or responses to stimuli.[161] In this

concept, the person is a reference to the sum of all learned experiences, including the modeling of observed behavior, by an agentive individual. This is an important distinction because previous experience, knowledge, goals, and general expectations shape individuals differently over the course of their lives. Further, the relationship between the aforementioned triad is reciprocal and dynamic, i.e., environmental changes may impact a person's summative experience which might alter their views or, conversely, a change in behavior could also lead to the person altering the environment to fit their preferences. When considering an individual's environment, it is important to consider the impacts of the internet as it has given the individual the ability to transcend their immediate environment and have access to an unlimited source of information.[19] Further, searching online can give a false sense of knowledge or competence by blurring the line between a person's actual knowledge and what they just read, i.e., people misinterpret their ability to access knowledge with actual knowledge.[162] According to SCT, self-efficacy and outcome expectations will have a direct impact on behavior and, subsequently, the aforementioned triad.[161] Self-efficacy is an individual's confidence in their own ability to adapt and overcome barriers in a specific context.[48] Outcome expectations represent the individual's anticipated consequence of a behavior or intention. The final tenet of SCT is self-regulatory action, in which individuals practice a self-reflective monitoring of their own behaviors and compare them to a stated goal. The notion that intention and behavior are often different is important when understanding the nuances of SCT. Bandura notes that "intention is not the sole proximal determinant of behavior" which is important when considering that knowledge of EBP does not always result in its implementation.[48]

Dietitians are expected to develop or maintain the skills necessary to combat misinformation, however they often report feeling uncomfortable searching and critically

appraising research information. Dietitians report to value EBP but have a widespread problem of implementing it, suggesting that a lack of skill or resources necessary for success are the limiting factor. A key aspect of self-efficacy is confidence in one's own ability but if dietitians do not perceive that they have the ability then they may choose to avoid pursuit of implementation. Further, they may avoid identifying themselves as noncompliant by simply reporting that they have implemented EBP although they just want to feel a sense of social approval.[163] Social desirability bias is an individual's need for social approval and may contribute to the enhancement of reporting positive characteristics and denial of negative characteristics when discussing their own perceptions of their use of EBP.[163] The desire to not disappoint may even impact the student preceptor relationship which has been demonstrated in pharmacist preceptors that avoid difficult conversations with their underperforming students.[164] Social desirability bias may make assessment of actual competence difficult even in instances of high self-reported efficacy. The proposed study seeks to understand how perceived efficacy may influence the adoption of new practices; however, it is important to note that just because something is new or even popular among dietitians does not mean that it is EBP.

Limitations of SCT in the proposed study are the difficulties in utilizing all of the major constructs. While reciprocal determinism is an important concept, it is difficult to assume which of its components may have a greater impact on the other two. Further, self-efficacy is known to be context specific and does not necessarily carry over even when one might intuitively think that it does, i.e., an individual with high self-efficacy in conducting research may have poor science communication skills due to a lack of perceived efficacy in their ability to communicate concepts to others.

Diffusion of Innovations Theory

Roger's Diffusion of Innovations Theory (DOI) explains how innovations gain momentum and spread throughout a specific population or community.[165] An innovation can be a product, idea, or even an EBP guideline. The adoption process is not simultaneous across a population and DOI theory separates adopters into 5 categories based on the speed at which individuals choose to adopt: innovators, early adopters, early majority, late majority, and laggards.[165] Key to DOI is the concept of opinion leaders and their influence over the community which is based on perceived trustworthiness and competence. These opinion leaders influence the adoption speed through their advocacy which leads others to adopt and continue the diffusion process to the rest of the community. The resultant pattern of adoption is said to be an "S" shape curve with innovators modeling and advocating behaviors until they begin to be adopted by the early adopters and then slowing as the adoption process reaches its potential.[166] DOI has been shown to improve the dissemination of EBP in the field of Social Work by identifying best practices and recruiting opinion leaders to assist in the proper adoption patterns to implement theory into daily practice.[166] Conversely, a qualitative study found that dietitian opinion leaders in Israel were sometimes at odds with public officials over nutrition labeling practices although both parties were intending to promote better public health.[167] It is important to consider the downstream effects that may result from dietitians or other opinion leaders being at odds with organizations perceived to be trustworthy by the general public or even other dietitians.

The "innovators" are described as risk-takers with a desire to be first or innovative by nature and require very little, if any, persuasion to adopt or create innovations. "Early adopters" are the primary opinion leaders and represent the ideas of the innovators with a high tendency to embrace change and progressive ideas. Innovators and early adopters require very little

convincing to change and are often very influential on the remaining population. The "early majority" are rarely opinion leaders but do tend to move faster than the average person; this population may prefer to hear testimony or see some evidence that it works before adoption. The "late majority" is a bit more skeptical and tend to wait to see how the innovation impacts the early majority before choosing to adopt. The "laggards" are highly conservative and most often difficult to get onboard with change. In the field of dietetics, innovators and early adopters have ample opportunity through official platforms such as continuing education but also unofficial means such as social media and books. Some of the major factors that influence adoption of innovations across the spectrum include complexity of the innovation, compatibility with the target population, the ability to observe others, and the testability of the innovation. It is important to note that not all opinion leaders are dietitians in the field of nutrition and validation of credentials is not always available when assessing content provided.

An important limitation of DOI to the proposed study is the inability to know how dietetics professionals differ from the opinion leaders regarding level of training and competence. In the general public, most are not experts in nutrition and therefor the adoption process hierarchy is intuitively established whereas amongst dietitians the gap is much smaller because of the required training prior to credentialing. It is unknown how this might impact the adoption rates although other allied fields have demonstrated similar patterns of adoption such as the example[166] provided above.

Combining Social Cognitive Theory and Diffusion of Innovation Theory

Bandura asserts that observational learning is governed by three subfunctions known as attentional, representational, and productive processes.[19] Attentional process refers to the factors that influence what people selectively observe and what information they extract. Attentional

processes are heavily influenced by the cognitive skills, preconceptions, and values of the learner. The representational process refers to memory, or the ability to transform and restructure information, which ultimately generate new patterns of behavior. The production process is the individual closing the gap between symbolic conceptions and their own patterns of behavior. It is important to note that these processes are heavily impacted by the person's lived experiences up to that point and the greater knowledge and skill an individual has, the easier it is for them to produce the new pattern of behavior. This is important when considering the relationship between intern and preceptor because students will use the values and lessons observed as a heuristic and not necessarily precise mimicry. The intern may recognize the degree to which EBP is valued in one context and apply that same ideology elsewhere in their practice although this may not have been the explicit intent of the preceptor.

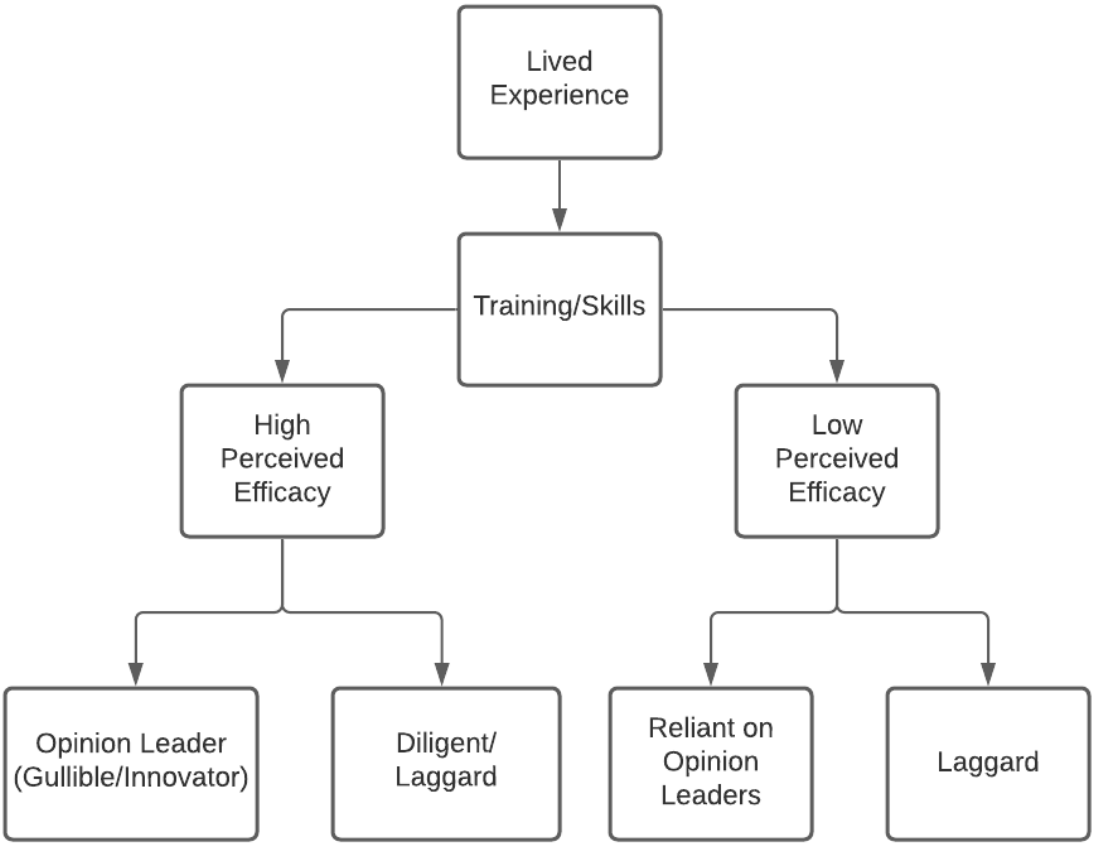
Bandura also states that in order to adopt an innovation into practice the individual must believe that they have the efficacy to do what is needed without incentives present and also when difficulties arise.[19] Activities that are perceived to exceed the capabilities of the individual are less likely to be adopted. Therefore, perceived self-efficacy is key to the adoption of innovations. Poor perceived self-efficacy in the context of understanding and implementing EBP will likely result in the individual maintaining a heavy reliance on opinion leaders. Rogers[146] and Bandura[18] both warn against the tendency to conceptualize the diffusion process from the prospective of the promoter. Instead, it should be equally likely that the "early adopter" is gullible rather than always assumed to be innovative and holdouts could be diligent rather than "laggards". Given the rapid development of nutrition science and the often-misconstrued evidence it produces in its wake, it is important to remember this distinction when considering that which is attractive and

popular because it could instead just be socially expedient and potentially harmful. Like Schrodinger's cat, we should assume both are true until we can “lift the lid”.

The combination of SCT and DOI align precisely with the dietitian training pipeline as well as the continuing education practices which often involve diffusion of innovations matched against the individual’s perceived efficacy and the attempts to model behaviors of opinion leaders (see **Figure 1**). Further, given the complexity and uniqueness of nutrition research, self-efficacy may be a limiting factor for appraising research and implementing EBP guidelines for dietitians. As mentioned previously, perceived time constraints, lack of skills for gathering and appraising research information, decreasing confidence in ability over time, and a “sense of competence” are reported to further limit the implementation of EBP which may be a cause and/or symptom of low self-efficacy. However, dietitians are expected to maintain or gain these skills regardless of perceived or actual barriers. As Bandura’s[19] outcome expectation construct implies, the dietitian must feel that there is enough incentive to overcome these barriers in order to devote time and energy resources into satisfying these expectations, i.e. the expected outcome must be perceived to be superior than the work needed to accomplish the task. It is then theorized that the individual with low self-efficacy will be more reliant on opinion leaders as described in the DOI. Opinion leaders are thought to have high levels of self-efficacy and subsequently initiate the diffusion of information to others. However, the speed at which the non-opinion leader adopts the information will be largely dependent on their own degree of self-efficacy. As mentioned, if one does not possess the skills necessary to discern information for themselves, they are more likely to rely on those they perceive to have that ability regardless of actual demonstrated competence. Those non-opinion leaders with higher levels of self-efficacy may be less reliant on opinion leaders and more reluctant to accept the information as true. Conversely,

low self-efficacy may also reduce the adoption of innovations because they do not perceive the benefits to outweigh the efforts necessary to effectively implement them even in the presence of opinion leader influence. In sum, a high degree of self-efficacy will likely result in either a person becoming an opinion leader or being less dependent upon opinion leaders whereas low self-efficacy may result in higher reliance on opinion leaders or just simply lacking the perceived ability to implement the innovation regardless of opinion leader influence. The combination of SCT and DOI as described served as a guide in the development of the semi-structured interview and also the survey. Interviews will encompass the complexity of obesity, nutrition science, EBP, and the interviewee's perceived efficacy in whether to adopt innovations in practice.

Figure 1: Application of Proposed Theoretical Construct



Chapter 3: Methods

Study Aims

The present study was approved by the University of North Florida Institutional Review Board on 3-2-2021, approval number 1706192-1. The primary aim of this mixed-methods study was to identify the barriers and facilitators of research utilization and EBP implementation in adult weight management. The secondary aim was to identify how

dietitians gather information about obesity and/or adult weight management as well as to understand what factors influence how they discern whether to adopt a new practice strategy.

