INTEGRATIVE AND FUNCTIONAL MEDICINE PRACTICE AMONG NEW YORK STATE REGISTERED DIETITIANS AND REGISTERED DIETITIAN NUTRITIONISTS

By

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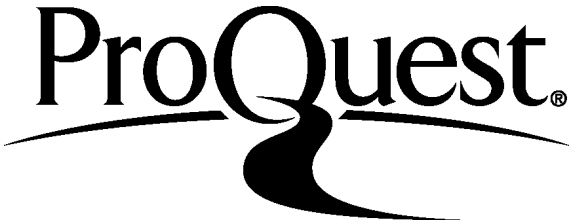

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Abstract

The purpose of this study was to explore the percentage of New York State (NYS) registered dietitians/registered dietitian nutritionists (RD/RDNs) who are and who are not currently utilizing integrative and functional medicine (IFM) in their dietetics practice. Furthermore, the study explored which IFM therapeutic modalities are being recommended by NYS RD/RDNs in current practice and what informational sources those who are currently practicing IFM are using. Additionally, the study aimed to identify RD/RDN-perceived barriers to adopting IFM into dietetics practice. A total of 41 NYS RD/RDNs completed this survey using a researcher-developed questionnaire. Subjects were contacted via the New York State Academy of Nutrition and Dietetics (NYSAND) and Western New York Dietetic Association (WNYDA) listserve and were provided with an email embedded link to the questionnaire via Survey Monkey. Descriptive statistics were used to summarize the results of the questionnaire. Results showed that the majority of respondents use IFM to varying degrees while mostly utilizing nutrition supplements and/or minerals and therapeutic elimination diets. The main reason for not using IFM was identified as not having received adequate training in IFM. Additionally, those that do practice IFM received training mostly from either dietetic program courses or not at all. Their information sources included peer reviewed journals, association websites and newsletters, and webinars/conference sessions. Most respondents did not believe that enough reliable information sources exist for IFM. Respondents also showed the most interest in increased information for nutrition supplements and/or minerals, botanical medicine, and nutritional genomics.

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Chapter 1

Introduction

In the United States (U.S.), there has been an increase in interest and use of complementary health approaches among the general public (Clarke, Black, Stussman, Barnes & Nahin, 2015). Consequently, there has been an increase in practice of integrative medicine within various healthcare settings (National Institutes of Health [NIH], 2015a). Integrative medicine is defined as a practice of whole-person medical therapy that supports the patient-practitioner relationship while utilizing all appropriate conventional and complementary and alternative medicine (CAM) therapies (Jones, Hoffman, & Quinn, 2009). Functional medicine is a patient-centered and comprehensive practice that is grounded in science and clinical medicine, with the primary aim of prevention of chronic disease (Jones et al., 2009). Generally, when using Integrative and Functional Medicine (IFM), healthcare practitioners advocate a more holistic approach to patient health and healing while also supporting the patient-practitioner relationship. More specifically, IFM is used in healthcare to determine the underlying problem of a disease or illness, which is then used to create a complete and individualized treatment plan for patients. Multiple therapeutic modalities exist within IFM and are used in a multitude of different healthcare professions. Examples of IFM include, but are not limited to, mind-body practices (e.g., meditation and yoga); alternative systems of medical practice (e.g., Ayurveda and homeopathy); biologically based therapies (e.g., nutritional supplements and herbal medicine); manipulative and body-based methods

(e.g., physical therapy and massage); and energy therapies (e.g., Reiki, magnet therapy) (Touger-Decker & Thomson, 2003).

In 2011, the American Dietetic Association (ADA) (currently known as The Academy of Nutrition and Dietetics [the Academy]) published Standards of Practice (SOP) and Standards of Professional Performance (SOPP) for Registered Dietitians in Integrative and Functional Medicine (DIFM) (Ford et al., 2011). IFM includes therapeutic modalities that can be practiced by registered dietitians and registered dietitian nutritionists (RD/RDNs) such as the study and practice of dietary supplements and minerals, botanical medicines, nutritional genomics, therapeutic food elimination diets, and detoxification programs (Ford et al., 2011).

RDN practitioners currently use major principles of either integrative or functional medicine to complement conventional medical practice (Dietitians in Integrative and Functional Medicine, 2015a). Among healthcare professionals, DIFM is taking the lead within this approach. Most recently, DIFM worked with the Council on Future Practice on the development of an Academy-accredited online Integrative and Functional Nutrition (IFN) Certificate of Training Program to offer continuing professional education units (CPEUs) to RD/RDNs. The Accreditation Council for Education in Nutrition and Dietetics (ACEND) has also included standards and competencies regarding IFM within their new 2015 Recommended Model for Future Education, which will be released for voluntary adoption by programs in 2017 (ACEND, 2015).

With defined SOP and SOPP in IFM by the Academy and the development of an Academy-accredited online IFN Certificate of Training Program, it is important to explore whether NYS RD/RDNs are actually utilizing IFM within their practice and which therapeutic modalities they are currently recommending. This information could help to pinpoint increases in specific IFM therapeutic modality use or IFM philosophy adoption. For client safety and healthcare efficacy, it is also important to know where current practitioners are obtaining their information for IFM recommendation to better ensure legitimacy. Moreover, identifying the perceived barriers for those who choose not to practice IFM could prove helpful in determining how to better incorporate IFM into mainstream healthcare.

The study explored the percentage of NYS RD/RDN's who are and who are not currently utilizing IFM within their dietetics practice, excluding those RD/RDNs who work solely in food service environments. Specific IFM therapeutic modalities that are used by NYS RD/RDNs in practice were also explored. Additionally, the study sought to identify where NYS RD/RDNs gain their information regarding IFM as well as NYS RD/RDNs' perceived barriers to incorporating IFM's philosophy and science-based principles into their dietetics practice. Results from this study may aid in determining the future of dietetic programs in relation to possible increases in the adoption of holistic healthcare philosophies among forthcoming generations of dietitians within different healthcare environments.

Statement of Purpose

The purpose of this study was to determine the percentage of NYS RD/RDNs who are currently utilizing IFM within their dietetics practice. The study also aimed to identify which IFM therapeutic modalities are being recommended by NYS RD/RDNs in current practice. Furthermore, the study sought to identify informational sources used by those who are currently practicing IFM as well as the perceived barriers of those who have chosen not to adopt IFM into their dietetics practice.

Theoretical Framework

In regards to IFM, it is uncertain how much is known and what is actually put into use within healthcare fields. Healthcare professionals may not be quick to adopt IFM into their own practice due to unfamiliarity with its principles or uncertainty of its validity. The Diffusion of Innovation Theory, proposed by Everett Rogers in 1962, seeks to explain differing idea adoption rates by providing an understanding of how ideas and practices spread throughout a social system. This theory has been used in multiple research fields including education, public health, and medical sociology studies to determine the diffusion of teaching/learning, medical concepts, and health ideas (Rogers, 1962). Moreover, this theory has been successful in accelerating the adoption of important public health programs that are intended to change a social system's behavior (Boston University School of Public Health, 2013).

Rogers (1962) defines diffusion as "the process by which (1) an *innovation* (2) is *communicated* through certain *channels* (3) *over time* (4) among the members of a *social system*" (p. 10). For the purpose of this study, IFM principles and concepts were

identified as the (a) *innovation,* the field of dietetics and dietetics education system as the (b) *communication channel*, the amount of NYS RD/RDNs currently practicing IFM therapeutic modalities as the (c) *rate of adoption/time*, and NYS RD/RDNs as the (d) *social system*.

Within The Diffusion of Innovations Theory, the innovation-decision process determines the ultimate adoption of an innovation. This process consists of five phases including (a) knowledge, (b) persuasion, (c) decision, (d) implementation, and (e) confirmation (Rogers, 1962). The first phase, knowledge, occurs when an innovation's existence becomes apparent and the individual gains a better understanding of it. For example, a RD/RDN who is newly introduced to an IFM therapeutic modality such as nutritional genomics, may begin to read relevant studies on it. Within the second phase, persuasion, an innovation's perceived characteristics promote favorable or unfavorable attitudes toward the innovation to be formed. Perceived characteristics that may increase favorable attitudes include those that provide (a) relative advantage over current practices, (b) compatibility with current norms, (c) simplicity in understanding/degree of complexity, and (d) observable results from the innovation's adoption (Holli & Beto, 2014). For example, gaps in relevant research concerning IFM may inhibit known relative advantages over current practices, but IFM does embrace conventional medical practice and therefore reflects compatibility. Some IFM principles may be easier to understand, but due to its multiple practices it may be considered very complex. Since the use of IFM among RD/RDNs is unknown, it may be difficult to establish known observability. The third phase, decision, involves the adoption or rejection of an

innovation once its advantages and disadvantages have been determined. For example, an RD/RDN might decide to include IFM principles into his/her practice if he/she has determined that there are distinct advantages to using it. Within the fourth stage, implementation, the innovation is put into use. This would include an RD/RDN actively practicing IFM. Confirmation, the fifth and final stage, occurs when those who adopted the innovation seek reinforcement for their decision to do so. In this phase, the adoption may be unconfirmed and the decision to adopt the innovation may be reversed (Rogers, 1962). If an RD/RDN receives criticism for practicing IFM, he/she may decide to discontinue using it.

Among the five-step process and its key elements is a hierarchy of individuals (adopter categories) who are identified by the rate at which an innovation is adopted. They include (a) innovators, (b) early adopters, (c) early majority, (d) late majority, and (e) laggards. These adopter categories are used as a way to identify innovativeness, which is defined by Rogers (1962) as the degree of adoption rate relative to other members of a social system.

Innovators are characterized as venturesome risk-takers and are the gatekeepers in the innovation adoption process. They are the first to adopt an innovation even if there is a high level of uncertainty and rarely need input from others to make their decision. Early adopters are considered to be role models in the innovation adoption process and usually hold respectable leadership roles due to their contemplative nature. Early adopters' acceptance of an innovation in turn decreases uncertainty of that acceptance among other groups who have yet to adopt it. The early majority is deliberate in their adoption of new

ideas and will do so only prior to the average number of peers in their social system and have a longer innovation-decision time frame than the other adopter categories. The late majority is skeptical of innovations and therefore will adopt them only after the average participant of a social system already has. The late majority may make the innovation-decision because of economic necessity or increasing pressure from peers. Laggards, the final category, are the last to adopt an innovation. They possess a traditional orientation that makes them suspicious of innovations. Laggards tend to transfix on the past and usually have only adopted an innovation once it has been surpassed by an even newer innovation (Rogers, 1962).

The Diffusion of Innovations Theory was appropriate for this study as a theoretical framework, as it explains and maps how an innovation or recurring idea becomes accepted among a population, in this case IFM among RD/RDNs. The acceptance and usage of IFM among RD/RDNs may also explore identification of adopter categories within different work areas. Furthermore, the key elements that impact diffusion of IFM can be identified and further studied in an effort to increase its adoption within the dietetics field.