Study Design

This study employed a two-phased, sequential-dependent mixed-methods approach which began with a cross-sectional survey that was followed by semi-structured interviews that were used to further explore the findings of the survey.

Phase 1: Quantitative Analysis

In order to understand the barriers and facilitators to research utilization and EBP as well as the means of information gathering preferred by dietitians, a survey was employed.
The survey gathered demographics information followed by an adapted version, the validated BARRIERS scale,[168] which can be seen in **Table 1**. Finally, the survey captured the frequency of utilization of known best practices in adult weight management. All participants were Registered Dietitians working at least part-time with patients with obesity in an ambulatory or outpatient setting.

Phase 2: Qualitative Analysis

The second phase sought to further explore the findings from the survey by utilizing semi-structured interviews. Multiple data sources were used to triangulate findings in order to add credibility and to ensure the data from the quantitative phase is fully understood.[169] The qualitative component of this study employed a phenomenology research design to explore the shared experiences of dietitians working with patients with obesity. Central to the phenomenology design is the exploration of "common" experiences or understanding of the research problem.[170] This research used a semi-structured interview guide to conduct interviews

via teleconference due to COVID-19 safety considerations (see **Appendix A**). The interview guide was designed to explore the entire process of patient care including information gathering and practices preferred. The guide explored the extent to which the interviewee prefers empirical evidence, anecdotal evidence, or a mix of both. To ensure quality data was collected, the interview guide was pilot tested in two phases. The first phase was conducted by a panel with experience in obesity management. The second phase was conducted in the target population using a small sample of volunteers. The guide was edited based on the findings of the pilot test. Similarly, in order to "calibrate" the researcher as a research tool a process known as reflexivity was performed through self-assessment and peer-support. Reflexivity is the researcher's active acknowledgement that their own personal biases and lived experience will impact the meaning of the research findings.[171] The interviews were recorded, transcribed, and then coded for emerging themes. These codes and themes were discussed among the lead researcher and a dietitian with practice experience in the target setting to ensure accuracy of the data collection process.

Study Participants

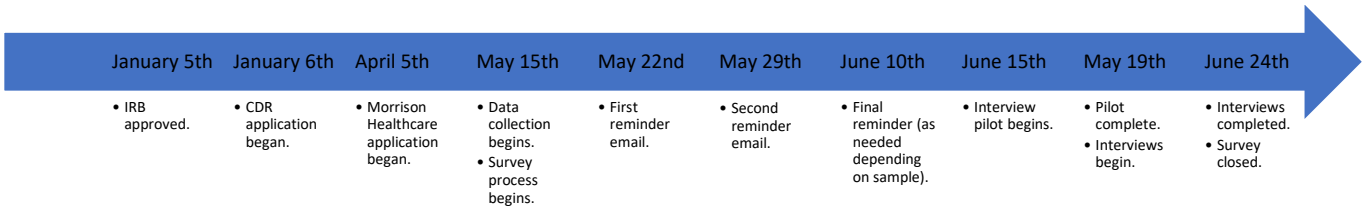
This study sought to examine the experiences of Registered Dietitians working with people with obesity. Only Registered Dietitians who reported active credentialing were included in this study. Included participants all reported working with patients with obesity, at least part-time, in an ambulatory or outpatient setting. Although weight loss is commonly recommended for people with a BMI over 30 kg/m^2, the survey did not exclude dietitians based on their weight-neutral or weight-centric philosophies nor did it require that the patients are seen specifically for obesity, i.e., a dietitian working in diabetes education might see a great deal of patients who also have obesity. These broad inclusionary criteria allowed for the full range of data on how

dietitians prioritize obesity in different settings. Participants were recruited via email communication. Contacts were made via a random selection of 5,000 dietitians generated from the Commission on Dietetic Registration (CDR). Two follow up reminders were sent to all CDR participants. Another contact was made by Morrison Healthcare in the form of a consent form with a link to the study. The Morrison Healthcare contact was only made once to an unknown number of dietitians.

Data Collection

Survey response data was collected along with demographics information see Table 1. Demographics were all measured nominally or ordinally respective to the data type. Timeframe for data collection (see **Figure 2**) can be seen below.

Figure 2: Timeline for Data Collection



The instrument used for data collection in the first phase (quantitative) was a validated[168] survey along with additional practice utilization questions conducted through Qualtrics®. The primary instrument for the second phase (qualitative) was the researcher and the interview guide. The interviews were recorded and transcribed via Zoom® and field notes were taken during the interview for later review.

Validity and reliability (trustworthiness) of the instruments in the second phase depended largely on the researcher's ability to withhold preconceived notions about how the interviewee might have responded. In order to mitigate bias, the researcher was trained in conducting

qualitative research including conducting mock data collection via one-on-one interviewing and focus groups. Additionally, a peer-review by another dietitian familiar with obesity management practices and the use of triangulation via survey were used to ensure the trustworthiness of the data.

Data Analysis

Study power was established respective to each phase of data collection. For the survey, an *a priori* calculation proposed by Smith[172] produced an ideal sample size of 380 participants. Smith's[172] calculation is as follows: (Z-score)² * Standard Deviation * (1-Standard Deviation) / (margin of error)². In this equation, the Z-score (1.96) corresponds with a 95% confidence interval, based on a similar study[173] an estimated 0.55 is used for the standard deviation, and a margin of error is assumed at 5%. In order to produce this sample size in the target audience, a convenience sample of dietitians belonging to respective groups described previously were solicited. Due to the use of "skip-logic", the survey did not have any missing data. The data was evaluated for outliers and remedied as appropriate for the context. During the qualitative process, data saturation was declared when there was enough data to replicate the study, when no new information could be attained, and further coding was no longer feasible.[169] Data saturation was accomplished in 10 interviews.

The survey demographic data was described by frequencies. The survey data was analyzed to identify relationships found between demographic characteristics and responses to the BARRIERS scale[168] questions. The BARRIERS Scale is grouped into 4 subscales Setting Barriers and Limitations, Presentation and Accessibility of the Research, Qualities of the Research, and Dietitians Research, Values, Skills, and Awareness. These 4 subscales shall be

henceforth referred to as Setting, Presentation, Qualities, and Dietitian. A final category of "Miscellaneous Items" was developed to explore items not captured in the BARRIERS Scale and no composite mean was calculated given that it was not part of the original list, and no comparisons can be drawn to the original subscales. Rather than attempting to draw comparisons of individual items across different subscales, composite mean scores for the 4 subscales were calculated to allow for the greatest variability in responses for comparison. The composite mean scores represent the extent to which participants agreed or disagreed with the barrier subscale questions. The higher the composite mean, the more strongly the participants agreed with the stated barrier. The subscales Dietitian and Setting contained 8, 5-point Likert questions which provided possible scores between 8 and 40 whereas the subscales Presentation and Qualities contained 6, 5-point Likert questions which provided possible scores between 6 and 30. In order to compare the 4 subscales appropriately, each composite score was divided by the total possible score and represented as a percentage of the total.

In order to further examine the BARRIERS Scale data results, a series of MANOVAS were performed with various grouping (independent) variables and the four barrier subscales as dependent variables. The four dependent variables were created as continuous or interval data. Although Likert scales are ordinal in nature, it is considered acceptable practice to treat them as interval data in order to meet parametric assumptions.[174] A summary of research questions and the data used to answer them can be seen in **Table 2**. The survey data was analyzed via IBM SPSS Statistics version 26 (IBM Corp. Released 2019.).

The qualitative data was recorded and transcribed via Zoom® and then analyzed. Initially, segments of data were labeled to help form descriptions about commonalities identified known as codes. The coding process was deductive in nature as many barriers and facilitators to EBP

have been identified.[170] Codes were refined until the most precise definitions were established.[170] A second reader, who is dietitian familiar with obesity management practices assisted to ensure trustworthiness of codes. As codes began to show relationships with other codes, themes were developed to better understand the commonalities of the dataset. These themes were evaluated in the context of the previously established theory to better understand how dietitians utilize research, gather information, and discern practice strategies.

Table 1

Description of Demographic Variables 1

Independent Variable	Description
Gender	Nominal 4 Options (Male, Female, Non-binary, and prefer not to answer)
Age	Categorical 5 Options (21-29, 30-39, 40-49, 50-59, 60 or older)
Race	Nominal 7 Options (White, Black or African American, American Indian or Alaskan Native, Asian, Native Hawaiian or other Pacific Islander, from multiple races, other (please specify))
Geographic Practice Setting	Nominal 3 Options (Urban, Suburban, and Rural) Population density will be offered to guide selection (>100,000, 10,000-99,999, or less than 10,000 respectively)
Highest Degree Earned	Categorical 3 Options (Bachelor's, Master's, and Doctoral)
Recency of Highest Degree Earned (years)	Categorical 7 Options (0-5, 6-11, 12-18, 19-25, 26-32, 32 and above)
Years of Experience	Categorical 7 Options (0-5, 6-11, 12-18, 19-25, 26-32, 32 and above)
Specialty Certification	Nominal 6 Options (Certified Specialist in Weight Management (CSOWM), Certified Diabetes Care and Education Specialist (CDCES) formerly Certified Diabetes Educator (CDE), Board-Certified Diabetes Management (BC-ADM), Certified Specialist in Renal (CSR), Certified Specialist in Sports Dietetics (CSSD), American College of Sports Medicine (ACSM), National Academy of Sports Medicine- Certified Personal Trainer (NASM-CPT) and Other, please specify.)
Practice Type	Nominal 5 Options (Obesity/Weight Management, Diabetes Education, Renal, Sports Nutrition, and other, please specify.)
Participate in an on-site, multidisciplinary, high-intensity comprehensive lifestyle intervention consisting of greater than or equal to 14 sessions in 6 months.	Nominal (yes or no)
Practitioner preferences	Nominal- Which intervention style best describes practice style? (Weight-neutral, Weight-centric, or Utilize both)

Table 1 Continued

Questions and Subscales	Scale
Subscale: The dietitian's research values, skills and awareness	
The dietitian is unaware of the research.	Likert: 1, 2, 3, 4, 5

The dietitian does not feel capable of evaluating the quality of the research.	Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree
The dietitian is isolated from knowledgeable colleagues with whom to discuss the research.	
The dietitian is unwilling to change/try new ideas.	
The dietitian sees little benefit for self.	
There is not a documented need to change practice.	
The dietitian feels the benefits of changing practice will be minimal.	
The dietitian does not see the value of research for practice.	
Subscale: Setting barriers and limitations.	
There is insufficient time on the job to implement new ideas.	Likert: 1, 2, 3, 4, 5 Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree
The dietitian does not have time to read research.	
The dietitian does not feel she/he has enough authority to change patient care procedures.	
The facilities are inadequate for implementation.	
Other staff are not supportive of implementation.	
Physicians will not cooperate with implementation.	
The dietitian feels results are not generalizable to own setting.	
Administration will not allow implementation.	
Subscale: Qualities of the research.	
The research has not been replicated.	Likert: 1, 2, 3, 4, 5 Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree
The literature reports conflicting results.	
The research has methodological inadequacies.	
Research reports/articles are not published fast enough.	
The dietitian is uncertain whether to believe the results of the research.	
The conclusions drawn from the research are not justified.	
Subscale: Presentation and accessibility of the research.	
The statistical analyses are not understandable.	Likert: 1, 2, 3, 4, 5 Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree
The relevant literature is not compiled in one place.	
Research reports/articles are not readily available.	
Implications for practice are not made clear.	
The research is not reported clearly and readably.	
The research is not relevant to the dietitian's practice.	
Miscellaneous Questions	
The amount of research is overwhelming.	Likert: 1, 2, 3, 4, 5
The research must be endorsed by a major organization (e.g., Academy of Nutrition and Dietetics) before implementing into practice.	
The dietitian prefers to wait until a trusted individual endorses a recommendation before implementing into practice.	

The dietitian prefers to learn from seminars, conferences, or webinars rather than finding and interpreting research literature independently	Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree
Misinformation is a major barrier to implementing effective obesity/weight management interventions.	
The dietitian feels confident in their ability to correct misinformation.	
The dietitian utilizes social media to gain knowledge about obesity/weight management issues and/or interventions.	Yes/No
The dietitian utilizes the Academy of Nutrition and Dietetics Evidence Analysis Library to gain knowledge about obesity/weight management.	Likert: 1, 2, 3, 4, 5 Never, Sometimes, About half the time, Most of the time, Always
The dietitian utilizes behavior change theory to guide patient/client interventions.	Likert: 1, 2, 3, 4, 5 Never, Sometimes, About half the time, Most of the time, Always
The dietitian feels confident utilizing cognitive behavioral therapy techniques when working with patients.	Likert: 1, 2, 3, 4, 5 Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree
The dietitian feels confident utilizing Motivational Interviewing techniques when working with patients.	Likert: 1, 2, 3, 4, 5 Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree

Table 2

Data Analysis and Thematic Underpinning.