Significance and Justification

There has been an escalation in the use of complementary health approaches among the general public (Clarke et al., 2015). Since an increase in the general use of complementary health approaches has been recognized, healthcare practitioners including RD/RDNs may need to focus their practice on appropriate IFM therapeutic modalities. Identification of the specific IFM therapeutic modalities being recommended by

RD/RDNs, as well as the sources of their IFM information is important. In turn, this may be influential to Academy-accredited dietetic programs while they consider voluntarily adopting the IFM standards and competencies in ACEND's new 2015 Recommended Model for Future Education. In order to ensure healthcare safety and professional integrity within the dietetics field, accrediting organizations may need to increase core curriculum of IFM to ensure that dietetic professionals are receiving the most complete education for future practice.

This study is significant due to its contribution to the body of literature in the field of dietetics. Previous studies have shown that increased education within dietetic programs may also result in future RD/RDNs that are better prepared to work with populations that have an increased desire for IFM healthcare practitioners (Vickery & Cotugna, 2006). Results from this study may expose a need for further research regarding the role of dietitians in IFM. This study may also be instrumental in promoting more appropriate and safer use of IFM among practitioners and subsequently, the general public. Furthermore, results from this study may add to the literature regarding the need for IFM education among dietetic programs.

Assumptions

The following statements were assumed to be true for the purpose of this study.

1. Due to an increase in IFM use among the general public, there is an increase in demand for healthcare practitioners to practice IFM.

2. The subjects completing the questionnaire answered truthfully.

Research Questions

This study has four research questions:

1. What percentage of New York State Registered Dietitians and Registered Dietitian Nutritionists are recommending integrative and functional medicine therapeutic modalities in their practice?

2. Which integrative and functional medicine therapeutic modalities are New York State Registered Dietitians and Registered Dietitian Nutritionists recommending within their practice?

3. Of those New York State Registered Dietitians and Registered Dietitian Nutritionists who are recommending integrative and functional medicine therapeutic modalities, what are their sources of information regarding integrative and functional medicine?

4. Of those New York State Registered Dietitians and Registered Dietitian Nutritionists who are not recommending integrative and functional medicine therapeutic modalities, what are their reasons for not doing so?

Definitions of Terms

The terms in this study were defined theoretically and/or operationally.

Alternative medicine

Theoretical definition: any of the systems of medical diagnosis and treatment differing in technique from that of the allopathic practitioner's use of drugs and surgery to treat disease and injury (Mosby, 2007).

Botanical medicine

Theoretical definition: the use of plants or plant parts for their medicinal or therapeutic properties. Operational definition: the use of plants or plant parts to supplement the diet (NIH, 2011).

Complementary medicine

Theoretical definition: A non-mainstream practice used together with conventional medicine practices (NIH, 2015a).

Conventional medicine

Theoretical definition: treating a patient by identifying diseases through the recognition of patterns of symptoms and then treating those symptoms by prescribing mainstream treatment and therapy (Institute for Functional Medicine, 2015).

Dietetics

Theoretical definition: the science of applying nutritional principles to the planning and preparation of foods and regulation of the diet in relation to both health and disease (Mosby, 2007). Operational definition: the field of work in which RD/RDNs specialize.

Dietetics education

Theoretical definition: Didactic Program in Dietetics (DPD), Coordinated Program (CP), or Dietetic Internship (DI) that is accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND) (Academy of Nutrition and Dietetics, 2013).

Functional medicine

Theoretical definition: functional medicine is a patient-centered and comprehensive practice that is grounded in science and clinical medicine, with the primary aim of prevention of chronic disease (Jones et al., 2009).

Information sources for IFM knowledge

Operational definition: The resources used by NYS RD/RDNs to gain accurate information regarding the IFM therapeutic modalities being recommended in their professional dietetic practice as reported in questions *7* and *8* of questionnaire (Appendix A).

Integrative medicine

Theoretical definition: Integrative medicine is defined as a practice of whole-person medical therapy that supports the patient-practitioner relationship while utilizing all appropriate conventional and alternative medicine therapies (Jones et al., 2009).

Integrative and functional medicine

Theoretical definition: Together, integrative and functional medicine is a systems-oriented practice of whole-person, evidence-based medicine that integrates all appropriate conventional and alternative therapies to achieve optimal health and healing (Jones et al., 2009).

Integrative and functional medicine therapeutic modality

Operational definition: A therapy, which may be recommended or practiced by NYS RD/RDNs that is considered an expression of IFM. Examples include dietary supplements and minerals, therapeutic elimination diets, botanical medicines, nutritional

genomics, and detoxification programs as reported in question *6* of questionnaire (Appendix A).

New York State registered dietitians

Theoretical definition: Food and nutrition experts in New York State who have earned the RD/RDN credential by meeting certain standards. Criteria for earning the RD/RDN credential include completing a minimum of a bachelor's degree from a regionally accredited college/university and coursework that has been approved and accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND) of the Academy of Nutrition and Dietetics (Academy). Further criteria include completing a 6-to 12-month ACEND-accredited, supervised practice program and passing a national examination, which is administered by the Commission on Dietetic Registration (Academy of Nutrition and Dietetics, 2013). Operational definition: any dietitian who practices in New York State that has obtained necessary credentials to practice dietetics under the titles registered dietitian (RD) or registered dietitian nutritionist (RDN) (Academy of Nutrition and Dietetics, 2013).

Reasons for not using IFM

Operational definition: Barriers to use of IFM in a NYS RD/RDN's professional dietetics practice as reported in question *5a* of questionnaire (Appendix A).

Use of IFM therapeutic modalities in a NYS RD/RDN's practice

Operational definition: the extent to which NYS RD/RDNs use certain traditional and non-traditional therapies within their professional dietetic practices as reported in questions *5* and *6* of questionnaire (Appendix A).

Variables

The research variables for this study include NYS RD/RDNs' use of IFM modalities in their practice, IFM therapeutic modalities currently being used within dietetics, RD/RDNs' information sources for IFM knowledge, and RD/RDNs' perceived barriers to adopting IFM into their practice. The population for the study included NYS RD/RDNs, excluding those working solely in food service environments.

Limitations

Limitations of this study included:

1. This study took place in one geographic area. Therefore, the results are not generalizable to all RD/RDNs.

2. This study used self-reported data.

3. The questionnaire used in this study was researcher-developed. Therefore validity and reliability were not established.

Summary

In this chapter, IFM use was discussed as it relates to practice by healthcare professionals, specifically whether dietetics professionals recommended IFM to their clients. Increasing use of IFM among the general public has consequently expanded the need for increased practice of IFM among healthcare practitioners. With IFM trending positively within healthcare, it is important to ensure the safe and effective use and recommendation of its therapies (Ford et al., 2007). In light of this trend, the Academy has defined SOP and SOPP for registered dietitians in IFM. In similar fashion, ACEND has included IFM within their future practice model.

The purpose of this study was to determine the percentage of NYS RD/RDNs who are currently utilizing IFM within their dietetics practice, which IFM therapeutic modalities are being recommended by NYS RD/RDNs in current practice, the informational sources used by those who are currently practicing IFM, and the perceived barriers of those who are not incorporating IFM into dietetics practice.

The theoretical framework used for this study was constructed from the Diffusion of Innovations Theory, which seeks to find and explain how, why, and at what rates new ideas, in this case IFM practice, spread through populations. The research variables for this study included RD/RDNs' decisions whether to adopt IFM into dietetics practice, IFM therapeutic modalities currently being practiced within dietetics, RD/RDNs' information sources for IFM knowledge, and RD/RDNs' perceived barriers to adopting IFM into their practice. The population for the study included NYS RD/RDNs, excluding those dietitians that work solely in the food service industry.

Limitations for this study included the use of a single geographic area, self-reported data, and a research-developed questionnaire.

Within Chapter II, literature that was relevant to this study was reviewed. Chapter III addresses the study's procedures.

Chapter II

Review of the Literature

Introduction

As integrative and functional medicine (IFM) use among the general public has continued to trend positively, it is important to explore the use and knowledge of IFM among New York State registered dietitians to ensure relevance within the profession (Vickery & Cotugna, 2006). Dietetics professionals may find that their patients wish to include IFM therapeutic modalities within their disease treatment plans. Dietary supplements and minerals, herbal botanicals, nutritional genomics, detoxification programs, and therapeutic food elimination programs are IFM modalities that may be used by registered dietitians to ensure appropriate nutrition intervention (Ford et al., 2011). To ensure safe recommendations and use of nutritional products, increased education within programs approved by the Accreditation Council for Education in Nutrition and Dietetics (ACEND) may be necessary. Within this chapter, literature significant to the purpose of this thesis was reviewed. The literature includes: (a) complementary and alternative medicine (CAM); (b) IFM; (c) adoption of CAM among healthcare professionals; (d) adoption of IFM among registered dietitians; (e) dietetic information sources for IFM; (f) IFM modalities in dietetics including dietary supplements and minerals, therapeutic elimination diets, botanical medicines, nutritional genomics, and detoxification programs; and (g) the survey development and tools used to gather research data were discussed.

Complementary and Alternative Medicine

Treatment with complementary medicine embraces healthcare practices and/or products that may be considered outside of mainstream healthcare, but are still used along with standard care practices. This type of care can be found in many medical areas including hospitals and long-term care facilities. Alternative medicine includes healthcare practices that are used in place of standard/conventional practices. Though academic programs such as integrative oncology, pediatrics, and medicine do exist along with physician advocacy for select complementary practices, lack of evidence for many CAM practices raises concern. A healthcare practitioner sometimes directs complementary medical practices, but CAM is often practiced under patient self-care due to this concern and can therefore fuel controversy (Briggs, 2015).

Integrative and Functional Medicine

Chronic disease is an epidemic that affects more than half of all Americans (DeVol et al., 2007). According to The World Health Organization (WHO), chronic diseases are the leading cause of mortality in the world and represent 60% of all deaths and 43% of the global burden of disease. Moreover, by 2020, chronic disease contribution is forecasted to rise to 73% of all deaths and 60% of the global burden of disease (WHO, 2002).

The major premise of functional medicine is to identify and remediate underlying causes of chronic diseases using science, clinical wisdom, and innovative tools both pre- and post-onset of illness. According to Ursano (2011), “Disease is neither the starting point nor the end point of illness. It is a pathological process that may not be discovered

until decades after the identification of an illness" (p.1). The primary catalyst of the chronic disease phenomenon is the interaction among an individual's genome, the environment, and lifestyle factors, including food (Jones et al., 2009; Willet, 2002).