Research Question	Theoretical Construct	Data Collected	Analysis of Data
What are the greatest perceived barriers to research utilization and implementation of EBP?	Self-efficacy, outcome expectations, and reliance on opinion leaders for diffusion of innovations.	Survey Subsection: All. Interview Guide Questions: 1-6	Phase 1: Survey analysis using composite means of BARRIERS subscales along with ranking of individual barrier questions via mean response. MANOVA to identify relationships between demographics questions and BARRIERS subscales. Frequencies of EBP analyzed with descriptive statistics. Phase 2: Triangulation of Survey via Semi-Structured Interviews.
What are the preferred methods of information gathering amongst dietitians?	Self-efficacy, outcome expectations, and influence of opinion leaders.	Survey Subsection: All. Interview Guide Questions: 1-6	
To what extent are dietitians utilizing best practices for adult weight management?	Self-efficacy, outcome expectations, and influence of opinion leaders.	Survey Subsection: Question is asked directly as "yes or no". Interview Guide Questions 1-6	
What are the greatest perceived facilitators of research utilization and implementation of EBP?	Self-efficacy, outcome expectations, and reliance on opinion leaders for diffusion of innovations.	Survey Subsection: All. Interview Guide Questions: 1-6	
How many dietitians utilize weight-neutral practices?	Outcome expectations and influence of opinion leaders.	Survey Subsection: Practice Philosophy. Interview Guide Questions: 1-6	
To what extent do dietitians depend on opinion leaders to make practice decisions?	Self-efficacy, outcome expectations, and reliance on opinion leaders.	Survey Subsection: All. Interview Guide Questions: 1-6	

Chapter 4: Results

This study employed a mixed-methods approach to answer 6 research questions which will be detailed after a brief description of the survey sample and qualitative analysis findings. The precise means of how each research question was answered is detailed within the respective sections.

Description of Survey Sample

Of the 355 survey participants that opened the survey, only 269 completed the survey and met the criteria as defined above. Of the 269 who completed the survey, 10 participants were ultimately interviewed in the qualitative portion of the study. The survey sample aligns well with the CDR registry statistics[44] described previously. The participants identified mostly as female (93.3%) which is consistent with the CDR reporting of 92%. The majority of participants identified as white (89.2%) which is also relatively consistent with CDR reporting of 80%. The most common age range reported was 30-39 (32.3%) and CDR reports a mean age of 45 years of age. The most common geographic practice setting was suburban (46.5%). Most participants had earned a master's degree (63.2%) and the most common response to recency of degree earned was 0-5 years (32.3%). The most common response to years of experience was 0-5 years. Most indicated that they practiced in categories "other" (52.8%) than the ones listed and most did not have a specialty certification of any kind (62.5%). Finally, the most commonly reported practice philosophy selected was "use both strategies" (45.7%). A detailed description of the sample demographics can be seen below in **Table 3**.

Table 3

Sample Demographics

Gender

	Frequency	Percent
Male	14	5.2
Female	251	93.3
Non-binary	3	1.1
Prefer not to answer	1	.4
Total	269	100.0

Age

	Frequency	Percent
21-29	56	20.8
30-39	87	32.3
40-49	46	17.1
50-59	52	19.3
60 or older	28	10.4
Total	269	100.0

Race

	Frequency	Percent
White	240	89.2
Black or African American	3	1.1
American Indian or Alaska Native	2	.7
Asian	8	3.0
Other	16	5.9
Total	269	100.0

Geographic Practice Setting

	Frequency	Percent
Urban (> 100,000 Population)	107	39.8
Suburban (10,000-100,000 Population)	125	46.5
Rural (<10,000 Population)	37	13.8
Total	269	100.0

Highest Degree Earned

	Frequency	Percent
Bachelor's Degree	97	36.1
Master's Degree	170	63.2
Doctorate Degree	2	.7
Total	269	100.0

Recency of Highest Degree Earned

	Frequency	Percent
0-5 years	87	32.3
6-11 years	70	26.0
12-18 years	25	9.3
19-25 years	38	14.1
26-32 years	24	8.9
32 or more years	25	9.3
Total	269	100.0

Years of Experience

	Frequency	Percent
0-5 years	78	29.0
6-11 years	68	25.3
12-18 years	29	10.8
19-25 years	37	13.8
26-32 years	27	10.0
32 or more years	30	11.2
Total	269	100.0

Primary Practice Area

	Frequency	Percent
Obesity/Weight Management	53	19.7
Diabetes Education	46	17.1
Renal	16	5.9
Sports Nutrition	4	1.5
Corporate Wellness	8	3.0
Other	142	52.8

Total	269	100.0

Specialty Certification

	Frequency	Percent
None	168	62.5
CSOWM	14	5.2
CDCES	40	14.9
BC-ADM	2	.7
CSR	3	1.1
CSSD	7	2.6
ACSM	5	1.9
NASM-CPT	1	.4
Other	42	15.6
Total	269	100.0

Description of Qualitative Analysis

To further examine the barriers and facilitators of EBP, 10 participants were selected to participate in follow-up, semi-structured interviews. Only 10 participants were necessary to reach saturation, or the point when no new themes or subthemes could be identified. Interview guide can be found in **Appendix A** and is broadly summarized by questions related to information gathering, utilization of various practice strategies/techniques, research utilization, ethics, and general attitudes about the field of adult weight management. Participants were selected mostly at random, but efforts were made to include two participants that identified as male to approximately match the survey findings for gender. The participants ranged in age, years of experience, highest degree earned, and geographic location which is also reasonably consistent with the survey findings. Transcripts were created and then coded until themes emerged. A second reader was employed to compare and contrast findings and to assist in the development of theories based on the findings. The 3 major themes that emerged throughout all

the participants' interviews were related to time, training, and opinion leaders. **Table 4** shows a summary of findings from the qualitative analysis.

Table 4

Summary of Interview Themes

Major Theme	**Emergent Theme**	**Theory**	**Quote**
Time	Reading research	Time constraints are a major barrier to reading research and implementing findings.	"Sometimes you have to read four or five articles to get to the information you want and that can be really difficult to find time to weed through all of the ones that don't really apply or ones that are old" "The time [to read research], no, but that's just because of the nature of my position"
	Utilizing social media	Time constraints increase reliance on social media such as podcasts, Facebook, and many other media sites.	"There was a period for at least a month or so that I would listen to a podcast from like the dietitians and nutrition support group… and use that information in my practice" "People are busy, they're always doing stuff but like you know it's really easy to you know put on a podcast when you're driving"
	Listserv	Time constraints increase reliance on listservs.	"I actually have a separate email account that I use just to follow random, various listserv." "I am part of like the smart briefs that come out"
	Jack of all trades	Time constraints are increased by the broad array of patient needs (e.g., weight loss advice is given during lactation education or renal diet education)	"I had to jump in feet first and really like train myself on critical care nutrition" "The majority of my CEUs are lactation specific"

Training	Statistics	Lack of training in statistical interpretation is a major barrier to research utilization.	"When they start talking about the statistical methods used, I can't tell you whether or not that was a good choice" "…after I was able to get my master's degree that was really helpful… but even after that, you know, I still don't understand stats."
	School wasn't enough	Inadequate training during graduate and/or undergraduate schooling is a major barrier to research utilization.	"I don't think we're really trained… to read research and really dissect research" On MI - "We went over it a little bit in undergrad but not really. We had like one class on it."
	On the job	Most training in Motivational Interviewing is employer sponsored or self-guided learning modules.	"I learned most of my Motivational Interviewing mostly from my second job." "I went to an awesome training CEU, Molly Kellog… that was probably the bulk"
	CEUs	CEU requirements are seen as a major barrier to research utilization due to the ease of attaining them.	"I just think it's not that hard to get the CEUs and I think a lot of dietitians are just too busy and they're just zooming through and not really maybe paying attention" "…the CEU program, I almost would like to see that revamped at some point. You just have to answer those 5 or 6 test questions to pass it."
	Misinformation	Misinformation is a major barrier and most dietitians have had no formal training in dealing with it.	"I didn't even know there could potentially be training out there with this information" "If it was [covered], I don't remember"
	NCP	Dietitians fall back on NCP when faced with unknowable questions or problems.	"I go patient-oriented, you know, like if I have an obese or overweight patient the doctor

			referred them to lose weight, but they are not in the place for it emotionally or in their lifestyle…" *****referenced doing an assessment to understand the - "risk versus the benefit or potential benefit" "I would find out everything I can about this person and basically start a nutrition assessment"
Opinion Leaders	Shape the field	Opinion leaders shape the field of dietetics because they offer more of a "call to action" when compared to independent research.	"I feel walking away that whatever that person just said, everybody in the room is just "oh my gosh, this is the newest, greatest thing" "People can listen to information or listen to a person talking versus like reading this really boring, you know research paper" "It is more influential to have a speaker because you get more from a person when you're in person and with them… now if you're just reading it on paper... I think we all lose something"
	Put it into context	Relying on opinion leaders to put research findings into context is a major barrier to research utilization.	"She's a dietitian that I often listen to, and she, you know, she kind of breaks things down." "Presenting all the research, right, not just presenting like this one side of it but showing me all the sides, showing me the cons too" "I can appreciate that he presents it in a way that it is easy to pass on to someone else…"

	Tribalism	Tribalism is a major barrier to research utilization.	"If there's somebody, something like, you know, Academy then I won't go for somebody like that" "There's a lot of dietitians that are not doing things that are evidence-based and so just because they have the credential doesn't mean, I think, that the information they have to share is evidence-based" "I'd be less skeptical against someone who's with HAES, intuitive eating, and weight neutral, yeah." "I find it interesting that dietitians can be so distinct on the topic, you know, separated and how, you know, patient driven isn't the number one priority"
	Conflict of Interest	Conflict of interest is a major barrier to research utilization.	"The whole thing with the Kraft singles" "Conflict of interest stands out to me. I think there's gotta be some… even if it's subconscious bias." "weary" of sponsors. "How can I know if what they're presenting is legitimate basically?"

Question 1

What are the greatest perceived barriers to research utilization and implementation of EBP?

BARRIERS Scale Findings

The BARRIERS Scale is grouped into 4 subscales Setting, Presentation, Qualities, and Dietitian. A final category of "Miscellaneous Questions" was developed as an extension of the BARRIERS Scale and no composite mean was calculated given that it was not part of the original list, however, mean response was still captured for comparison to other individual items. Composite mean scores for the 4 subscales were compared (see **Table 5**) to allow for the greatest variability in responses for comparison. Comparison of composite means showed that the greatest perceived barrier was Setting (M = 23.89, SD = 6.83) compared to Presentation (M = 17.49, SD = 4.80), Qualities (M = 17.29, SD = 3.62), and Dietitian (M = 15.71, SD = 5.45). The rank of the individual items can be seen in Appendix B along with the mean Likert score (1-5 range) with a higher mean score indicating that the respondent more strongly agreed with the statement as written.

Table 5

BARRIERS Subscale Composite

Subscale (Possible Score)	Composite	SD	95% Confidence Interval- Lower Bound	95% Confidence Interval- Upper Bound
Setting (8-40)	23.89	6.83	23.07	24.71
Presentation (6-30)	17.49	4.80	16.90	18.05
Qualities (6-30)	17.29	3.62	16.85	17.72
Dietitian (8-40)	15.71	5.45	15.06	16.37

In order to further examine the BARRIERS Scale data results, a series of MANOVAS were performed with various grouping variables and the four barrier subscales as dependent variables. The four dependent variables were created as continuous or interval data. The initial

examination of gender, age, geographic setting, highest degree, and recency of degree were all found not to be statistically significant.

Years of Experience was examined. **Table 3** shows the frequency and percent, while **Table 7** shows the descriptive statistics (means and standard error for each year by Setting Subscale). Next examination of the Box's Test of Equality of Covariance Matrices revealed that the data met the assumption of homogeneity of variance-covariance matrices (p = .061). In addition, the Levene's Test of Quality of Error Variances was examined and the data met the assumption of equality of variance for each variable (p > .05). Partial eta squared for Setting by Years of Experience was .049.

With assumptions met and the multivariate analysis significant, further examination of between-subjects effects were warranted. Examination of the Test of Between-Subject Effects table revealed that only Setting was statistically significant for Years of Experience (F (1,5) = 2.713, p = .021) (see **Table 6**).

Table 6

Test of Between-Subject Effects

Source	Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.
Yrs. Exp	Dietitian	75.316	5	15.063	.503	.774
	Setting	613.452	5	122.690	2.713	.021*
	Qualities	107.330	5	21.466	1.660	.145
	Presentation Score	181.025	5	36.205	1.586	.164

Based on these findings, a post hoc test was warranted. A one-way ANOVA was performed for Years of Experience by Setting. Examination of the multiple comparisons table revealed that 0-5 years compared to 32 or more years was statistically significant (p = .030) as

well as 6-11 years compared to 32 or more years also meeting statistical significance (p = .036). Further examination showed 0-5 years for Setting was (M = 25.01, SD = 6.39) and 6-11 years for Setting was (M = 25.00, SD = 6.29) compared to 32 or more years (M = 20.60, SD = 6.38). **Table 7** shows the comparison of 32 or more years against the respective categories.