IFM is a practice of whole-person medical therapy that supports the patient-practitioner relationship while utilizing all appropriate conventional and alternative medicine therapies in a functional medicine approach. The IFM system of diagnosis and treatment permits increased awareness of the uniqueness of each individual's health. IFM can be practiced by various healthcare practitioners and encompasses multiple conventional as well as CAM practices including mind-body practices, alternative systems of medical practice, biologically-based therapies, manipulative and body-based methods, and energy therapies (Touger-Decker & Thomson, 2003).

With the multifactorial causation of chronic disease, it is important to integrate the science of medicine, the complexity of the human adaptive system, and the art of clinical practice in order to newly define patient care. Functional medicine practitioners work to develop effective patient-centered partnerships with their clients to better identify the cause and therapy options for each individual's unique expression of chronic disease. They acknowledge their biochemical individuality while also addressing the internal and external factors that affect total functioning (DIFM, 2015a).

When practicing IFM, practitioners should implement an operating system that is also multifactorial. The evidence base has increased regarding the key common pathways to disease (e.g., inflammation, GI dysfunction, oxidative stress), the role of lifestyle

factors (e.g., diet, physical activity, stress), and environmental degradation on health, which has caused the evolution of the tools used to understand and treat it (Jones & Quinn, 2014). According to Jones and Quinn (2014),

> Adopting a new operating system for 21st century medicine requires that we: recognize and validate more appropriate and successful clinical models; re-shape the education and clinical practices of health professionals to help them achieve proficiency in the assessment, treatment, and prevention of chronic disease; reimburse equitably for lifestyle medicine and expanded preventive strategies, acknowledging that the greatest health threats now arise from how we live, work, eat, play, and move. (p. 2)

Adoption of Complementary and Alternative Medicine Among Healthcare Professionals

IFM and CAM components can be practiced among various healthcare professionals working in multiple environments, but it is not certain that these healthcare professionals have received accredited training in those components. Research regarding the use, knowledge, and perceived benefits of IFM in particular is still limited, but these factors among IFM and CAM components in medical use have been studied internationally among physicians and nurses (Whaner-Roedler et al., 2014; Shorofi & Arbon, 2010). Research has also been conducted to study the use, knowledge, and perceived benefits of IFM and CAM components regarding medical students (Yurtseven et al., 2015). A study based on a 10-item CAM health belief questionnaire (CHBQ) in the Balkans found that acceptance of combination conventional medicine and CAM was

present mostly in healthcare professionals in primary healthcare (p = .034), followed by pharmacists in dispensing pharmacies and industry. This study also found that medical, pharmacy, and dental students were more accepting of CAM therapies as they moved closer to their graduation (Jakovljevic et al., 2013).

A 2012 follow-up to a study previously conducted in 2004 of physician attitudes toward and knowledge of CAM therapies found that 71% of physicians participating in the 2012 survey were more likely to refer patients to a CAM practitioner than those that responded to the 2004 survey (44%; $p < .001$) (Wahner-Roedler et al., 2014). Wahner-Roedler et al. (2014) related these findings to the continuing demand from patients to access CAM services as well as increased research efforts for investigating CAM therapy efficacy. Furthermore, 77% of the physicians in the 2012 survey thought that incorporating CAM therapies would lead to a positive impact on patient satisfaction. The study also used a scale of, *agree, neither agree nor disagree, disagree, no response* and found that a significant amount of practitioners agreed more in 2012 than they did in 2004 with the following statements: "Physician knowledge of CAM practices leads to better patient outcome" (p = .006); "CAM therapy has an impact on symptoms, conditions, and/or diseases" (p = .001); and "Some CAM therapies hold promise for treatment of symptoms, conditions, and/or disease" (p = .03) (Wahner-Roedler et al., 2014, p.58). Contradictorily, 61% of physicians surveyed expressed the opinion that the current practice of CAM therapies in the U.S. represents a threat to the health of the public. The study pinpointed multiple factors that affected physician's attitudes toward CAM in 2012 including personal experience (35%), recommendations of respected

colleagues who used the therapy on themselves (25%), recommendations of a medical specialist to whom patients were referred (38%), and case reports in CAM journals (7%). According to Wahner-Roedler et al. (2014), "results also suggest the need to ensure that CAM/integrative medicine topics are covered in medical school and residency education programs" (p. 60).

Nurses have been identified as healthcare professionals that are more prone to deliver CAM therapies to their patients using modalities such as mind-body therapies. A study conducted in Adelaide, Australia determined nurses' knowledge, attitudes, and professional use of CAM (Shorofi & Arbon, 2010). While it was found that 60% of the qualified nurses surveyed had very little or no knowledge of CAM, Shorofi and Arbon (2010) found that 59% of nurses were positive about CAM and remained open to using it in practice. Only 3.4% (n=11) of nurses perceived their knowledge of CAM as *a lot.* Of these nurses, 22.4% (n=27) rated their attitudes toward CAM as *very positive*. This study also noted that some CAM modalities used by these nurses have the potential to endanger patient safety, such as non-herbal supplements (17.4%) and herbal/botanical supplements (3.4%). It was mentioned that, "harm may be a consequence of the therapy itself or a result of delivering the therapy incorrectly without sufficient knowledge and competency" (Shorofi & Arbon, 2010, p. 232).

Evidence for increasing education in CAM among healthcare students has been identified due to the increased use and practice of CAM in the medical field. A study conducted by Yurtseven et al. (2015) concluded that CAM modalities should be integrated into Turkish medical schools due to the positive attitudes, yet limited

knowledge, of medical students concerning CAM therapies. These students exhibited an understanding of the importance of CAM education in the medical curriculum in order to positively influence professional attitudes and stimulate the doctor-patient relationship. Yurtseven et al. (2015) also determined that, due to increased medical use of CAM therapies, it is important that medical professionals update their knowledge using reliable sources in order to stay current with CAM safety and efficacy. It is important to note that not all possible CAM therapies were included in this study.

Adoption of Integrative and Functional Medicine Therapies Among Registered Dietitians

In 2011, the American Dietetic Association (currently known as the Academy of Nutrition and Dietetics) published standards of practice (SOP) and standards of professional performance (SOPP) for registered dietitians in IFM, which supplemented the revised 2008 SOP and SOPP for Registered Dietitians and Registered Dietitian Nutritionists (RD/RDNs) in Nutrition Care (Ford et al., 2011). The 2011 SOP and SOPP were approved by the executive committee of the Dietitians in Integrative and Functional Medicine (DIFM) Dietetics Practice Group (DPG), the Scope of Dietetics Practice Framework Sub-Committee, and the Academy's Quality Management Committee (Ford et al., 2011). The SOP and SOPP are decision tools within The Scope of Dietetics Practice Framework, which changes in response to the progression of knowledge, the healthcare environment, and advancing technology. RD/RDNs may develop their own scope of practice using the Scope of Dietetics Practice Framework, but must abide by state legislation. In addition to state laws, RD/RDNs must also take into account federal

regulations, institutional policies and procedures, individual competence, accountability, and responsibility for their own actions. "Many practitioners are currently using either an integrative or functional medicine approach that is complementary to conventional medicine practices, and include the major tenets that DIFM RDs embrace" (Ford et al., 2011, p. 903).

The DIFM DPG consists of members who practice integrative and functional medical nutrition therapy (IFMNT) by assessing a person's biochemical individuality to develop a nutrition care process (NCP) that addresses a root cause (DIFM, 2015a). More specifically, when practicing IFMNT, an RD/RDN must first recognize that the individual client has a unique genetic make-up. Additionally, a DIFM RD/RDN must recognize that each client is faced with internal and external factors that influence mind, body, and spirit interactions. Once a system's assessment has been completed, a plan is created using the nutrition care process (NCP). Although ACEND's 2015 Recommended Model for Future Education will contain IFM standards and competencies that may be voluntarily adopted in 2017, there are presently no existing requirements for the implementation of curriculum representing IFM within accredited dietetic programs. Medical nutrition therapy (MNT) provided by RD/RDNs has been found to be effective in the treatment of many diseases and conditions, such as with diabetes (Franz et al., 2010). IFMNT is similar to MNT in that it uses the NCP to conduct assessments, provide nutrition related diagnoses, create and implement nutrition interventions, and monitor/evaluate those interventions (ADIME). The IFMNT radial (Figure 1) is a conceptual IFMNT framework that presents a critical thinking model for dietetic

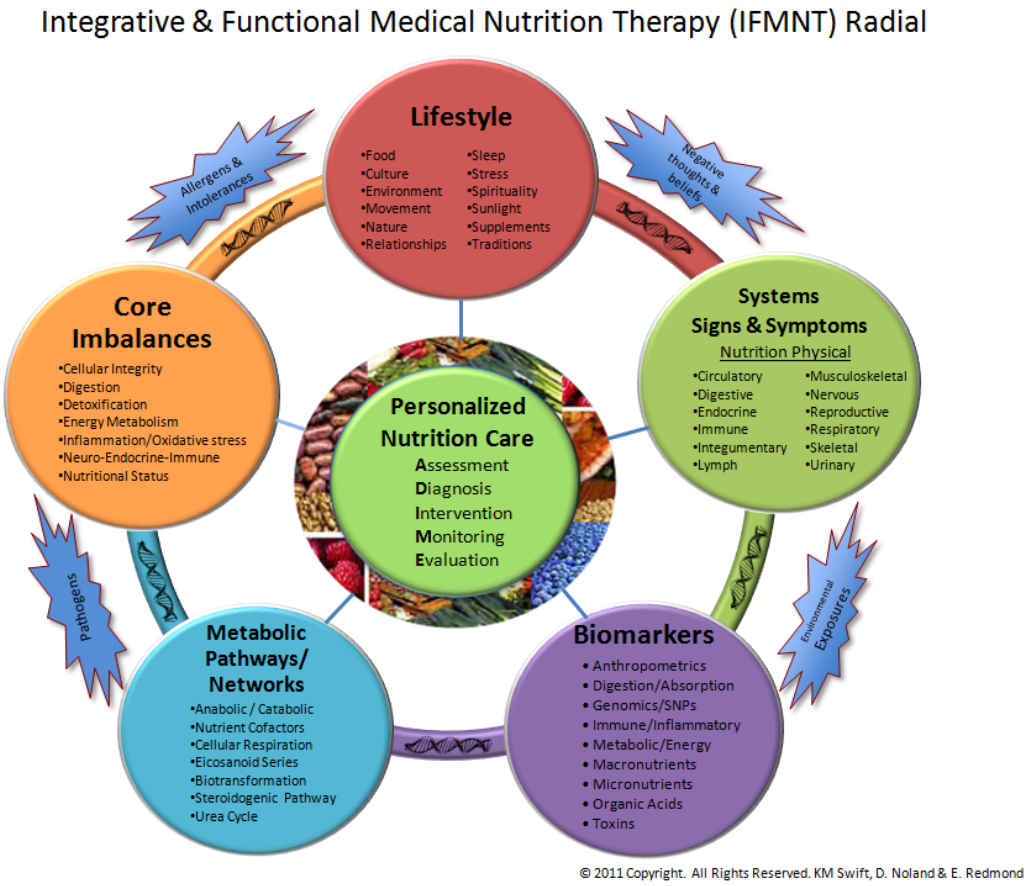

Figure 1. Integrative and Functional Medical Nutrition Therapy Radial.