Table 7

Comparison of mean differences between years of experience by Setting.

(I) Years of Experience	(J) Years of Experience	Means	Mean Difference (I-J)	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
32 or more years (M = 20.60)	0-5 years	25.01	-4.413*	1.445	-8.56	-.27
	6-11 years	25.00	-4.400*	1.474	-8.63	-.17
	12-18 years	22.00	-1.400	1.751	-6.43	3.63
	19-25 years	23.89	-3.292	1.652	-8.04	1.45
	26-32 years	23.56	-2.956	1.784	-8.08	2.17

* P < 0.05

Interview Findings

Time and Training appeared to be the two major themes identified during the interview process. Time restraints included those caused by workplace setting demands as well as the time to find and read research itself. Training limitations also play a role in research utilizations and include items such as limitations of understanding statistics, a sense of competence, and misinformation.

Time

Participants felt that time was a major barrier to research utilization, however, the drivers of the time constraints appeared to be multifaceted with one participant stating “Sometimes you have to read four or five articles to get to the information you want and that can be really difficult to find time to weed through all of the ones that don’t really apply or ones that are old”

while others asserted that time constraints are just due to the nature of their position such as “The time [to read research], no, but that’s just because of the nature of my position”. Many participants also reported being responsible for a broad variety of job responsibilities and patient types which further compete for their time resources. One participant had recently had to take on critical care patients due to the nature of her position stating, “I had to jump in feet first and really like train myself on critical care nutrition”. Others will primarily see patients for other issues but discuss weight as a secondary issue. One participant reported being behind on best practices for weight management because she needed to keep up with lactation needs stating “The majority of my CEUs are lactation specific”. This “Jack of all trades” was a common feature amongst participants that included a broad variety of patient types and information needs to match.

Training

The most commonly reported training barrier was a lack of confidence in statistical analysis and interpretation. Some reported a complete lack of confidence with one participant stating, “When they start talking about the statistical methods used, I can’t tell you whether or not that was a good choice”. Although most explicitly stated that they did not feel confident in analyzing statistical information, the idea that the graduate degree requirement assisting in the discomfort around statistics was mentioned a few times. One participant stated, “I'm about to start grad school this fall so I'm very excited to relearn about confidence intervals so I can write proper notes this time around.”. However, another participant did not feel that her graduate degree resolved her discomfort with statistical analysis stating “…after I was able to get my master’s degree, that was really helpful… but even after that, you know, I still don’t understand stats.”. It is important to note that although most participants reported discomfort with statistical

analysis, nearly all reported feeling confident in reading and interpreting research overall. One example, in contrast to a previous statement about discomfort with statistics "I feel pretty confident in my abilities to decipher research" and the majority felt confident when asked if they were comfortable teaching research analytical skills to a colleague, although most provided the caveat of "but not statistics". The sense of competence seemed to remain with understanding research generally, but statistical analysis being removed from that self-assessment. "[Teaching others] the research process and learning how to dissect and read that, so yeah, everything else I feel quite comfortable. Though statistics part, I'm usually like there's someone else… [that] could probably explain that a little bit better, but yeah, otherwise I feel comfortable." The few that did report a feeling of confidence only seemed to mention "p-values" as a marker of understanding. When asked about comfortability teaching a colleague, one participant reports "To a colleague? Yeah, I have, sure. Like p value and, yeah, things.". Another dietitian reportedly similarly to the question, "Yeah, telling them, again, looking for the p-values on things…what kind of study… what kind of journal…"

On the issue of training, many participants felt that their schooling was inadequate on the topic of research utilization and best practices. Some spoke generally such as "I don't think we're really trained… to read research and really dissect research" but others felt that their training missed specific items such as MI, "We went over it a little bit in undergrad but not really. We had like one class on it.". However, many have been able to remedy the lack of training through employer-led or sponsored courses and conferences, mostly around the topic of MI. "I learned most of my Motivational Interviewing mostly from my second job." Another stated, "I went to an awesome training CEU, Molly Kellog… that was probably the bulk".

CEU requirements were noted by most participants as a barrier to research utilization. CEU requirements are often seen as "busy work" and, as noted above, often compound the limited time resources and participants feel that they are more a hinderance than a learning opportunity. One participant stated, "I just think it's not that hard to get the CEUs and I think a lot of dietitians are just too busy and they're just zooming through and not really maybe paying attention". Another stated, "…the CEU program, I almost would like to see that revamped at some point. You just have to answer those 5 or 6 test questions to pass it." Integrity and quality of information was also noted throughout as a potential limitation of CEUs.

Misinformation is seen as another major barrier to implementing best practices by all participants. Most voiced frustration with this topic and the majority had never received any formal training in how to combat misinformation. Some were not even aware that training for this might exist with one participant stating, "I didn't even know there could potentially be training out there with this information" and most couldn't recall ever discussing it such as "If it was [covered], I don't remember". Social media was mentioned by most as a significant source of misinformation but with various approaches. One participant stated they will sometimes choose to engage with findings of misinformation on Facebook "… I've responded to a few of them… and sometimes it goes well." However, others choose not to engage such as another participant stating, "oftentimes people will just dig their heels in.". When addressing misinformation in person, most participants noted that they will find a way to respectfully correct the information in a direct way and provide alternative sources of information to the patient.

Question 2

What are the preferred methods of information gathering amongst dietitians?

Results from the information gathering section of the survey showed that only 37.9% of participants utilize social media as a means of gaining knowledge about obesity/weight management issues and/or interventions. The mean response for use of the EAL (M = 2.58, SD = 1.14) for gaining knowledge about obesity/weight management issues with fewer than 25% indicating that they use it "most of the time" or "always". Further breakdown of social media and EAL use can be seen in **Table 8** below. Dietitians report that they prefer to learn from seminars, conferences, or webinars as opposed to independently interpreting research literature (M = 3.58, SD = 1.17) and that the amount of research is overwhelming (M = 3.56, SD = 0.94). Endorsement of research recommendations appears to be more important from a major organization (M = 3.06, SD = 1.25) than from an individual (M = 2.91, SD = 1.18). Dietitians feel that misinformation is a major barrier to implementing EBP (M = 3.98, SD = 1.17) but are confident in their ability to correct it (M = 3.94, SD = 0.85).

Table 8

Information gathering preferences

The dietitian utilizes social media to gain knowledge about obesity/weight management issues and/or interventions.

	Frequency	Percent
Yes	102	37.9
No	167	62.1
Total	269	100.0

The dietitian utilizes the Academy of Nutrition and Dietetics Evidence Analysis Library to gain knowledge about obesity/weight management.

	Frequency	Percent	Cumulative Percent

Never	41	15.2	15.2
Sometimes	116	43.1	58.4
About half the time	45	16.7	75.1
Most of the time	50	18.6	93.7
Always	17	6.3	100.0
Total	269	100.0	

Interview findings

Many participants referenced utilizing listservs or daily email blasts to remedy the shortage of time with one participant stating, “I actually have a separate email account that I use just to follow random, various listserv.” and many used Academy specific listservs “I am part of the smart briefs that come out” but a variety are reported. Another remedy appears to be the utilization of social media in order to get information with podcasts being the overwhelming favorite. “There was a period for at least a month or so that I would listen to a podcast from like the dietitians and nutrition support group… and use that information in my practice”. Utilizing time outside of work, such as a commute, appeared to be a common practice as well “People are busy, they’re always doing stuff but like you know it’s really easy to you know put on a podcast when you’re driving”. Facebook, Instagram, LinkedIn, and others were all referenced but had a more nuanced status among the participants.

Question 3

To what extent are dietitians utilizing best practices for adult weight management?

Utilization of Evidence Based Practice

Results from the utilization section of the survey identified that only 18.22% of participants report that they participate in an on-site, multidisciplinary, high intensity comprehensive lifestyle intervention consisting of greater than or equal to 14 sessions in 6 months as recommended by the USPSTF. Further, only 56.88% of participants agree with the USPSTF recommendation. Dietitians report to use BCT to guide patient interventions ($M = 3.59$, $SD = 1.10$) and feel confident using CBT ($M = 3.49$, $SD = 1.14$) as well as MI ($M = 4.28$, $SD = 0.85$). Further breakdown of these results can be seen below in **Table 9**.

Table 9

Description of best practices

Do you agree with the United States Preventive Services Task Force (USPSTF) recommendation that clinicians should offer or refer adults with a body mass index of 30 or higher to intensive, multicomponent behavioral interventions?

	Frequency	Percent
Yes	153	56.9
No	53	19.7
Unsure	63	23.4
Total	269	100.0

Do you participate in an on-site, multidisciplinary, high-intensity comprehensive lifestyle intervention consisting of greater than or equal to 14 sessions in 6 months?

	Frequency	Percent
Yes	49	18.2
No	220	81.8

Total	269	100.0

The dietitian utilizes behavior change theory to guide patient/client interventions.

	Frequency	Percent
Never	5	1.9
Sometimes	57	21.2
About half the time	37	13.8
Most of the time	113	42.0
Always	57	21.2
Total	269	100.0

The dietitian feels confident utilizing cognitive behavioral therapy techniques when working with patients.

	Frequency	Percent
Strongly disagree	13	4.8
Somewhat disagree	53	19.7
Neither agree nor disagree	41	15.2
Somewhat agree	113	42.0
Strongly agree	49	18.2
Total	269	100.0

The dietitian feels confident utilizing Motivational Interviewing techniques when working with patients.

	Frequency	Percent
Strongly Disagree	2	0.7
Somewhat disagree	13	4.8
Neither agree nor disagree	18	6.7
Somewhat agree	111	41.3
Strongly agree	125	46.5
Total	269	100.0

Interview findings

When asked about the utilization of BCT only 3 participants mentioned something other than MI. The Transtheoretical Model was alluded to by three participants but not explicitly named. Some recalled the stages of change such as "and behavior change theory, kind of, you're talking about maybe like the spectrum of, you know, preparation and the kind of that were action, kind of those phases or…" as well as another participant who utilized the stages of change for screening purposes "I definitely use the theoretical model of change, like the pre-contemplate, contemplate, of you know, action, maintenance every single day." Another participant discussed stages of change "probably the one that always comes to mind the most is just like stages of change.". The other 7 participants responded similar to statement, "Behavior change theory, as in like Motivational Interviewing?". One participant did go on to mention the Health Belief Model, but no other theories were stated or described when directly asked about utilization of BCT to guide patient interaction.

Question 4

What are the greatest perceived facilitators of research utilization and implementation of EBP?

The BARRIERS survey identified that Dietitian was the lowest composite mean response (M = 15.71, SD = 5.45) indicating that dietitians feel their research values, skills, and awareness are less of a barrier to research utilization than Setting, Presentation, and Qualities subscales. Further, when examining the individual items within the Dietitian subscale it appears that the entire subscale makes up 8 of the 9 lowest responses indicating that participants most strongly disagreed with these items. See Table 10 for an examination of the Dietitian subscale and the

items ranked in the entirety of the BARRIERS survey. All subscale items are ranked in Appendix B for further comparison. Further, as described in Question 1 results, years of experience appears to reduce the perception of settings barriers which may promote research utilization over time.

Table 10

Dietitian Subscale

Rank	Dietitian's Research Values, Skills, and Awareness	15.71*	5.45
20	The dietitian is isolated from knowledgeable colleagues with whom to discuss the research.	2.53	1.33
22	The dietitian feels the benefits of changing practice will be minimal.	2.20	1.00
23	The dietitian is unaware of the research.	2.19	1.18
24	There is not a documented need to change practice.	2.18	1.09
25	The dietitian does not feel capable of evaluating the quality of the research.	1.91	1.03
26	The dietitian is unwilling to change/try new ideas.	1.63	1.02
27	The dietitian sees little benefit for self.	1.62	0.91
28	The dietitian does not see the value of research for practice.	1.45	0.80

Interview findings

Although insufficient schooling is noted as a barrier to research utilization, it seems that employers may be facilitating its implementation by creating training programs to fill the gap. Many have been able to remedy the lack of training through employer-led or sponsored courses and conferences, mostly around the topic of MI. “I learned most of my Motivational Interviewing mostly from my second job.” With another stating, “I went to an awesome training CEU, Molly Kellogg… that was probably the bulk”.

Although many barriers related to training were identified, one facilitator of EBP seemed to recur throughout when participants were asked about how they deal with questions or situations that don't have clear guidelines or paths forward. The NCP seems to be the default setting for most participants although most never explicitly stated it. The NCP as a model was used to guide difficult situations such as disagreements with physician orders that seem to go against patient wishes or stated goals such as this quote, "I go patient-oriented, you know, like if I have an obese or overweight patient the doctor referred them to lose weight, but they are not in the place for it emotionally or in their lifestyle…[goes on to say that it needs to be the patients decision]". This information is gathered by following the NCP and making interventions based on an assessment. The NCP is used to answer tough questions about supplements like "the risk versus the benefit or potential benefit" or when asked about a novel weight loss strategy that isn't known to the RD like "I would find out everything I can about this person and basically start a nutrition assessment". Participants seem to filter out the unnecessary influx of misinformation, diet trends, and other revolving door nutrition related topics by falling back on the NCP as they were trained to do.