Used with permission from Kathie M. Swift, MS, RDN, LDN. (Appendix B)

practitioners who choose to implement both conventional and alternative nutrition therapies into their practice (Ford et al., 2011). As shown in Figure 1, the middle of the radial signifies how IFMNT is person-centered, while also adhering to the NCP ADIME principles. The circular design of the radial is conducive to the complex interaction and interrelationships of the five key IFMNT areas, including (a) life cycle, (b) systems signs & symptoms, (c) biomarkers, (d) metabolic pathways/networks and (e) core imbalances (Ford et al., 2011).

The lifestyle sphere includes the factors that must be considered in personalized nutrition care including access to food, culture and traditions, environment, extent of movement/exercise, nature, relationships, sleep, spirituality, supplements, sunlight, and stress. The system's signs and symptoms sphere is representative of each of the body's systems, which should be assessed with nutrition-focused hands-on exams (Ford et al., 2011). Examples of systems to be examined include skeletal, urinary, digestive, and circulatory, which can show characteristics of unintended weight loss/gain, malnutrition, muscle wasting, and inflammation. The biomarkers sphere helps with evaluating abnormalities found during the systems exam. Biochemical assessments include functional laboratory assessments that may provide useful information about their organic acid profile as well as their energy and metabolic efficiency. Enzyme simulation assays, loading tests/ saturation measures, challenge tests, nutrigenomic screenings, and stool analyses are all functional laboratory assessments, which may be used to gain information on an individual's biochemical nature (Lord & Bralley, 2008).

The metabolic pathway sphere includes anabolic and catabolic pathways, nutrient cofactors, cellular respiration, the urea cycle, and biotransformation. Information expressed by these pathways may lead to the evaluation of appropriate enzymes that drive key metabolic pathways and are dependent on micronutrient cofactors. The core imbalances sphere summarizes findings from the other spheres and includes cellular integrity, digestion, detoxification, energy metabolism, inflammation/oxidate stress, neuro-endocrine-immune, and nutritional status (Ford, et al., 2011).

The deoxyribonucleic acid (DNA) helixes between each area represent how each may be influenced by an individual's biochemical and genetic attributes. Triggering factors that may adversely affect an individual and present measurable biomarkers, such as food allergens, intolerances, negative thoughts, beliefs, pathogens, and environmental exposers, are also found between each sphere.

Dietetic information sources for integrative and functional medicine. Dietetics is grounded in evidence-based medicine and depends on research-based methods and therapies for dietary recommendations. Resources including the National Center for Complementary and Integrative Health (NCCIH) provide health information, access to research, grants and funding, news, and research training for complementary and integrative health (National Institutes of Health, 2015b). To further support the backbone of science-based medicine, the DIFM DPG provides legitimate and trusted sources of IFM information and materials, which can be found on their website (www.integrativerd.org). Some of the sources listed on the DIFM DPG website, such as the Institute for Functional Medicine and the American Botanical Council are well

known, while others are not. Along with the sources provided, members of the DIFM DPG have access to peer-reviewed journals and webinars that continue to expand on IFM knowledge and information. Little research exists on the evaluation of IFM information sources for NYS RD/RDNs.

It is not currently mandatory for a dietetics curriculum to contain IFM knowledge and competencies, and currently few programs are in place which focus their curriculum on IFM therapy (ACEND, 2015). Some Academy-accredited programs do offer IFM education within their curriculum, such as Bastyr University, University of Bridgeport, Connecticut, University of Kansas School of Medicine, University of Medicine and Dentistry, University of Western States, and Maryland University of Integrative Health (Academy of Nutrition and Dietetics, 2015).

Textbooks providing nutrition from a natural medicine perspective are also available for institutional and personal use. Examples provided by DIFM (2015b) include *Krause's Food and the Nutrition Care Process* (Mahan, Raymond, & Escott-Stump, 2011); *Nutritional Medicine* (Gaby, 2011); *Advancing Medicine with Food and Nutrients (*Kohlstadt, 2012); and *Staying Healthy With Nutrition: The Complete Guide to Diet and Nutritional Medicine* (Haas & Levine, 2006).

Multiple journals that provide peer-reviewed research articles also exist, including, but not limited to, the *Functional Medicine Journal*, *Journal of Complementary Medicine Online*, *Alternative and Complementary Therapies*, and the *Journal of the Academy of Nutrition and Dietetics* (DIFM, 2015b). These journals are available to dietitians wishing to expand their knowledge of science-based IFM research.

Online resources for natural products exist for IFM-practicing dietitians and can provide immediate information at their fingertips. NAPRALERT (2015) is a database of natural products and includes pharmacological/biochemical information on extracts of organisms, as well as ethnomedical information. This database states that it provides a comprehensive review of scientific literature and includes more than 200,000 scientific papers and reviews. Similarly, the Natural Medicines Comprehensive Database (2015) claims to provide unbiased information concerning scientific clinical information on complementary, alternative, and integrative therapies. On this database, one can access information concerning the safety and efficacy of natural supplements as well as review reported interactions with other substances.

Programs are currently in place to provide continuing professional education units (CPEUs) for dietitians interested in gaining knowledge from Academy-accredited sources while also maintaining their dietetic credentials. The Integrative and Functional Nutrition Academy (IFNA, 2015) is an accredited, continuing professional education (CPE) provider by the Commission on Dietetic Registration, which is the credentialing agency for the Academy. The IFNA provides up to 108.5 CPEUs along with an IFN-certified practitioner credential upon completion of the course, which consists of peer-reviewed content by IFNA's thought leaders/advisory board. The Next Level Functional Nutrition program is another source for dietitians interested in learning more about how integrative and functional medical nutrition therapy (IFMNT) can be used within their professional dietetics practice. The program was founded by Susan Allen, RD, Certified Clinical Nutritionist (CCN), who is also a DIFM member. This program provides three levels of

training and while all IFMNT aspects are touched upon in her courses, the certificate of training in IFMNT focuses on nutritional genomics (Next Level Functional Nutrition, 2015).

Integrative and Functional Medicine Therapeutic Modalities

While multiple modalities exist within IFM, certain forms may be practiced in greater frequency within the dietetics field. Dietary supplements and minerals, botanical medicines, nutritional genomics, therapeutic food elimination diets, and detoxification programs are registered dietitian-utilized IFM modalities recognized by the Academy (Ford et al., 2011). However, studies determining which modalities are practiced most by dietitians are limited. The use of nutrition supplements and botanical medicines may sound familiar in mainstream use, especially as utilized by health-oriented individuals, but nutrition supplements, such as vitamins/minerals, and botanical medicines can also be used during the treatment of chronic conditions and diseases (Marra & Boyar, 2009; Wachtel-Galor & Benzie, 2011). Therapeutic food elimination diets have been useful in the determination of food sensitivities or specific food antigens (Denton, 2012). Nutritional genomics is the exploration of a person's genetics and its relationship with the individual's health, which can then lead to appropriate nutrition that is specific for each person and condition (Camp & Trujillo, 2014). Detoxification programs, though utilized in the general sense, are still lacking in adequate scientific research (Schaeffer, 2014).

Dietary supplements and minerals. Dietary supplements (or nutrition supplements) are regulated as a subcategory of food by the Food and Drug Administration's (FDA) Center for Food Safety and Applied Nutrition. Dietary

supplements are defined by the Dietary Supplement Health and Education Act (DSHEA) as products intended to supplement the diet that contain all, some, or a combination of the following dietary ingredients: a vitamin, a mineral, an herb or other botanical, an amino acid, a dietary substance for use by humans to supplement the diet by increasing the total dietary intake, or a concentrate, a metabolite, a constituent, or extract (DSHEA, 1994).

The DSHEA (1994) defines and sets safety labeling requirements for dietary supplements, while the FDA approves health and nutrient content claims found on labels of dietary supplements. Manufacturers of dietary supplements are responsible for ensuring the safety of their products before they are on the market, but once a product is on the market, the FDA has the authority to remove it if it has been proven to be unsafe (FDA, 2015).

In a National Center for Health Statistics (NCHS) data brief, Gahche et al. (2011) reported an increase in the use of dietary supplements among U.S. adults. Multivitamins and multiminerals are the most commonly used dietary supplements with 40% of men and women reporting having used them during 2003-2006. Gahche et al. (2011) also found that the use of vitamin D and calcium supplements increased in 2003-2006 compared to a study conducted in 1988-1994. A 2009 report from the U.S. Government Accountability Office states that, "surveys and experts indicate that consumers are not well-informed about the safety and efficacy of dietary supplements and have difficulty interpreting labels on these products" (U.S. Government Accountability Office, [GAO], 2009, p. 1). Consequently, consumers may be exposed to health risks associated with adverse reactions and toxicity.

While a food-first approach is usually used to achieve nutritional adequacy, the Academy also recognizes that dietary supplements have a role to play in improving nutrient intake to support health and wellness. The Academy states that the use of supplements is prevalent and emergent in the U.S. and that additional nutrients from supplements can help people reach their specified nutrition needs (Marra & Boyar, 2009). To help educate consumers on safe and appropriate selection and use of dietary supplements, it is recommended that dietetics practitioners position themselves as the first source of information on nutrient supplementation by gaining expertise in supplement efficacy and safety (Marra & Boyar, 2009).

As a study by Dickinson, Bonci, Boyon, and Franco (2012) shows, registered dietitian recommendation of dietary supplements is significant. This study surveyed 300 registered dietitians in clinical and private practice environments on the use and recommendation of dietary supplements. Results indicated that 97% of the 300 registered dietitians surveyed recommended dietary supplement use for bone health, filling nutrition gaps, overall health and wellness benefits, lowering cholesterol, heart health, dietary pattern/vegetarian/vegan, and digestive or gastrointestinal health. Eighty percent of dietitians reported professional journals as their most trusted source of information on supplements. Other sources included clinical studies in scientific journals, clinical guidelines from professional organizations, and continuing education conferences. Of the dietitians surveyed, 87% reported that their clients were comfortable reciting their use of dietary supplements (Dickinson et al., 2012).

Therapeutic food elimination diets. When food sensitivities or allergies are difficult to pinpoint, therapeutic elimination diets may serve as a diagnostic tool and/or intervention. Furthermore, elimination diets may be beneficial for those with functional gastrointestinal disorders or food sensitivities, some of which may not be responsive to traditional allergy tests. Information collected from an elimination diet can ultimately lead to appropriate dietary changes or drug therapy. The first step within an elimination diet is to cease the intake of suspected foods that serve as possible symptom triggers for 10-14 days. If symptoms persist, other foods can be eliminated. Once all symptoms are no longer present, the patient will then proceed with food challenges. Generally, challenge tests are initiated to determine the problematic food or food group. Specific foods are systematically added back into the diet – one at a time – to see if symptoms again arise. Though studies on the use of elimination diets as therapy for eosinophilic esophagitis (EoE) exist, few large-scale studies accept or reject the hypothesis of effective therapeutic elimination diets in regards to other conditions (Denton, 2012). The role of food in EoE was first discovered after elemental amino acid-based formula diets/crystalline amino acid-based elemental (ELED) formulas showed effectiveness in its dietary management (Kagalwalla et al., 2006).

A 2012-2014 multicenter quasi-experimental study with a removed-treatment design was conducted with 52 adult Spanish patients with EoE, which is a disorder that is predominately triggered by food-related antigens (Molina-Infante et al., 2014). This study utilized a four- and six-food group elimination diet to achieve remission in these patients. In the four-food group elimination diet (FFGED), cow's milk, wheat, eggs, and legumes

were all eliminated for 6 weeks. For those who responded successfully, as evidenced by clinicopathologic remission on a FFGED (54%), 6 weeks of food challenges followed to try and identify the specific triggering food antigen. If subjects did not respond on the FFGED (37%), a six-food group elimination diet (SFGED), which excluded cow's milk, wheat, eggs, nuts, and seafood, was introduced with remission success (31%). Seventy-eight percent finished the individual food reintroduction challenge. Clinical remission from EoE-related dysphagia was accomplished in 67% ($p < .001$) of total patients compared to those who still presented with dysphagia. Fifty-four percent of patients achieved histologic remission after FFGED therapy with a significant decline in EoE at distal esophagus ($p < .001$) compared to those who still presented with EoE at distal esophagus. An overall remission rate of 72% percent was achieved with a combination of the FFGED and SFGED. It may be noted, however, that this study did not initiate dietitian supervision to detect long-term nutritional deficiencies due to entire food group restrictions (Molina-Infante et al., 2014).

Therapeutic elimination diets may also be beneficial in pediatric populations. A retrospective observational study by Kagalwalla et al. (2006) found that six-food elimination diet (SFED) treatment was successful (74%; $p < .0001$) in children with eosinophilic esophagitis (EE) compared to those who did not show improved symptoms of EE. While the crystalline amino acid-based elemental diet (ELED) formula was as an effective treatment (88%), the SFED treatment was found to have better acceptance, cost, and compliance than use of ELED formulas. The SFED used in this study excluded milk protein, soy, egg, wheat, peanut/tree nuts, and seafood, which are foods associated most

commonly with food allergies in children. This study also showed challenges of appropriately implementing the SFED without the active participation of a registered dietitian. Specific incriminating food allergens were not identified in this study (Kagalwalla et al., 2006).

Botanical medicines. Botanical medicine, also called herbal medicine or phytomedicine, may be used for health promotion and therapy for chronic and mildly acute conditions (Wachtel-Galor & Benzie, 2011). They have been used for decades in a variety of techniques and are therefore considered to be of traditional use (Anton, Serafini, & Delmulle, 2014). These medicines are derived from a plant's seeds, berries, roots, leaves, bark, or flowers, are named by the plant's genus and species, and can be sold as fresh or dried products, liquid or solid extracts, tablets, capsules, powders, tea bags, etc. (NIH, 2011). Actions of botanicals range from mild to potent (NIH, 2011), and the preparation of each product has been optimized over time according to achieved beneficial effects (Anton et al., 2014). For example, chamomile and peppermint may mildly aid digestion and are generally considered safe for self-administration. Mild botanical medicines may take multiple days before effects are seen, while a potent herbal medicine may cause an immediate effect (NIH, 2011).

A report by the National Center for Complementary and Alternative Medicine (NCCAM) (Barnes, Bloom, & Nahin, 2007) showed that herbal therapy and the usage of natural products were the most commonly used alternative medicines, except for use of prayer (18.9%). Botanical medicines are utilized in the treatment of chronic and acute

conditions such as inflammation, cardiovascular disease, prostate problems, depression, as well as compromised immune systems.

According to Anton et al. (2014), a long history of use, paired with the combined preparation knowledge and the absence of reported adverse effects, strengthens the consideration of the safety of botanical medicine use. The authors also state that if it is unknown which compounds in an herb are responsible for beneficial activity, the preparation of the herb must be identical to that of the traditional preparation in order to use the traditional information relating to its benefit and safety (Anton et al., 2014). No standardization exists for botanical medicines, and their quality is not regulated. Furthermore, due to the lack of their regulation, botanical medicines may be contaminated, adulterated, or even contain toxic compounds. The environment may also significantly affect botanical extracts (Wachtel-Galor & Benzie, 2011). Good Manufacturing Practices (GMP) have been put in in place by the FDA (2007) as requirements and expectations to prevent the inclusion of incorrect ingredients, incorrect amounts of ingredients, and the possibility of contamination (NIH, 2011).

Some studies exist on the use of botanical medicines as therapy for conditions. For example, a study by Shrestha et al. (2006) found that a combination of 7.28g psyllium and 2g of plant sterols (PS) provided within a cookie per day, reduced low-density lipoprotein (LDL) cholesterol ($p < .01$) from pre-study values and decreased the number of intermediate density lipoprotein particles and the smaller LDL and high-density lipoprotein (HDL) subfractions in hypercholesterolemic individuals. However, more research is needed to strengthen the safety and knowledge of botanical use. Even

with increased research and possible evidence-based efficacy of their use, lack of standardization may cause altered effects per dosage of botanical medicine products.

Nutritional genomics. Nutritional genomics is a term that encompasses nutrigenetics, nutrigenomics, and nutritional epigenomics, all of which explore how nutrients and genes interact and are expressed to reveal phenotypic outcomes (Camp & Trujillo, 2014). Nutrigenetics is a science that explores genetic makeup and its interactions with dietary components, which can, in turn, influence health status including the risk of diet-related disease and biological functions including metabolism, absorption, digestion, and cellular responsiveness to dietary components (Rimbach & Minhane, 2009). For example, one type of a nutrigenetic condition is a rare, autosomal recessive metabolic disorder called phenylketonuria (PKU), which is caused by mutations in the phenylalanine hydroxylase gene and is treated with a low-phenylalanine diet (Camp & Trujillo, 2014). The goal of nutrigenetics research is to use genetic profiling to detect disease risk and personalize dietary recommendations (Rimbach & Minhane, 2009).

Nutrigenomics is concerned with how dietary components impact the genomes, the proteome, and metabolome (Mead, 2007). The focus of nutrigenomics is on single-nucleotide polymorphisms (SNPs), which are DNA sequences accounting for the majority of all human genetic variation. Dietary factors may alter the effect of SNPs to increase or decrease disease risk. In 2008, a pilot study by Ornish et al. was conducted to examine the effects of dietary interventions in prostate tissue on the basis of previous studies showing how comprehensive lifestyle changes have been therapeutic. In the study, 30 low-risk prostate cancer patients who declined traditional treatment participated

in an intensive nutrition and lifestyle intervention. Three months into the study, subjects' BMI, waist circumference, blood pressure, and lipid levels had improved ($p < .05$) compared to values collected before intervention. Gene expression analysis detected 48 up-regulated and 453 down-regulated transcripts. Of even more interest was a set of down-regulated ras family oncogenes that may function in the prostate as an androgen receptor coactivator that expresses as increased in tumor tissues (Ornish et al., 2008).

Nutritional epigenomics or epigenetics is defined as the study of heritable changes in gene function that occur independently of changes in DNA sequence (Kauwell, 2008). The epigenome provides instructions within the genome that influence gene activity and whether certain genes are transcribed. Environmental factors, including food intake, may alter the epigenetic state of a genome, which may in turn affect the phenotype independent of the sequence of base pairs in the genetic code. Methylation, histone modification, and genomic imprinting can also be used in genetic modification. According to Kauwell (2008), epigenetic modification via diet may influence risk for certain cancers and chronic disease by controlling gene activation and silencing.

Dietetics practice is based on rigorous evidence that is obtained from clinical application of scientific discoveries. Nutritional genomics, though an emerging science, is not yet ready to be utilized to provide dietary advice; however, it is recognized in some dietetic practice areas, such as by those in the DIFM DPG. According to Ford et al. (2011),

> DIFM RDs appreciate that all individuals have unique metabolic patterns often based on genetics that affect health needs . . . Client uniqueness encompasses both

> voluntary activities such as decision-making and emotional responses, and the involuntary activities of nutrient metabolism, cellular processing of information, and communication between organ systems. (p. 903)

The world of genetic and genomic understanding is continuously advancing and has influenced a deeper understanding of epigenetics and the influence of microbiome on health and disease. Consequently, a better understanding of nutrient-genome patterns on preventive health and disease development has followed. Unfortunately, genotyping alone is not enough to personalize dietary interventions for improved health. According to Camp and Trujillo (2014),

> Understanding and manipulating how diet affects the phenotype of an individual will require technologies that can reveal the processes of what happens from the genetic blueprint through transcription and synthesis of proteins to identification of metabolites that will tell us what has happened, both abnormal and normal. (p. 299)

Furthermore, due to the multifactorial and multigenetic nature of many chronic diseases, genetic mutations are only partially predictive of disease risk. On the other hand, risk factors, biochemical parameters, and family history of disease remain as relevant tools in the personalization of dietary interventions. Ultimately, if nutritional genomics is to take a place in the field of dietetics, dietetic practitioners must not only remain competent in the field of genetics, they must also be able to fully interpret, understand, and communicate complex genetic test results in which the actual risk of developing a disease may still be unknown (Camp & Trujillo, 2014). According to

Wright (2014), nutrition and dietetic curricula must be augmented to include material on nutritional genomes, so that future practitioners enter into the profession with knowledge of these emerging innovations.

Detoxification Programs. Currently, there is debate within the dietetics profession concerning the safety and efficacy of dietary detoxification programs. The debate focuses on whether detoxification is a natural human bodily process that flushes toxins out of the system. These toxins, called xenobiotics, are chemical substances foreign to the human body. Fad detox diets are currently popular, but no evidence exists to substantiate their benefits. While fad detox diets may be radical and even harmful, a gentle detoxification regimen used by an RD/RDN can be as simple as an overall healthful eating plan, including naturally detoxifying foods and beverages (Schaeffer, 2014). Ultimately, to enhance the use of detoxification programs within dietetics, increased education on the detoxification process must be explored along with science-based evidence.