Question 5

How many dietitians utilize weight-neutral practices?

The survey data found that 33.8% of participants prefer to exclusively utilize weight-neutral practices. However, the majority prefer to utilize components of both weight-neutral and weight-centric strategies to counsel patients/clients with obesity. See **Table 11** for breakdown of frequency and percent.

Table 11

Description of Practice Styles

Which intervention philosophy best describes your preferred practice style?	Frequency	Percent
Weight-Neutral	91	33.8
Weight-Centric	10	3.7
Use Both Strategies	123	45.7
Unsure	45	16.7
Total	269	100.0

Question 6

To what extent do dietitians depend on opinion leaders to make practice decisions?

The present study examined the mean responses to miscellaneous items (see **Table 12**) that were designed to understand how dietitians prefer to gather information and how they feel about misinformation. Dietitians' preferred means of information gathering are detailed in Question 2 results and misinformation as a barrier are described in Question 1 results, however it is important to recall that dietitians generally prefer learning from others while recognizing the burdens of misinformation. Further, time restraints and limited training (See Question 1 Results) may further exacerbate reliance on others, often opinion leaders, to place research findings into context on their behalf. These findings are confirmed by interview findings which are detailed in the next section.

Table 12

Miscellaneous Items

Miscellaneous Items	**Mean**	**SD**
Misinformation is a major barrier to implementing effective obesity/weight management interventions.	3.98	1.17

The dietitian prefers to learn from seminars, conferences, or webinars rather than finding and interpreting research literature independently.	3.58	1.17
The amount of research is overwhelming.	3.56	0.94
The research must be endorsed by a major organization (e.g., Academy of Nutrition and Dietetics) before implementing into practice.	3.06	1.25
The dietitian prefers to wait until a trusted individual endorses a recommendation before implementing into practice.	2.91	1.18
The dietitian feels confident in their ability to correct misinformation.	3.94	0.85

Opinion Leaders

Opinion Leaders are broadly categorized as persons who exert influence on the opinions of others about an issue, product, or service. Opinion Leaders can be innovative, but it is important to recall that innovation should be cautiously interpreted and not viewed strictly through the eyes of the promoter, i.e., not all information from Opinion Leaders is evidence-based and some could intentionally or unintentionally mislead others. Opinion Leaders are identified by survey participants as a potential barrier as well as a potential facilitator of EBP implementation. Participants identified opinion leaders as podcast hosts, blogs or other social media authors, and lecturers appearing in conferences, webinars, and general media. This theme is broken into categories such as shape the field, put research into context, tribalism, and conflict of interest.

Opinion leaders are seen as a double-edged sword by participants. Many cite that opinion leaders are shaping the field of adult weight management and nutrition practice in general because they seem to offer a “call to action” when compared to independent research appraisal and implementation. When dietitians have limited time resources and perceive their training to

be insufficient, they turn to opinion leaders for help. “People can listen to information or listen to a person talking versus like reading this really boring, you know research paper”. Many recognize the potential negative effects of this reliance stating, “I feel, walking away, that whatever that person just said, everybody in the room is just, oh my gosh, this is the newest, greatest thing”. Some explicitly prefer the experience of listening to speakers because they feel like they miss out on details otherwise such as “It is more influential to have a speaker because you get more from a person when you’re in person and with them… now if you’re just reading it on paper... I think we all lose something”. However, it seems that many participants rely on opinion leaders to place research findings into context for them. Limited time and training increase the appeal of others piecing research together on their behalf such as “She’s a dietitian that I often listen to, and she, you know, she kind of breaks things down.” or “I can appreciate that he presents it in a way that it is easy to pass on to someone else…”. Help “arguing both sides” was another common statement such as “Presenting all the research, right, not just presenting like this one side of it but showing me all the sides, showing me the cons too”. This barrier becomes clearer as participants begin to explain how they begin to find like-minded opinion leaders resembling that of tribalism. Some feel that the Academy isn’t trustworthy like “If there’s somebody, something like, you know, Academy then I won’t go for somebody like that”. Others avoid information that runs counter to their beliefs such as “I’d be less skeptical against someone who’s with HAES, intuitive eating, and weight neutral, yeah.”. Others find that not all dietitians are offering evidence-based information such as “There’s a lot of dietitians that are not doing things that are evidence-based and so just because they have the credential doesn’t mean, I think, that the information they have to share is evidence-based” and “I find it interesting that dietitians can be so distinct on the topic, you know, separated and how, you know, patient

driven isn't the number one priority". Conflict of interest seems to exacerbate the problem of tribalism by involving money in the CEU process. Nearly all participants stated that they are at least attentive of potential conflict of interest with sponsors with answers ranging in intensity of conviction such as those mildly suspicious and "weary" of sponsors. "How can I know if what they're presenting is legitimate, basically?" to those a bit more moderate "conflict of interest stands out to me. I think there's gotta be some, even if it's subconscious, bias." and those that are highly averse to sponsored content like this participant, "the whole thing with the Kraft singles" referencing a former Academy sponsorship. Many brand names and companies were mentioned as sources of concern by nearly all participants at some point. All participants felt that CEU lecturers, podcast hosts, interest groups, and other non-refereed sources of information are shaping practice habits more than refereed sources.

Chapter 5: Discussion

The overall purpose of this study was to identify the barriers and facilitators of EBP implementation in adult weight management. Specifically, this study examined the means in which dietitians prefer to gather information as well as examining which barriers to implementing EBP were perceived to be most significant. The mixed-method approach allowed for insightful data on a relatively unexplored topic.

Barriers to Research Utilization and Best Practices

Participants reported that Setting items were the greatest barrier within the BARRIERS subscales. These findings are consistent with the findings of Byham-Gray et al[15] as well as Heiwe et al[145] both of which found that barriers related to workplace setting were frequently

reported as perceived barriers. Interestingly, the present study found that years of experience seems to improve perceptions around Setting barrier items. Those reporting 32 or more years of experience perceived less Setting barriers than those reporting both 0-5 and 6-11 years of experience. When comparing subscale composite means, dietitians are more likely to perceive that Setting items such as facility limitations, staff cooperation, and time restraints are greater perceived barriers than Dietitian items which are questions about the dietitian's research values, skills, and awareness. It is important to note the items that make up the Setting subscale as they represent mostly external factors whereas items in the Dietitian subscale are primarily internal factors which are scored much lower. Further, of the possible 28 BARRIERS items, the majority of the lowest perceived barriers came from Dietitian subscale items. Ranked 23rd and 25th are "the dietitian is unaware of the research" and "the dietitian does not feel capable of evaluating the quality of the research", respectively. This suggests that the dietitian feels that it is not their own values, skills, and awareness that are the most significant barriers to research utilization, but rather the greatest barrier is likely an external one. Dietitians may also be reluctant to admit that internal factors such as training limitations found during the interviews are of greater concern due to social desirability bias. Similarly, dietitians having a sense of competence may also be evidence of social desirability bias which may promote greater responses toward external barriers rather than internal.

When examining time resource limitations, the qualitative data helps to explain the survey data findings. Setting subscale items contain issues regarding time such as insufficient time on the job to implement and not having time to read research. Workplace setting may offer burdens beyond what is captured on the BARRIERS survey. For example, misinformation causes frustration and takes time away from counseling sessions or pre/post session processes because

the dietitian must do the necessary work in order to ensure accurate information can be found, processed, and properly communicated to the patient or client. CEU requirements may further limit time resources and incentivize the utilization of non-peer reviewed information. However, seminars, conferences, and webinars offer an expedited version of research findings and EBP guidelines by allowing the dietitian to be spared the time spent conducting independent research. When time is limited, it is intuitive that research volume is perceived as overwhelming, and literature being spread across different mediums only further restrict time resources. Byham-Gray et al[15] also identified that dietitians appear to perceive that research findings are often conflicting like in the present study. Byham-Gray et al[15] did not inquire specifically about research being overwhelming but their findings support that time is a perceived barrier and that dietitians are not familiar with databases that allow for relatively quick searches of literature (e.g. Cochrane) as was found in the present study.

Examining the dietitian's perceived level of training, specifically in statistics, also helps to elucidate the survey responses. Limited training in statistics was among the most commonly reported themes throughout the interviews. The qualitative findings align with the Byham-Gray et al[15] findings in that the question "I understand statistical analyses" was among the lowest responses regarding dietitian's attitudes toward research utilization. However, the statistics as a barrier question in the present study was only ranked 12th (of 28) in the BARRIERS survey. Further exploration of the interview data, however, identified that dietitians might exclude statistical analysis from their self-assessed competence in critical research appraisal. Van Horn[175] found that dietitians are relatively accurate in their own self-assessment of knowledge and competence regarding EBP, but it seems that statistics might be an exception. Those that did report a moderate understanding of statistics only seemed to mention "p-values" when directly

asked about their confidence with statistical analysis. This finding aligns with the work of Heiwe et al[145] who found that research terms such as odds-ratio, confidence-interval, heterogeneity, and saturation were rated "least understood". If training in statistics is limited, it may further explain the desire to learn from conferences, seminars, and webinars and also why research is overwhelming and conflicting.

When the findings of the present study are examined against the totality of the literature, commonalities begin to appear. Further examination of the identified barriers of the present study align with the "sense of competence" barrier identified by Papoutsakis et al,[109] as well as Hand and Abram,[142] and Baker et al.[119] As stated previously, few dietitians reported being confident in statistical analysis, but the majority of those interviewed suggested that they could still teach their colleagues how to critically appraise research as long as they could skip statistical analyses. Limited training combined with social desirability may cause anxiety about pursuing research analysis independently, or without reliance on opinion leaders to place findings into context. Similarly, expectations to be "evidence-based" may exacerbate perfectionistic tendencies leading to procrastination as a form of escape. Time is one of the greatest perceived barriers identified in both the survey and the interview data, but perceived time limitations may actually stem from procrastination which is often a sign of anxiety owing to perfectionist standards.[176,177] The Academy promotes dietitians as "food and nutrition experts" and begins indoctrinating students into this belief during their undergraduate programs.[178] However, imposter syndrome is likely common although poorly documented among dietitians.[179] Social media allows the dietitian to compare themselves to dozens of other professionals in a matter of only minutes, which may further contribute to imposter syndrome.[180] Notably, feelings of imposter syndrome are said to decrease with years of experience which was identified also in the present study regarding

Setting barriers.[180] A sense of competence may be nothing more than a thinly veiled attempt at hoping to not be "found out" as a fraud.[178]

Information Gathering

The present study identified that dietitians prefer to listen to information through a variety of mediums. Dietitians prefer to learn from seminars, conferences, and webinars rather than independent research appraisal. Interviews confirmed this finding and further identified that podcasts and various forms of social media are also popularly utilized. A review by Rolls et al[181] found that healthcare professionals are trending toward a greater reliance upon social media in order to gather information and utilize a wide variety of mediums similar to the present study. Although dietitians value peer-reviewed or otherwise refereed sources of information, it does not appear that non-refereed sources of information are dismissed for practice guidance. However, the survey data found that only 37.9% of participants report to utilize social media for information gathering purposes whereas all interview participants reported utilizing it for this purpose. One possible explanation for the discrepancy is the nonspecific nature of the survey question which does not specifically ask about the vast variety of what might be considered "social media". The interviews suggest that mediums such as Facebook® have a more problematic view than something like LinkedIn®. Further, not all participants viewed podcasts as social media although most mentioned utilizing them for information gathering. It is possible that the survey participants limited their answer to what they considered to be social media.

Listservs or email blasts containing summarized findings of research as well as popular media were frequently cited as sources of information. As stated, time barriers are a significant perceived barrier which makes listservs and email blasts an attractive option to gather

information due to the brief and summative nature of the content distributed to subscribers. This also aligns with the present survey data that suggests that the literature not being compiled in one place is one of the top 5 barriers when assessed individually. Among nurses, the literature not being compiled in one place was also a top barrier found by Fashafsheh et al.[173] Listservs and email blasts help to remedy the time barrier by compiling new and relevant information.

When examining the qualitative and quantitative data collectively, it is clear that independently searching for and appraising research findings is not a popular means of information gathering for dietitians due to perceived time barriers and training barriers, specifically in statistical analysis. It is also clear that the Academy's EAL is not a popular source of information with only 25% of participants selecting that they utilize the resource "always" or "most of the time". Disapproving sentiments of the Academy in general were common throughout the interviews. Conflicts of interest were most commonly cited as sources of distrust among Academy sponsored events such as FNCE. Tribalistic responses were noted among some participants who admitted that they associated some organizations as automatically trustworthy or not. Dietitians appear to follow specific opinion leaders and in deciding which to follow was commonly noted as those who talk about research findings. When asked about how they select those that they choose to follow, most dietitians prefer opinion leaders that place research findings into context, i.e., they explain how to best interpret and utilize the findings. Opinion leaders are discussed in greater detail in the next section.