Perceived Barriers to Using Integrative and Functional Medicine Therapeutic Modalities

There is limited research currently available concerning the perceived barriers to a dietitian's use of IFM therapeutic modalities, and as noted by Briggs (2015), lack in evidence base for many CAM practices raises concern. Only a few research studies have investigated this area and are limited to specific modalities (Collins et al., 2013; Lee, Georgiou, & Raab, 2000).

In 2013, a cross-sectional study measured knowledge and current involvement and confidence in genetics and nutritional genomics. This study found that the majority of clinical dietitians in the UK, Australia, and the U.S. reported low knowledge, involvement, and confidence in education and clinical genetic and nutritional genomic activities. Collins et al. (2013) suggested that low knowledge scores on nutritional genomics may be reflective of its characterization as a new, emerging concept. Collins et al. (2013) also noted that, as reflected by their data, "Dietitians who were more confident in undertaking clinical or educational activities relating to genetics and nutritional genomics were more likely to be involved in them, and this relationship is likely to be bidirectional" (p. 528).

An Oregon study by Lee, Georgiou, & Raab (2000) examined the perceived knowledge and attitudes of licensed dietitians (LDs) (n = 162) regarding the effectiveness and safety of functional foods, nutrient supplements, and herbs as complementary medicine. This study found that although more than 80% of LDs surveyed believed that functional foods and nutrient supplements were effective for maintenance of health and treatment of disease, less than 10% of LDs considered themselves knowledgeable about herbs for the prevention and treatment of illness. Lee et al. (2000) also found that LDs' interest in functional foods and nutrition supplements was high (75%) and that 60% were interested in training concerning the use of herbs.

Survey and Questionnaire Development

In this study, a questionnaire was used to collect data on the use of, information sources of, and perceived barriers to IFM and IFM therapeutic modalities. A

questionnaire is a type of survey, which is therefore a system used for the collection of information from or about a group of people (Fink, 2009). Self-administered questionnaires, as used in the study, are completed by the respondent and are one of the most frequently used methods for collecting research study data. They can be used to collect data from a representative sample, in which population characteristics are distributed similarly to the way in which they are distributed in the population at large (Fink, 2009).

Many details, including the survey format and question design, are involved in the development of a questionnaire. These details should not be overlooked because a survey may not be useful if the data it provides does not clearly answer established research questions. For example, it is important to include questions that are purposeful, straightforward, and concrete in order to avoid ambiguity in answers from respondents. A question may seem very clear for the creator of the survey. However, to the respondents, it may seem very confusing. While it is important to create a professional and formalized questionnaire, simple and familiar words within questions that are short, to the point, and in complete sentences, may further eliminate confusion and vagueness (Dillman, Smyth, & Christian, 2014).

Some questions are easy to answer accurately, such as those concerning age and other factual demographics. Questions concerning opinions and attitudes may take more time to answer as the respondent recalls relevant information, forms a judgment, and reports his/her answer. Previous questions, the wording of the question, the response options provided, and the visual layout of the question are all elements that impact how

the respondent will answer. To improve accuracy of behavior type answers, it is best to ask questions that people can easily recall. It may also be helpful to include definitions and examples to make the questions easier to understand and to eliminate misinformation (Dillman et al., 2014).

Furthermore, care should be taken when deciding which types of questions to use in order to obtain the best information for a study. Question format will affect how the respondent must answer the question. It is important to ask one question at a time and when possible to avoid double- or triple-barreled questions. Multiple concept questions will be better answered if each question is answered separately (Dillman et al., 2014).

Different types of questions, such as open- and closed-ended questions, may be used in questionnaires to obtain different responses. Open-ended questions require respondents to use their own words and are used for unanticipated answers, while closed-ended questions provide preselected answers for the respondents to choose from. Answer choices are equally important when creating a questionnaire. Answer choices for closed-ended questions can either be categorical/nominal, ordinal, or numerical and are used often in self-administered questionnaires. Categorical and nominal choices have no numerical values, such as asking whether respondents have long or short hair. Ordinal choices are often used to rate or order a list of items, such as a continuum or scale ordered from positive (very important) to negative (very unimportant). Numerical choices have numerical value and may be used to ask about age, height, and so forth (Fink, 2009). Other concerns in determining answer choices for closed-ended questions include eliminating bias. When choosing vocabulary for answers, it is important to use equal

comparisons. In self-administered surveys, respondents may be more apt to choose early response options; therefore, it may also be helpful to randomize response options (Dillman et al., 2014).

Using email to distribute surveys. Electronic surveys are the fastest growing form of surveying in the U.S. (Dillman et al., 2014). Providing questionnaires via email or online has advantages and disadvantages. Online questionnaires have the advantage of being the least expensive, the least complex, and the most time efficient. They may also provide relatively clean data that require little or no end-stage processing. Problems with questionnaires administered via email may include a decreased response rate compared to those distributed more personally (Dillman et al., 2014). Distortion of the questionnaire's format due to software or skills required by the recipient may also decrease response rate. For example, placing the questionnaire in the body of an email may distort its formatting, or attaching the questionnaire to an email as a PDF may cause it to remain unopened if the recipient does not have the appropriate software. To decrease the possibility of distorted format, the questionnaire may be created on a website, and the recipients can be emailed a link. Unfortunately, the email sent containing the link might not be sent to the recipients' inbox and end up within their spam or junk email folder instead. Recipients may also be cautious in their willingness to click on the provided link (Gaiser & Schreiner, 2009).

Several question formats are available for web surveys. Conventional responses as seen in paper questionnaires are generally preferred to decrease user difficulty, but dynamic question formats may be used if they are likely to provide more accurate data.

Examples of a dynamic question format include visual analog/slider scales and drop-down menu formats. Visual/ slider scale formats are designed to emulate an ordinal closed-ended question format. A drop-down menu provides respondents with a list of options from which the participant selects one or multiple responses. While these formats may be easy to use for some, other respondents may have difficulty using these on different media including their cellular device (Dillman et al., 2014).

Summary

The review of the literature provided information on CAM and IFM to help provide an understanding of their roles within the healthcare profession and medical sciences. The importance of increased education in healthcare professional programs concerning CAM and IFM was addressed, as the trend of its use among the general public and practitioners rises. Information sources for dietitians that provide information on IFM were explored. IFM therapeutic modalities were reviewed to clarify their roles within the dietetics health profession, and the perceived barriers to using IFM therapeutic modalities were addressed. To conclude the chapter, survey and questionnaire development were discussed as tools for assessing IFM practice among NYS RD/RDNs.

Chapter III

Procedures

Introduction

The purpose of this exploratory study was to determine the percentage of NYS RD/RDNs who are currently utilizing IFM within their dietetic practice as well as which IFM therapeutic modalities they are recommending within their dietetic practice. Furthermore, the study sought to identify information sources used by those who are currently practicing IFM and the perceived barriers of those who have chosen not to adopt IFM into their dietetics practice. A self-designed questionnaire was implemented to survey and obtain information regarding these variables.

Setting

This study took place in NYS. The questionnaires were completed online by RD/RDNs at a convenient location. Each survey was then sent electronically to the researcher for analysis.

Population and Sample

The target population included RD/RDNs practicing dietetics in various professional environments within NYS. A total target sample of 50 or more participants was anticipated out of NYSAND's current 5,000 plus members, which includes ten district associations of professionals working, attending school, and residing in NYS. All surveys submitted were used in the sample as long as they were complete and met inclusion criteria. To recruit participants within the target population, all RD/RDNs practicing as members of NYSAND were invited to participate in this study via an email

sent by NYSAND. Participants who did not answer all appropriate questions were excluded from the study as clarified in the treatment of data. Also excluded were those NYS RD/RDNs working solely in food/nutrition service management positions.

Data Collection Methods

Full approval to conduct this study was obtained from the Institutional Review Board (IRB) at D'Youville College (Appendix C) before the study was conducted. Once approval was received from the IRB, NYSAND was contacted to receive approval for the study's questionnaire to be sent out to all registered members of the association (Appendix D). Once approval was obtained from all appropriate parties, the research for this study was initiated. The researcher constructed a questionnaire consisting of closed-ended questions. The questionnaire can be found in Appendix A. Pilot testing was administered using a group of three registered dietitians who were not included in the list of RD/RDNs sent the email via NYSAND. The results from pilot testing provided further insight into the clarity and readability of the questionnaire. The pilot test form can be found in Appendix E. After pilot testing, appropriate changes were made to the questionnaire, which was then formatted for use on Survey Monkey for further electronic distribution.

All NYS RD/RDNs were informed of the study via email, which was sent by NYSAND using their current member listserve. The prospective participants were informed of the purpose of the study and were provided with a link to the questionnaire via Survey Monkey. A copy of this email can be found in Appendix F. A cover letter was also provided, which included all components of implied consent, subjects' rights, ability

to withdraw, and instructions for the questionnaire (Appendix G). The survey (Appendix A) was open for a total of 10 days. The email was sent to association members requesting participation on the first day. On the third and ninth days, a reminder email was sent (Appendix H). On the 10th day, the survey closed at midnight EST. The questionnaire data were collected anonymously and all data were stored anonymously.

Human Rights Protection

Permission to conduct this study was obtained from the IRB at D'Youville College (Appendix C) and NYSAND (Appendix D). Prior to questionnaire completion, subjects were informed that the purpose of the study was to explore NYS RD/RDNs' use of IFM. Participation was completely voluntary and anonymous. The subjects' rights and implied consent were stated (Appendix G).

The study required implied consent because there was no identifying demographic information within the survey, there was no contact between researcher and participant, and the surveys were distributed by a third party. Furthermore, the surveys were unmarked and unsigned by participants in order to maintain anonymity. Participants were also informed that completing and returning the questionnaires implied their consent and that, due to the anonymity of the questionnaires, they would be unable to withdraw from the study following submission (Appendix G). Subjects could discontinue taking the questionnaire by exiting the website at any time before completion, which would indicate that they had withdrawn from the study. Furthermore, participants were not subjected to physical or psychological harm and were not coerced to participate in the study.

Participants were informed that the summary of results of the study would be provided via the NYSAND listserve and also available in the D'Youville College Library.

Tool

This study used a researcher-designed questionnaire to measure multiple variables related to NYS RD/RDN use of IFM. An online questionnaire of 12 questions was created via Survey Monkey, which offered the advantages of low cost, simplicity of use, and time efficiency (Dillman et al., 2014).

A pilot study was used to test the reliability of the tool. A structured feedback form was used to establish the content validity of the researcher-designed questionnaire. The questionnaire was modified as needed based on feedback results prior to distribution to subjects.