Utilization of Best Practices and Potential Facilitators

Utilization

The USPSTF recommends that clinicians should offer or refer adults with a body mass index of 30 or higher to intensive, multicomponent behavioral interventions. It is also recommending that these interventions be multidisciplinary in nature, including dietitians, in order to produce the best outcomes. However, only 18.2% of participants selected that they are involved in these types of programs. One possible explanation is that only 56.9% of participants agreed with the USPSTF's recommendations. The USPSTF noted[50] that some objections to their recently published diabetes screening recommendations were due to inadequate consideration for social determinants of health which may provide some explanation for current findings as well. It should be noted that the USPSTF did take those criticisms into consideration and revised the screening recommendations to include social determinants of health.[50] Much controversy exists over the utilization of BMI as a screening tool and many dietitians do not condone weight management of any sort, with some participants going so far as to say that it is not possible to lose weight without negative ramifications and any research findings otherwise should be dismissed as correlation. Another explanation of poor participation is the identification of Settings being the largest BARRIERs subscale. Considering the items found in the Settings subscale, it is possible that physicians, administration, and other staff (see **Appendix B**) are not supportive of creating multidisciplinary groups or that financial and other resources are too limited to implement the necessary interventions. It appears that dietitians are not participating in what has been called the "gold standard" for weight management by the Academy[12] and

disagreement with the recommendation of its use as well as Setting barriers may be the most likely cause.

On the topic of BCT, 63.2% of participants selected that they "always" or "most of the time" utilize BCT to guide patient interactions. However, the interview data suggest that dietitians only utilize MI and Stages of Change in practice. This suggests that the Transtheoretical Model is the predominant theory utilized in adult weight management settings although it was never explicitly named. Two participants named the Health Belief Model but did not articulate how they utilized it. No other behavior change theories were explicitly mentioned by name. A few mentioned that "it doesn't work" when asked about whether they utilize BCT but went on to describe MI and did not allude to any specific theory. This might suggest that dietitians associate the term BCT with MI. The survey data supports the popular utilization of MI where 87.8% of participants selected either "somewhat agree" or "strongly agree". Similarly, 60.2% of participants responded that they are confident in utilizing CBT techniques although it was never mentioned in the interviews nor were any of its components when participants described how they utilized BCT to guide patient/client interaction. CBT is an effective psychological treatment for weight management in adults[49] but the present study suggests that dietitians may only report feeling confident in using it due to social desirability as it was not discussed in the interviews despite participants being given ample opportunity. Social Cognitive Theory was also not explicitly mentioned by participants, nor were any of its major tenets. However, Social Cognitive Theory is credited with improved intervention effects when compared to control in a recent systematic review of randomized controlled trials.[135] Finally, self-efficacy was also never explicitly mentioned which is important to note due to its potential impact on weight loss and motivation.[49]

The utilization of the NCP was a topic organically discovered through the semi-structured interviews. Use of NCP processes were never explicitly asked by the interviewer, but interviewees alluded to its use very frequently, especially when asked about how they might handle situations with no clear guidelines. Participants stated that they would often "do an assessment" in order to identify risk/reward ratios or simply to find out "What does the patient want?" before deciding on an intervention. It appears that the NCP offers a foundation on which to operate and nearly all participants referenced its components when identifying patient care practices.

Finally, misinformation was cause for frustration for nearly every interview participant, but their concerns were not just what their patients were hearing but also what other dietitians were promoting. However, the topic of dietitians concerned about their colleagues' misgivings are covered in a later section. Misinformation as a barrier to effective practice was the largest barrier in the miscellaneous items of the present survey. Interestingly, dietitians feel confident in combatting misinformation although the majority reported during the interview process that they had never received any training on the topic. Further, dietitians reported to widely utilize MI for behavior change but most also reported that they attempt to correct misinformation directly which goes against "the righting reflex",[182] a prominent component of MI theory. Further still, correcting misinformation directly has been shown to cause further reinforcement of belief which is sometimes called "the continued influence effect".[183] It is unclear how effective dietitians are at combatting misinformation and further research is needed.

Facilitators

Survey participants identified that Dietitian subscale items (see **Appendix B**) were noted as the least significant perceived barrier. In fact, the majority of lowest individual item responses were in this subscale and will be briefly summarized here. As discussed, a "sense of competence" is a major barrier to research utilization and implementation of EBP and further evidence of this is seen in the response "The dietitian does not feel capable of evaluating the quality of the research" being the 25th out of the 28 individual responses (see **Table 13**). However, the remaining responses suggest that dietitians value research for practice, feel confident in their abilities, and are willing to change or try new ideas. Valuing research for practice is a facilitator to its utilization and also to the implementation of EBP.

Another facilitator is the workforce industry filling the void of training deficiencies. Most interview participants identified their primary training for MI being conducted or sponsored by their employer. This suggests that industry recognizes the value of MI and want to remove barriers to implementing it into practice. In contrast, Setting subscale items were the greatest barrier listed, although on the topic of training in MI techniques, it seems to be the greatest facilitator as well. Further, MANOVA findings suggest that with years of experience, dietitians perceive Setting subscale items to be less significant over time. This suggests that with time and training, perceived barriers become less prominent, and industry may be willing to shorten that learning curve for its employees in some circumstances.

Practice Schism

The present study identified that dietitians do utilize weight-neutral practices. The survey data found that 33.8% of participants prefer to exclusively utilize weight-neutral practices.

However, the majority prefer to utilize components of both weight-neutral and weight-centric strategies in order to counsel patients/clients with obesity. This aligns with findings from Schaefer and Zullo[43] who found that dietitians utilize a mix of strategies but generally utilize traditional/restrictive strategies less often. The present study also found that only 3.7% of respondents prefer to only utilize weight-centric strategies. This finding can be explained by the prevalence of those utilizing the NCP as a guide to patient/client care. As previously described, EBP is defined as a triadic relationship between the patient/client, the clinician, and best practices. The NCP allows the clinician to gather information that helps to identify the relevant barriers and compare the best practices against the patients desires and wishes. Dietitians interviewed in the present study overwhelmingly felt that consideration of patient desires serve as a prerequisite for identifying which strategy should be utilized and considered things like previous history with weight loss and motivation when deciding how to move forward.

Findings from the present study also found evidence of tribalistic points of view. During the interview phase, two dietitians stated that weight loss, regardless of how it is accomplished, is always harmful. This aligns with survey findings that only 56.9% of participants agreed with the USPSTF's recommendations that patients with a BMI greater than 30 should be referred for treatment. Nearly all participants noted HAES® being a source of information regarding weight-neutral practices, however only 2 participants felt strongly that weight loss should always be avoided. The work of Rolls et al[181] posits that tribalism is likely exacerbated by reliance on social media groups and other social networks where only like-minded individuals are in groups communicating without hearing opinions that may be in opposition to the ideals or values of the group. An article written by Webb[37] found that dietitians operate across a wide spectrum of beliefs about obesity treatment which is consistent with the findings of the present study. Social

media can create “echo chambers”, or the aggregation of homophilic clusters of individuals, which prevent the dissemination of information based on merit and provide an environment only suitable for confirmation bias.[184]

Opinion Leader Influence

The present study examined the degree to which opinion leaders influence dietitian practice decisions through specific survey and interview questions. Dietitians report that they prefer to learn from seminars, conferences, or webinars as opposed to independently interpreting research literature. During the interviews, many dietitians reported that they find research dry and overwhelming. They also explicitly stated a preference for things like podcasts and other social media when asked about means of information gathering. One of the major themes identified during the interviews was a preference for opinion leaders who place the research into context for them. Dietitians reported being uncomfortable with certain aspects of research utilization and have limited time resources which make opinion leaders who read, interpret, and contextualize research findings desirable among dietitians. Further, credibility seems to be gained by simply reviewing, or giving the impression of reviewing research findings. However, interview participants noted the potential ramifications of reliance on others for putting research findings into context for them. Rolls et al[181] found that when examining posts in social media groups or “hashtags” the majority of post contributions came from only a few individuals while the majority of members only observe without contributions of their own. This implies that the conversation is dominated by a small number of what could be considered opinion leaders.

Conflict of interest was an emergent theme with dietitians reporting that they are weary of sponsorship in both research articles and conferences. Many participants felt that speakers could not possibly be free of bias if their discussion was being sponsored in some manner.

Further, participants noted that they prefer learning from specific individuals after their own personal vetting. It seems that these individuals are then "followed" as they continue to produce content for their "followers" similar to that described by Rolls et al.[181] Few of the specified individuals in the present study produced content that was peer-reviewed or refereed in any notable sense. This suggests that a relatively charismatic individual who discusses research findings is likely to develop a following over time. It is unclear how dietitians might know if all content produced by these individuals is evidence-based or simply just opinion. As stated by both Rogers[146] and Bandura,[18] the tendency to conceptualize the diffusion process from the prospective of the promoter increases the potential for being misled. The learner should consider even the most charismatic speaker to be potentially wise or foolish regardless of whether they cite research. Drawing on the present findings that dietitians are uncomfortable with statistical analysis while still holding a sense of competence with research utilization in general, it is likely that many podcast hosts, continuing education lecturers, and other non-refereed speakers are drawn to their respective platforms through the actualization of the Dunning-Kruger effect[91] just as often as they are by legitimate merit and competence. Finally, even a validated subject matter expert ranks at the lowest possible tier when examining the traditional "hierarchy of evidence".[107]

The majority of dietitians interviewed agreed that opinion leaders are shaping the field of nutrition practice greater than that of peer-reviewed or otherwise refereed sources of information such as the Academy's EAL. When examining the entirety of the present study findings, time restraints, training limitations, and a preference to gather information from non-peer reviewed sources create an environment in which those willing to publicly state their opinion are the most likely to influence patient care in the most significant way. CEU requirements are intended to

keep dietitians current on new research findings and best practices, however the present study identified that CEUs often only further incentivize dietitians to learn from non-refereed sources of information and to depend on others to contextualize research findings on their behalf. CEU requirements may also further exacerbate the sense of competence providing an opinion that has not been verified the extent to which the presented information is evidence-based or misleading. Further, tribalism and concerns over conflict of interest exacerbate the idea that findings from specific individuals or groups are by default trustworthy or not trustworthy.

Chapter 6: Practice Implications and Professional Recommendations

Theories used to guide the present study are based on the concept of transactional memory, or utilizing others as an extension of one's own memory.[157] Bandura[19] explains that the internet has given people the ability to transcend their immediate environment and utilize the entire world for transactional memory. However, both Bandura[19] and Rogers[165] warned about the potential for seeing innovation and other produced content through the eyes of the promoter. Dietitian education must include training in identifying the difference between charisma and expertise. At present, dietitians appear content with gathering information via social media but evidence suggests that information provided on social media platforms may be predominantly produced by a small subset of individuals that are simply willing to share their thoughts.[181] However, dietitians are not left with clear options regarding adult weight management. A practice schism has led some dietitians to believe that all weight management interventions are

evidence of a morally corrupt society, whereas government task forces such as the USPSTF say that dietitians are an important component in the fight against rising obesity prevalence. Prior to 2021, the EAL offered little guidance on how to balance social stigma with health ramifications associated with obesity. In fact, adult weight management guidance has not been updated since 2014 although the Academy reports that they plan to release guidance later in 2021.[185] In spite of limited resources, dietitians should be encouraged to minimize reliance on opinion leaders which is discussed throughout this section.

The reports of time as a barrier to research utilization may likely be explained by procrastination owed to anxiety from limited training in research analysis. Setting or workplace burdens should still be considered when examining time resources, but procrastination remains the most likely explanation of perceived time resource limitations due to the prevalence of podcast and other social media utilization for information gathering. If a dietitian has time for social media information gathering, then they likely have at least some time to devote to research analysis given that none of the participants cited that access to research was a barrier. Setting barriers identified in the present study appear to become better with years of experience which may be evidence that young or inexperienced dietitians struggle with imposter syndrome during the early part of their career compared to their more experienced colleagues. Imposter syndrome is likely to be felt under novel circumstances such as a new job or a recent graduation and is often poorly recognized by the individual experiencing it and those around them.[180] Training in how to cope with imposter syndrome is relatively lacking in dietetics programs and should begin in undergraduate training and continue via mentorship through the first several years of professional work.[180] Although seemingly counterintuitive, “sense of competence” may also be mitigated by such training. The present study found that dietitians report differently via survey

than they do during a semi-structured interview regarding statistical analysis. The interviews were clear that statistical analysis was a major barrier to research utilization although participants still reported that they were comfortable teaching research utilization skills other than statistics. This implies that imposter syndrome reinforces the desire to "be the expert" even when they feel like a fraud. It stands to reason that a sense of competence is really a defense mechanism for imposter syndrome. If this were not true, years of experience would not likely have a significant impact on perceived Setting barriers since both experienced and inexperienced dietitians are faced with similar work environments. If anything, those with more experience are likely also burdened with more responsibility and possibly even leadership roles. It is perception that changes rather than the barriers themselves. Mentorship programs should be utilized to mitigate feelings of imposter syndrome by offering reassurance of previous training and qualifications.[180] Programs could also offer further training if indicated such as statistical interpretation or behavior change theory as identified in the present study. It is important for mentorship programs to work to decrease reliance on mentors over time and seek improvements in mentee's learning self-efficacy.[180] Dietitians appear to rely on others beginning early in their training and it is important to properly sever that relationship instead of perpetuating dependence. The NCP provides a framework on which to guide practice, especially when the clinician is unsure of the best solution or during times when patient desires may overrule the literature. Further, it may also provide the framework as a teaching guide to utilize best practices. For example, the NCP encompasses the utilization of BCT which suggests that the NCP training process may be an avenue to better understanding how to utilize various BCT strategies and techniques through the use of NCP Chains.[123] A foundation on which to begin teaching research utilization and best practices implementation is likely the greatest facilitator of all.

Dietitians should be taught to compare information gathered from both refereed and non-refereed sources against the totality of the evidence rather than attempting to isolate the findings of a single research article or opinion piece for use in daily practice. The two dietitians that suggested that weight loss of any sort is harmful under any circumstance seemed to commit this error frequently when explaining their stance. They would outrightly dismiss any findings that didn't align with their biases and justified this stance by stating that they want to avoid "being fed" a specific viewpoint which they felt dominated the literature. Further, both cited that they often immediately dismiss speakers that do not identify as HAES®, weight neutral, and/or intuitive eating because they disagree with restricting intake in any form. However, only about 3% of respondents reported utilizing strictly weight-centric practices which suggests that most dietitians have moved toward focusing on sustainable, long-term interventions for adult weight management. Dietitians should be cautious of "identifying" with a certain practice ideology, especially those that ignore specific evidence in favor of other evidence. This idea that one can identify with certain avenues of the literature will only create echo-chambers and prevent EBP implementation. The present study shows evidence of this with only 56.9% of participants agreeing with the USPSTF's recommendations and only 18.2% actually participating in organizations utilizing the recommendations. Dietitians must learn to avoid seeing innovation through the eyes of the promoter and recognize that even well-meaning organizations such as HAES® can incidentally promote fringe beliefs under the guise of being evidence-based. The NCP provides a foundational guide that should include the psychosocial concerns such as those promoted by HAES® while also balancing the potential health benefits of weight loss for patients with obesity. Finally, any interventions must consider the patient's needs, wishes, and values in order to be evidence-based. Evidence in favor of weight loss for people with obesity is well-

documented and discriminatory behavior against people with obesity is also well documented. These two concepts are often seen as being opposites or at odds with one another, but both can be balanced through the use of patient centered, EBP. In fact, public health goals and individual health goals may occasionally be at odds with one another due to psychosocial considerations and no amount of empirical evidence can override a patient's wishes or desires for their own care.[186] Dietitians identifying with only one type of practice, e.g. "I only use HAES® weight neutral" or "I only use traditional calorie counting" are, by definition, not practicing in an ethical nor evidence-based manner.[14,186,187] However, this is not to suggest that clinical judgement of such practices should be dismissed, rather that evidence-based practice must be considered a triadic relationship between the clinician, the evidence, and the patient's desires rather than an authoritative perspective in which the provider always knows what's best. The present study found that the NCP allows for dietitians to factor the relevant evidence alongside the patient's wishes and desires. Regarding the USPSTF guidance, it is difficult to assess the true potential of adult weight management programs that meet the AHA/ACC/TOS guidelines[11] because dietitian participation is poor according to the present study. Dietitians prefer to utilize a variety of practice strategies to help their patients manage weight, but it appears that they are not utilizing the best possible interventions. Public policy efforts such as the "Treat and Reduce Obesity Act" are designed to reduce barriers to implementing such programs.[188] This policy initiative posits that greater access to dietitians may reduce health care costs and improve outcomes[188] but the present study suggests that only approximately half of dietitians may value such policy changes. It is imperative that these programs grow in prevalence in order to accurately assess their potential for combatting obesity prevalence.

CEU requirements do not appear to offer value to dietitians working in the field of adult weight management for a variety of reasons. Some participants in the study cited to the potential for "zooming through" the lecture in order to get to the quiz in order to get to the certificate page. This implies that CEU requirements may be more of a barrier than a facilitator of EBP in their current format and lead dietitians to non-refereed sources of information due to their convenience and the fact that they are usually free of cost. If podcasts and other social media are free and can be consumed while driving to work, it is not likely that a dietitian will pay for a CEU webinar (or other formats) especially given that they cannot select the specific topic that they want to learn about. It should be noted, however that the CDR allows for podcasts creators to apply for CEU credits although the precise process for validating content is not described sufficiently.[155] Podcasts offer an infinite number of options about topics in nutrition or general healthcare whereas a CEU lecture is limited to what is approved, available, and free according to most respondents. CEU options are also often tainted by conflict-of-interest concerns, tribalism, and limited applicability to daily practice needs. It is highly likely that podcast speakers and other social media content producers are the predominant drivers of how patient treatment is handled in the field of adult weight management. If CEU providers must apply to certify material for CEU purposes, it stands to reason that the application could detail not only what objectives are to be covered, but the strength or grade of the evidence being utilized to meet such objectives.

Academy reputation is also waning due to previous perceptions about corporate influence on FNCE and other Academy related agenda items. These tribalistic sentiments were learned from opinion leaders through the diffusion of innovation just as described by Bandura and Rogers. New opinion leaders that can better describe the need for funding and working with

industry are likely the best path forward. A few participants described how they recognized that research and other academic functions cost money and that it is up to the dietitian to utilize their training and skills to assess the integrity of each speaker with sponsorship being only a single factor to consider. These participants did not outrightly dismiss speakers who are sponsored and most learned these opinions from trusted professors and/or preceptors. An alternative messaging campaign is necessary that divorces the idea of money and corruption being inseparable in academics and Academy functions. Working with industry is a necessary component in the fight against obesity and chronic disease. Dietitians must understand how and why money is needed to produce quality research and that it does not automatically corrupt those findings. It is reductionist thinking to assume that all researchers lose their integrity when money is involved in their study, however this idea is popular, nonetheless. Additionally, the present study shows that industry is willing to provide on the job training to dietitians for things like MI which are shown to help with decisional balance. It is likely that these employers recognize the value of EBP for financial health, patient safety, and general outcomes which is further evidence that industry is an asset for EBP dissemination.

Future Research

Future research should seek to identify the precise barriers to participation in an on-site, multidisciplinary, high-intensity comprehensive lifestyle intervention as described by the AHA/ACC/TOS guidelines. The present study found that participation is very poor but was unable to identify the precise barriers to that item, specifically. Given that it is described as the best means forward for weight management, it is critical that dietitians find a way to participate in these settings. Future research should also seek to uncover the extent to which dietitians utilize

BCT as well as their degree of competence in their utilization. The present study identified that dietitians are confident in their ability to perform various strategies, but it is unclear how much social desirability bias is at play.

Future research should also seek to evaluate dietitians' perception of CEU requirements. The present study discovered that interviewees did not look favorably on CEU requirements for a variety of reasons. It is unclear the extent to which this could be broadly applied to the field at large and should be a topic of further investigation.

Future research should also seek to identify the extent to which podcasts are utilized as a source of information for practice preferences. Nearly all dietitians mentioned the use of social media for information gathering during the interviews although the survey data only reported 37.9% of participants utilize these platforms. Clarification on what types of social media in addition to frequency of use is a topic in need of further exploration.

Strengths, Weaknesses, and Limitations

The present study attempted to identify the barriers and facilitators to research utilization and best practices by employing a mixed-methods approach. The limitations of the study are consistent with the limitations of any study conducting a survey and semi-structured interviews. This chapter will first address the study generally and then further discuss the limitations unique to each study question.

Strengths of Design

The mixed-method design added depth to the data found during the survey by exploring responses that would otherwise not have been feasible by doing a survey only. This study

identified data that would not be easily quantified due to the limited understanding of how dietitians gather information and discern whether to implement practice strategies. Further, dietitians are reported to value EBP, but subsequent evaluations show poor implementation[17] which is suggestive of the Hawthorne effect.[189] Additionally, "a sense of competence" has been identified as a barrier to the implementation of EBP[142] which suggests that dietitians may report the use of EBP based on an assumption of competence and not necessarily the degree to which they have actually read and implemented the findings. The semi-structured interviews allowed for a more in-depth view of various practice methods that could not be derived via survey in a reliable way.

Weaknesses of Design

Although this study employed mixed methods to triangulate findings, it was not immune to the Hawthorne effect[189] or social desirability bias[190] as the participants understood that they were being studied in both phases and may have responded differently based on that fact. An important limitation of qualitative research is that the quality and trustworthiness depend largely on the researcher as an instrument for data collection, the honesty of the participants, the quality of the questions being asked, and the ability to successfully reach data saturation.[170] Additionally, the results of this study do not offer external validity beyond the target population in question. Finally, one-on-one interviews required great time resources as well as the need for additional reviewers to ensure that the proper themes were discovered.[170]

Limitations

The first phase of the study utilized the BARRIERS scale to identify the most commonly reported perceived barriers to research utilization. This study has been primarily utilized in

nursing research and has not been previously utilized in dietitians, specifically. Although the survey aligns well with the findings of other similar surveys conducted with dietitians, it is possible that the differences between nursing barriers and dietitian barriers are too different to make a fair comparison. Further, the participants noted in the interviews that they often worked in a number of different settings and saw many different patient types. It is difficult to identify which particular part of their survey responses reflect their feelings specifically about weight management versus that of the examples given such as critical care, lactation, and renal care.

As with any survey, participants were fully aware that they were participating in a research study and may have answered in a manner consistent with their perceived expectations of the researcher; this phenomenon is often referred to as "social desirability bias".[163] Further, a sense of competence is an established barrier to establishing actual knowledge, attitudes, and perceptions about a variety of practice implementation topics. Further, the demographics included questions that sought to examine dietitians preferred practice styles such as weight-neutral or other strategies which may have further exacerbated the expectation of complying with their perception of the researcher's agenda. Finally, although the BARRIERS survey is a validated survey, the miscellaneous items were not included in the original survey.

Study power was another potential limitation of the present study. In order to examine multiple linear regression, a much larger study sample (n = 380) would have been desirable, and the demographic data was collected as categorical which further limited the power of prediction capabilities. A MANOVA was selected instead to provide an examination of between group differences while protecting against type 1 error although this was not originally presented as a preferred method of analysis.

Regarding the qualitative analysis, the study questions were created as a means of further examining the study questions and not necessarily to validate the findings of the survey data. Although this was the original intent, it is unknown how participants felt about specific questions asked within the BARRIERS survey. For example, Settings subscale items were among the greatest reported item in the survey, but interviewees rarely mentioned a settings item beyond what was specifically mentioned about time barriers.

Regarding Question 1, the most significant limitation was the finding that dietitians offer very little homogeneity in workplace settings. It seems that obesity and adult weight management are combined into other facets of nutrition practice making it difficult to discern commonalities experienced specific to the workplace setting. The highest reported section of barriers came from the miscellaneous category and were added due to the findings from the literature review. Many of the miscellaneous items are based on more recent findings such as the immediacy and depth of information and misinformation found on the internet. These items may not have been quite as prominent during the creation of the BARRIERS scale development.

Regarding Question 2, the interviews found that podcasts are a frequently cited means of information gathering. The survey failed to capture podcasts specifically and therefor it is unclear the extent to which this can be extrapolated to others who completed the survey. Further, the question regarding social media may have also been affected by this oversight since some do and some do not consider podcasts a form of social media. Building on this concept, highly reputable organizations conduct their own podcasts which are likely highly credible sources of information. The present study was not designed to capture the breadth and depth of podcast utilization and preferences.

Regarding Question 3, best practices were limited to the most promising for adult weight management. The semi-structured interviews did not confirm the utilization of CBT or most other behavior change theories beyond that of the Transtheoretical Model and its inclusion of MI principles. It is unclear of CBT or other BCT utilization due to the potential for social desirability bias as stated previously since the interviews were not designed to measure knowledge or competency in these areas, only utilization reports. Additionally, the USPSTF participation question was included because it aligns with the Academy's recommendations, but the survey does not explain the poor participation and the interviews were not designed to capture this item specifically.

Regarding Question 4, neither the survey nor the interviews contained very many questions that might elicit a perceived facilitator from the participants. The BARRIERS survey contains barriers questions and the remaining survey questions were not necessarily barriers or facilitators as most were pertaining to frequency of use. The interview also sought to examine barriers or perceived problems with information gathering. All facilitators were either born organically from the interviews such as the utilization of the NCP for problem solving or they were implied because the responses indicated that they were perceived as "less of a barrier".