Treatment of Data

Once all surveys were collected from the 10-day survey period, those that did not identify as a member of the target population were excluded from the data sample and discarded as determined by answers to question 1 (*no*; meaning not a RD/RDN practicing in NYS) and 4 (*solely working in food/nutrition service management*). Those that were incomplete were also excluded from the data sample and discarded. For the purpose of this study *incomplete* was defined in several ways: (a) any survey in which questions 1-6 were not answered, (b) any survey in which questions 1-6 were answered with the answer *never* for question 6, but question 7 was not answered, and (c) any survey in which questions 1-6 were answered with the answer *always, very often, fairly often, sometimes, or almost never* for question 6, but questions 8-12 were not answered.

The survey sample was described using frequencies and percentages of respondents in the following categories: years working as a NYS RD/RDN, current dietetics practice area, and current age range. The answers for these questions were either categorical or nominal.

Research question 1. Question 6 in the survey answered the first research question: "What percentage of New York State Registered Dietitians and Registered Dietitian Nutritionists are recommending integrative and functional medicine therapeutic modalities in their practice?" This question was scored using ordinal frequencies. Only one answer was to be selected, with the answers *always, very often, fairly often, sometimes, and almost never, and never,* followed by question 8. The answer *never* was followed by question 7 where this participant was then asked to end the survey. The number of responses for each category was tallied and then presented in a distribution bar graph. Data from this question were then analyzed by using the total number of participants included for the study. Responses were divided by the total number of responses from participants to obtain the percentage of those who chose the same frequency.

Research question 2. Question 8 in the survey answered the research question**:** **"**Which integrative and functional medicine therapeutic modalities are New York State Registered Dietitians and Registered Dietitian Nutritionists recommending within their practice?" This question provided a list of nutrition-related IFM therapeutic modalities and used a frequency scale of *always, very often, fairly often, sometimes, almost never, and never.* Participants were asked to select a frequency for each IFM therapeutic

modality. Data from this question were analyzed by comparing frequency answers for each therapeutic modality. Frequency distribution tables were then created to summarize the distribution of values in the sample.

Research question 3. Questions 9-12 in the survey were used to answer the research question: "Of those New York State Registered Dietitians and Registered Dietitian Nutritionists who are recommending integrative and functional medicine therapeutic modalities, what are their sources of information regarding integrative and functional medicine?" Question 10 directly answered the research question and asked participants to select all categorical answers that represented their most used sources for information on IFM. Question 9 asked whether the participants had received any training concerning IFM in order to gain further insight into the research question. Participants were asked to select all categorical answers that applied to them. Questions 9 and 10 were asked to reflect their opinions on reliability of IFM information and further needed information. Question 12 asked whether they believe enough reliable information sources exist for IFM, and they were asked to select from categorical answers *yes* or *no.* The frequencies for each answer were collected among the entire sample data set and then converted to percentages. Percentages were then placed in a table to show a comparison between answers. Question 11 asked participants which IFM therapeutic modalities they would like more information on for further integration into their dietetic practice setting. Participants were asked to select all that applied to them. Data collected from questions 9, 10, and 11 were collected and presented in a distribution bar graph to show frequency breakouts.

Research question 4. Question 7 in the survey answered the research question: "Of those New York State Registered Dietitians and Registered Dietitian Nutritionists who are not recommending integrative and functional medicine therapeutic modalities, what are their reasons for not doing so?" Participants were asked to select all categorical answers that were relevant to them. Tallied responses for each answer choice were collected. Frequency data from this question were converted to percentages of the entire data sample and presented in a distribution bar graph.

Summary

The purpose of this study was to determine the percentage of NYS RD/RDNs who are currently utilizing IFM within their dietetics practice. The study also aimed to identify which IFM therapeutic modalities are being recommended by NYS RD/RDNs in current practice. Furthermore, the study sought to identify informational sources used by those who are currently practicing IFM as well as the perceived barriers of those who have chosen not to adopt IFM into their dietetics practice. The research design of this study employed the survey method. Data collection took place online by NYS RD/RDNs at convenient locations. NYS RD/RDNs were contacted through by NYSAND through a member listserve. Any survey returned that did not fit into the inclusion criteria were discarded. A total target sample of 50 participants was anticipated. After approval from D'Youville College's IRB and NYSAND, the questionnaire was distributed via listserve. NYS RD/RDNs were advised that their participation was voluntary and also anonymous. The NYS RD/RDNs were also informed that once the questionnaire was returned, the

researcher assumed consent from that participant. The questionnaire was analyzed using descriptive statistics.

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Chapter IV

Article Manuscript

Integrative and Functional Medicine Practice Among New York State Registered Dietitians and Registered Dietitian Nutritionists

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ABSTRACT

Background In the United States (U.S.), there has been an increase in interest and use of complementary health approaches among the general public (1). Consequently, there has been an increase in the practice of integrative medicine within various healthcare settings (2).

Objective The purpose of this study was to explore the percentage of New York State (NYS) registered dietitians/registered dietitian nutritionists (RD/RDNs) who are currently utilizing integrative and functional medicine (IFM) in their dietetics practice. Furthermore, the study explored which IFM therapeutic modalities are being recommended by NYS RD/RDNs in current practice and what informational sources they are using. Additionally, the study aimed to identify RD/RDN-perceived barriers to adopting IFM in dietetics practice.

Design The study used a researcher-designed questionnaire on Survey Monkey. Prospective participants were informed of the purpose of the study via an email listserve and were provided with a link to the questionnaire. All responders to the survey remained anonymous. The survey was sent out via two NYS dietetic associations. The first survey

was sent out via the New York State Academy of Nutrition and Dietetics (NYSAND) for 10 days. Due to a low response rate and inability to send out a reminder email, the survey was then emailed out by the Western New York Dietetic Association (WNYDA) for 10 more days.

Sample/Setting Participants in the survey included RD/RDNs, who were members of NYSAND and WNYDA, practicing in various professional environments within NYS. The population was accessed via email listserve within NYSAND and WNYDA. Participants were able to access the survey at a location of their convenience. The survey remained open for 10 days via each association. All participants' information and data remained anonymous.

Statistical Analysis Anonymous data were collected and analyzed using statistical percentages and frequencies. Analyzed data were then summarized in distribution tables and bar graphs to show frequency breakouts among the data set.

Results A total of 36 surveys met inclusion criteria once data collection was completed. It was observed that the majority of respondents use IFM to varying degrees. The main reason for not using IFM was identified as not having received adequate training in IFM. The main therapeutic modalities used among those that do practice IFM include nutrition supplements and/or minerals and therapeutic elimination diets. Additionally, those that do practice IFM received training mostly from dietetic program courses or not at all. Their information sources included peer reviewed journals, association websites and newsletters, and webinars/conference sessions. Most respondents did not believe that enough reliable information sources exist for IFM. Respondents also showed the most

interest in increased information for nutrition supplements and/or minerals, botanical medicine, and nutritional genomics.

Conclusions NYS RD/RDNs are using IFM within their dietetic practice by using various therapeutic modalities, but many have not received training in this subject. Thus, due to a rise in the use of IFM among patients, an increase in research and integration of IFM into dietetics curriculum is needed in order to better prepare dietitians for the changing landscape of healthcare practice.

INTRODUCTION

As IFM use among the general public has continued to trend positively, it is important to explore the use and knowledge of IFM among NYS registered dietitians to ensure relevance within the profession (3). Integrative medicine is defined as a practice of whole-person medical therapy that supports the patient-practitioner relationship while utilizing all appropriate conventional and complementary and alternative medicine (CAM) therapies (4). Functional medicine is a patient-centered and comprehensive practice that is grounded in science and clinical medicine, with the primary aim of preventing chronic disease (4). Generally, when using IFM, healthcare practitioners advocate a more holistic approach to patient health and healing while also supporting the patient-practitioner relationship. More specifically, IFM is used in healthcare to determine the underlying problem of a disease or illness, which is then used to create a complete and individualized treatment plan for patients.

Since an increase in the general use of complementary health approaches has been recognized, healthcare practitioners, including RD/RDNs, may need to focus their

practice on appropriate IFM therapeutic modalities. Moreover, dietetics professionals may find that their patients wish to include IFM therapeutic modalities within their disease treatment plans. Dietary supplements and minerals, herbal botanicals, nutritional genomics, detoxification programs, and therapeutic food elimination programs are IFM modalities that may be used by registered dietitians to ensure appropriate nutrition intervention (5). To ensure safe recommendations and use of nutritional products, increased education within programs approved by the Accreditation Council for Education in Nutrition and Dietetics (ACEND) may be necessary.

Identification of the specific IFM therapeutic modalities being recommended by RD/RDNs, as well as the sources of their IFM information, is important. In turn, this may be influential to Academy-accredited dietetic programs while they consider voluntarily adopting the IFM standards and competencies in ACEND's new 2015 Recommended Model for Future Education (6). In order to ensure healthcare safety and professional integrity within the dietetics field, accrediting organizations may need to increase core curriculum of IFM to ensure that dietetic professionals are receiving the most complete education for future practice.

METHODS

After obtaining approval from the Institutional Review Board (IRB) of D'Youville College, formal approval to collect data was obtained from NYSAND. Pilot testing was then conducted using a group of four registered dietitians, and appropriate changes to the Survey Monkey questionnaire were made. The survey was emailed to the NYSAND member listserve within their April 2016 newsletter. Four responses were

collected and the survey remained open for ten days. Due to the low response rate, WNYDA was then contacted and approval was obtained to have them send out a survey email blast to their member listserve. The survey remained open on Survey Monkey for another 10 days. No reminder emails were sent out as previously planned in the study methods.

The email sent contained a cover letter with a link to the Survey Monkey survey. Once participants opened the link, they were then directed to the consent page, which restated the purpose of the study and allowed them the opportunity to either continue with the survey or exit before submission. By clicking "next", the participants confirmed that they had read the form and had decided to participate in the study. Implied consent was obtained once the participants accessed the provided survey link. To maintain absolute anonymity, the participants did not provide identifiable information. Once complete, results from this study were made available to NYSAND and WNYDA as well as the D'Youville College library.

This study used a researcher-designed questionnaire to measure multiple variables related to NYS RD/RDN use of IFM. An online questionnaire of 12 questions was created via Survey Monkey. A pilot study was used to test the reliability of the tool and a structured feedback form was used to establish the content validity of the researcher-designed questionnaire. The questionnaire was modified as needed based on feedback results prior to distribution to subjects.

Treatment of Data

Once all data were collected, descriptive statistics were utilized to obtain percentages and frequencies for each survey question. Surveys that were not completed were excluded from the data set. Skip logic was utilized in the Survey Monkey questionnaire to assist in sorting data. Specifically, if participants answered *no* (meaning not a RD/RDN practicing in NYS), they were directed to the end of the survey where they would then submit and exit the survey. If respondents answered *solely working in food/nutrition service management* to survey question 4, they were manually removed from the data set, since skip logic could not be applied. In order to submit the questionnaire on Survey Monkey, all appropriate questions must have been answered.