Regarding Question 5, the topic of weight-neutral versus weight-centric is difficult to capture due to the nuances of each strategy. Further, the interview data did not uncover the "why?" on this topic other than a few mentioning fear of eating disorders specific to their patient type. It is unclear what criteria helps a dietitian decide which strategy to use and this study was unable to capture that.

Regarding Question 6, opinion leader is used broadly to describe an individual who shares information for others to consume. Although this study did well to identify how dietitians

prefer to gather information for adult weight management and other topics, it is difficult to identify the precise ratio of credible vs non-credible sources of information utilized by dietitians. This study was not designed to capture that information. It must be assumed equally possible that participants strictly utilize evidence-based, legitimate sources the same as it is possible that all sources are poor sources of non-evidence-based information.

Conclusion

Dietitians value research utilization and EBP but perceived time restraints and limited training in critical research appraisal requires dietitians to rely upon a variety of opinion leaders to place research into context on their behalf. Imposter syndrome may further reliance upon opinion leaders due to feelings of inadequacy. Dietitians recognize the influence of opinion leaders on the field of nutrition but lack the time and skills to know which opinion leaders offer valid, evidence-based information and which opinion leaders are promoting misleading or unfounded information under the guise of being evidence-based. As Rogers[146] and Bandura[18] warned, dietitians must use caution to prevent seeing the information shared strictly through the eyes of the opinion leader. Just as Schrödinger explained that his cat is considered to be both dead and alive as long as the lid is closed, each opinion leader should be considered both an idiot and an innovator until further evaluation of their content can be undertaken. Regardless of opinion leader expertise, expert opinion is still among the lowest grades of evidence (Grade IV out of V) according to Academy standards[191] and among the lowest ranking sources of information according to the traditional hierarchy of evidence.[107] It is imperative that dietitians understand the limitations of present methods of information gathering and seek to be skilled independent research analysts.

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Appendix A

Interview Guide

Hello, my name is Blake Metcalf, and I am a Doctoral Candidate at the University of North Florida. The purpose of my research is to examine the factors that influence dietitians' decision-making process in regard to adopting new practices for obesity management. The interview will take approximately 15 minutes and may be stopped at any time. All information captured will be completely confidential; I will not use your name or any information that could identify you in any of my reports. You may choose not to answer questions or leave this session at any time without penalty of kind.

Recording Consent:
This interview will be recorded for accuracy; you may choose audio only or the audio and video option. No identifying information will be included in the recording and it will be destroyed immediately after transcription or within 30 days of today's date, whichever occurs first. Do you consent to the audio/video recording of this interview?

1. The public is exposed to a number of diets, strategies, supplements, and various media. How do you stay current with what your patients might be exposed to?
    a. Do you feel that you have the time and resources to do so?
    b. How do you decide what is evidence-based and what is not?
    c. How do you deal with misinformation?
        i. What type of training, if any, have you had to help you combat misinformation in an evidence-based manner?

2. Consider the following scenario: Several patients over the last few weeks have been excited to tell you about a new innovation that they just started, and they want to know your opinion about it. However, no current guidelines from any major organization exist to help you decide. What resources would you use to decide whether or not this new innovation is safe and effective?
    a. How do you feel about dietitians using social media to gather information for a scenario like this?
        i. Does your opinion change if the social media account is managed by dietitians not affiliated with any major organization?

3. Do you use Behavior Change Theory to guide your interactions with patients?
    a. If so, which ones do you use and how?
    b. What type of training, if any, have you had in BCT?

4. In the field of dietetics, numerous researchers have found that findings from research struggle to make it into daily practice. In other words, the evidence might be available, but it is not clear that dietitians are always using it. Why do you think this gap between research and practice exists?
    a. How often do you read peer-reviewed research?
        i. How do you access items that are not open?
    b. Do you feel confident in your ability to search for and critically appraise research? This would include search strategy, methodology, statistical analysis, limitations, strengths, and other relevant aspects.
    c. Would you feel comfortable teaching search strategy and/or critical appraisal skills to a colleague?

5. Among dietitians, there appears to be a variety of practice philosophies regarding obesity management. Some dietitians do not recommend weight loss as a treatment intervention and say that this approach might contribute to obesity stigma, disordered eating, and weight cycling. However, others suggest that weight loss services should be offered because it can improve health and find it unethical not to recommend it. With both sides making ethical arguments about whether or not to recommend weight loss for people with obesity, how do you decide which is right for your practice?
    a. Have you found any people, resources, or organizations to be helpful in deciding?
    b. What would you do if a patient came to you seeking the opposite of your preferred style?
    c. How often do you seek information that might disprove your own thoughts and opinions on this topic?

6. Dietitians are required to get 75 hours of continuing education credits every 5 years and many states have requirements for annual continuing education. Many dietitians will visit conferences (e.g., Food & Nutrition Conference & Expo "FNCE") to complete these requirements. However, these conferences have been criticized in the past by dietitians claiming that there are problems with the integrity of some of the educational sessions and that businesses had too much influence on the content provided. When you are listening to a speaker, how do you decide if what is being presented is evidence-based or not?
    a. How much have speakers contributed to your practice preferences versus other sources of information?
    b. How do you decide whether or not you want to attend a conference/seminar/webinar/etc.?
    c. In your opinion, how much do continuing education speakers shape the field of nutrition practice amongst dietitians?

Appendix B

RANK	BARRIER SUBSCALE	MEAN	SD
	Setting Barriers and Limitations	**23.89***	**6.83**
3	The dietitian does not feel they have enough authority to change patient care procedures.	3.16	1.35
4	Physicians will not cooperate with implementation.	3.13	1.16
6	There is insufficient time on the job to implement new ideas.	3.07	1.26
8	Other staff are not supportive of implementation.	3.06	1.22
9	The facilities are inadequate for implementation.	3.03	1.23
13	Administration will not allow implementation.	2.88	1.17
15	The dietitian does not have time to read research.	2.82	1.28
16	The dietitian feels results are not generalizable to own setting.	2.74	1.01
	Presentation and Accessibility of the Research	**17.49***	**4.80**
(1-TIE)	The relevant literature is not compiled in one place.	3.26	1.10
7	Implications for practice are not made clear.	3.06	1.13
10	Research reports/articles are not readily available.	2.99	1.17
12	The statistical analyses are not understandable.	2.92	1.07
14	The research is not reported clearly and readably.	2.86	1.09
21	The research is not relevant to the dietitian's practice.	2.39	1.04
	Qualities of the Research	**17.29***	**3.62**
(1-TIE)	The literature reports conflicting results.	3.26	0.91
5	The research has methodological inadequacies.	3.10	0.89
11	Research reports/articles are not published fast enough.	2.93	0.86
17	The research has not been replicated.	2.72	0.83
18	The dietitian is uncertain whether to believe the results of the research.	2.70	1.03
19	The conclusions drawn from the research are not justified.	2.58	0.88

	Dietitian's Research Values, Skills, and Awareness	**15.71***	**5.45**
20	The dietitian is isolated from knowledgeable colleagues with whom to discuss the research.	2.53	1.33
22	The dietitian feels the benefits of changing practice will be minimal.	2.20	1.00
23	The dietitian is unaware of the research.	2.19	1.18
24	There is not a documented need to change practice.	2.18	1.09
25	The dietitian does not feel capable of evaluating the quality of the research.	1.91	1.03
26	The dietitian is unwilling to change/try new ideas.	1.63	1.02
27	The dietitian sees little benefit for self.	1.62	0.91
28	The dietitian does not see the value of research for practice.	1.45	0.80
	Miscellaneous Items * **		
	Misinformation is a major barrier to implementing effective obesity/weight management interventions. ***	3.98	1.17
	The dietitian prefers to learn from seminars, conferences, or webinars rather than finding and interpreting research literature independently. ***	3.58	1.17
	The amount of research is overwhelming. ***	3.56	0.94
	The research must be endorsed by a major organization (e.g., Academy of Nutrition and Dietetics) before implementing into practice. ***	3.06	1.25
	The dietitian prefers to wait until a trusted individual endorses a recommendation before implementing into practice. ***	2.91	1.18
	The dietitian feels confident in their ability to correct misinformation. ***	3.94	0.85

*Composite mean for subscale
*** Not part of the BARRIERS Scale

Appendix C

MANOVA Descriptives, Tests of Between Subjects, and Multiple Comparisons Table

Years of Experience: Descriptive Statistics

	Years of Experience	Mean	Std. Deviation	*N*
Dietitian	0-5 years	16.01	5.447	78
	6-11 years	15.62	4.813	68
	12-18 years	16.72	5.605	29
	19-25 years	15.22	5.006	37
	26-32 years	15.78	6.405	27
	32 or more years	14.73	6.405	30
	Total	15.71	5.447	269
Setting	0-5 years	25.01	6.399	78
	6-11 years	25.00	6.291	68
	12-18 years	22.00	6.835	29
	19-25 years	23.89	7.553	37
	26-32 years	23.56	7.708	27
	32 or more years	20.60	6.387	30
	Total	23.89	6.832	269
Qualities	*0-5 years*	*18.17*	*3.316*	*78*
	6-11 years	17.21	3.423	68
	12-18 years	17.10	3.320	29
	19-25 years	17.05	4.359	37
	26-32 years	16.30	3.678	27
	32 or more years	16.53	3.830	30
	Total	17.29	3.618	269
Presentation	0-5 years	18.29	4.212	78
	6-11 years	17.37	4.926	68

12-18 years	17.72	4.423	29
19-25 years	16.70	5.270	37
26-32 years	15.59	5.351	27
32 or more years	18.00	4.976	30
Total	17.48	4.803	269

Tests of Between Subjects Effect

Source	Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Dietitian	75.316[a]	5	15.063	.503	.774
	Setting	613.452[b]	5	122.690	2.713	.021
	Qualities	107.330[c]	5	21.466	1.660	.145
	Presentation	181.025[d]	5	36.205	1.586	.164
Intercept	Dietitian	55527.267	1	55527.267	1854.283	.000
	Setting	123061.935	1	123061.935	2721.048	.000
	Qualities	65728.191	1	65728.191	5081.834	.000
	Presentation	67437.299	1	67437.299	2954.983	.000
Yrs. Exp	Dietitian	75.316	5	15.063	.503	.774
	Setting	613.452	5	122.690	2.713	.021*
	Qualities	107.330	5	21.466	1.660	.145
	Presentation Score	181.025	5	36.205	1.586	.164
Error	Dietitian	7875.643	263	29.945		
	Setting	11894.421	263	45.226		
	Qualities	3401.629	263	12.934		
	Presentation	6002.068	263	22.822		
Total	Dietitian	74373.000	269			
	Setting	166063.000	269			
	Qualities	83890.000	269			
	Presentation	88337.000	269			
Corrected Total	Dietitian	7950.959	268			
	Setting	12507.874	268			
	Qualities	3508.959	268			

	Presentation Score	6183.093	268

*$p < .05$

Multiple Comparisons Table: Tukey

(I) Years of Experience	(J) Years of Experience	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
0-5 years	6-11 years	.013	1.116	1.000	-3.19	3.22
	12-18 years	3.013	1.463	.312	-1.19	7.21
	19-25 years	1.121	1.342	.961	-2.73	4.97
	26-32 years	1.457	1.502	.927	-2.85	5.77
	32 or more years	4.413*	1.445	.030*	.27	8.56
6-11 years	0-5 years	-.013	1.116	1.000	-3.22	3.19
	12-18 years	3.000	1.492	.339	-1.28	7.28
	19-25 years	1.108	1.374	.966	-2.84	5.05
	26-32 years	1.444	1.530	.935	-2.95	5.84
	32 or more years	4.400*	1.474	.036*	.17	8.63
12-18 years	0-5 years	-3.013	1.463	.312	-7.21	1.19
	6-11 years	-3.000	1.492	.339	-7.28	1.28
	19-25 years	-1.892	1.668	.867	-6.68	2.90
	26-32 years	-1.556	1.798	.954	-6.72	3.61
	32 or more years	1.400	1.751	.967	-3.63	6.43
19-25 years	0-5 years	-1.121	1.342	.961	-4.97	2.73
	6-11 years	-1.108	1.374	.966	-5.05	2.84
	12-18 years	1.892	1.668	.867	-2.90	6.68
	26-32 years	.336	1.702	1.000	-4.55	5.22
	32 or more years	3.292	1.652	.349	-1.45	8.04
26-32 years	0-5 years	-1.457	1.502	.927	-5.77	2.85
	6-11 years	-1.444	1.530	.935	-5.84	2.95
	12-18 years	1.556	1.798	.954	-3.61	6.72
	19-25 years	-.336	1.702	1.000	-5.22	4.55
	32 or more years	2.956	1.784	.562	-2.17	8.08

32 or more years	0-5 years	-4.413*	1.445	.030*	-8.56	-.27
	6-11 years	-4.400*	1.474	.036*	-8.63	-.17
	12-18 years	-1.400	1.751	.967	-6.43	3.63
	19-25 years	-3.292	1.652	.349	-8.04	1.45
	26-32 years	-2.956	1.784	.562	-8.08	2.17

Appendix D