The survey sample was described using frequencies and percentages of respondents in the following categories: years working as a NYS RD/RDN, current dietetics practice area, and current age range. The answers for these questions were either categorical or nominal.

The first research question, "What percentage of New York State Registered Dietitians and Registered Dietitian Nutritionists are recommending integrative and functional medicine therapeutic modalities in their practice?", was answered using ordinal frequencies and presented in a figure bar graph. The second research question**,** **"**Which integrative and functional medicine therapeutic modalities are New York State Registered Dietitians and Registered Dietitian Nutritionists recommending within their practice?", was analyzed using ordinal frequencies and displayed in a table. Each therapeutic modality was analyzed separately. The third research question, "Of those

New York State Registered Dietitians and Registered Dietitian Nutritionists who are recommending integrative and functional medicine therapeutic modalities, what are their sources of information regarding integrative and functional medicine?", was analyzed by tallying all responses to determine the frequency distribution via percentages and then presented in a figure bar graph. The fourth research question, "Of those New York State Registered Dietitians and Registered Dietitian Nutritionists who are not recommending integrative and functional medicine therapeutic modalities, what are their reasons for not doing so?", was also analyzed by tallying all responses to determine the frequency distribution via percentages and then displayed in a figure bar graph to express break out sets among the data.

RESULTS

Between both association member email listserves, 41 total survey responses were received. Of the surveys received, five were identified as not meeting inclusion criteria, which included four incomplete surveys and one with *Food/Nutrition Service Management* as the sole dietetic practice area. All data not meeting inclusion criteria were removed from the data set appropriately. Demographic data (Table 1) revealed that the majority of the RD/RDNs who responded currently practice dietetics in *Western New York* (79%) and *Genesee* (7%) dietetic association districts. Three percent of participants identified as practicing in *Central NY*, *Greater NY*, *Mohawk Regional*, and *Southern Tier* districts. Of the RD/ RDNs participating, most identified that they have been practicing dietetics for more then five years (64%) (Table 2). Age ranges of the participants varied (Table 2), with the majority of RD/RDNs within the 25-34 year age range (24%),

followed by the 35-44 year age range (20%). Multiple practice areas were identified (Table 1), with the majority practicing in *consultation/private practice* (19%), *community nutrition* (17%), *long-term care* (13%), and *other* (13%). *Other* (13%) practice areas identified included, eating disorder clinic, assisted living facility, sports nutrition, integrative/holistic nutrition, education, and education (higher).

Upon asking whether the participants use IFM and/or have recommended IFM therapeutic modalities to patients in their practice setting (Figure 2), most (44%) indicated that they *never* use or recommend IFM, the second most *sometimes* do (20%), and the third most (24%) indicated that they *always* or *very often* do. Participants who identified that they *never* use/or recommend IFM modalities further identified their main reason for making this decision (Figure 3) was that they *have not received adequate training* (73%). *Other* (18%) reasons for never using IFM were identified as not being a clinical dietitian or it not being a part of their work.

Most IFM practicing respondents further indicated (Table 3) that they *sometimes*, *fairly often*, *very often*, or *always* use/recommend nutrition supplements and/or minerals (78%) followed by therapeutic elimination (57%), which therefore represent the most widely used and/or recommended in dietetic practice settings. Respondents also indicated that they mostly *never* or *almost never* use/recommend nutritional genomics (93%), detoxification programs (71%), or botanical medicines (64%), which therefore represent the least widely used and/or recommended in dietetic practice settings. Additionally, other modalities identified as being used *sometimes and very often* (14%) included mindful eating practices, trace elements, and OTC supplements.

Most participants identified that they *have not received training concerning IFM* (30%) even though they are currently practicing it (Figure 4). The most common sources identified by those that have received training included mostly *courses with dietetics program* (25%) followed by *webinars concerning IFM therapies* (20%). *Other* (10%) responses were further clarified as personal research and on the job training, webinars from Dietitian Central, and workshops sponsored by DIFM practice group and national and state conferences/conventions. Furthermore, the sources used most frequently for information concerning IFM were identified by participants (Figure 5) as *peer reviewed journals* (27%) followed by *association websites/newsletters* (22%) and *webinars/conference sessions* (20%). *Other* (2%) information sources used was identified as https://www.functionalmedicine.org. Additionally, most respondents indicated that they do not believe enough reliable information sources exist for IFM (64%). Respondents would also like more information on mostly nutrition supplements and/or minerals (30%) and botanical medicines (24%), followed closely by nutritional genomics (21%) and therapeutic elimination diets (18%).

DISCUSSION

Previous studies have examined the adoption and perception of CAM among healthcare professionals (7-11). A nationwide survey designed by members of the Dietitians in Integrative and Functional Medicine (DIFM) Dietetic Practice Group (DPG) and the Dietetics Practice Based Research Network (DPBRN) Oversight Committee (7) concluded that student and professional dietitians showed strong interest in professional education on integrative medicine (IM) topics (72.5%) as well as disease-specific

etiology-driven use of dietary supplements (87.4%). Furthermore, Augustine et al. (7) found that respondents were most likely to be willing to recommend vitamin and mineral supplements (71.7%) and least likely to recommended detox (12.1%). This current study had similar observations as the Augustine et al. (7) study in that, of the RD/RDNs who did identify as recommending IFM modalities in their practice, the majority recommended nutrition supplements/ minerals and therapeutic elimination diets. Moreover, the modalities least likely to be recommended were identified as nutritional genomics, followed by detoxification programs and botanical medicines. Additionally, respondents who identified as using and/or recommending IFM modalities all responded that they would like to receive more information on nutrition supplements and/or minerals, followed by botanical medicines and nutritional genomics; while therapeutic elimination diets and detoxification programs received the least amount of interest for further integration in their dietetic practice setting.

Results from this current survey identified that the main barrier for not incorporating IFM into dietetics practice was that adequate training on IFM was not received. A relatable study conducted by Yurtseven et al. (8), concluded that CAM modalities should be integrated into Turkish medical schools due to the positive attitudes, yet limited knowledge, of medical students concerning CAM therapies. Furthermore, the 2016 study conducted by DIFM and the DPBRN oversight committee (7) suggested that expanding dietetics education to include IM modalities, would result in dietitians that are better suited to take the lead in the topic versus other healthcare professionals. Other studies (9) have shown that increased education within dietetic programs may also result

in future RD/RDNs that are better prepared to work with populations that have an increased desire for IFM healthcare practitioners.

A 2001 survey (10) of alternative health care education in dietetic training programs identified the need to include training on dietary and herbal supplements in undergraduate, dietetic internship, and CPE programs. Similarly, Wahner-Roedler et al. (11) concluded that their results suggested a need to ensure the integration of CAM/integrative medicine topics into medical school and residency education programs due to the continuing demand from patients to access CAM services. Results from this current study support the suggestion by Wahner-Roedler et al. (11). It was found that the majority of the RD/RDNs who acknowledged that they do not use/recommend IFM in dietetic practice reasoned that they have not received adequate training concerning IFM. The majority or respondents that acknowledged that they do use/recommend IFM in dietetic practice also identified that they have not received training concerning IFM. Training sources that were identified by respondents using/recommending IFM varied including courses within dietetics programs and webinars concerning IFM therapies. The names of the programs used and/or attended were not specified in this study.

According to Augustine et al. (7), the perception of integrative and functional medicine may vary as the terminology surrounding this area continues to evolve. This may result in limited available information sources where more can be learned concerning IFM. Correspondingly, results from this current study show that peer reviewed journals and association websites/newsletters are the most frequently used information sources for IFM, which may be due to those sources being constantly

updated with new, science-based information.

As the percent of RD/RDNs using IFM was determined to be limited in the current study mostly due to inadequate training in the subject, it might be inferred that further data need to be gathered to increase the evidence behind IFM practices and modalities and RDNs' role in managing these treatments for further integration into dietetic curriculum. Moreover, in accordance with conclusions from other studies (9), as IFM use among the general public has continued to trend positively, it is important to explore the use and knowledge of IFM among registered dietitians to ensure relevance within the profession.

Limitations. There are several limitations for this study. The survey response rate was limited when trying to access all of NYS. Therefore, the majority of the data was collected from one district dietetic association and cannot be generalized to all of NYS. Due to the small sample size, these results did not represent a variety of RD/RDNs practicing within various dietetic settings and districts within NYS. Additionally, the questionnaire used in this study was researcher-developed and used self-reported data. Consequently, validity and reliability of the results were not established.

CONCLUSION

Additional data need to be gathered to increase the evidence behind all IFM practices and modalities as well as RDNs' role in managing these treatments for further integration into dietetic curriculum. Furthermore, by addressing the barrier of inadequate training in IFM by increasing dietitian preparation in specific IFM therapeutic modalities, dietitians may be better prepared to work within the progressing field of IFM, while also

ensuring safety and professional integrity within the dietetic profession. Moreover, by increasing the study of specific IFM therapeutic modalities, the number of reliable information sources may be increased to better ensure relevancy of IFM use within dietetics.

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Table 1. Respondent District and Practice Areas (*n* = 25)

NYS District	**n (%)**
Central NY	1 (3)
Genesee	2 (7)
Greater NY	1 (3)
Hudson Valley	0 (0)
Long Island	0 (0)
Mid-Hudson	0 (0)
Mohawk Regional	1 (3)
Southern Tier	1 (3)
Westchester Rockland	0 (0)
Western NY	23 (79)
Practice Area	
Business/Industry	0 (0)
Clinical nutrition, general	4 (8)
Community Nutrition	8 (17)
Communication/Publication	1 (2)
Consultation/Private practice	9 (19)
Diabetes Care	1 (2)
Education	4 (8)
Food/Nutrition service management	2 (4)
Gerontology	1 (2)
Hunger/Environmental	0 (0)
Long-term Care	6 (13)
Nutrition Support	0 (0)
Oncology	0 (0)
Pediatric nutrition	4 (8)
Policy/Advocacy	0 (0)
Renal Nutrition	1 (2)
Research	1 (2)
Other	6 (13)

Table 2. Respondent Years in Practice and Age Range (*n* = 25)

Years in Practice	**n (%)**
Less than 6 months	1 (4)
6 months to less than 1 year	2 (8)
1 year to less than 3 years	3 (12)
3 to 5 years	3 (12)
More than 5 years	16 (64)
Age Range	
18-24	3 (12)
25-34	6 (24)
35-44	5 (20)
45-54	4 (16)
55-64	4 (16)
65 or older	3 (12)

Table 3. Use and Recommendation of IFM Therapeutic Modalities in Dietetic Practice Setting (n = 14)

	n (%)					
IFM Therapeutic Modality	**Never**	**Almost Never**	**Sometimes**	**Fairly Often**	**Very Often**	**Always**
Nutrition Supplements and/or Minerals	2 (14)	1 (7)	3 (21)	3 (21)	4 (29)	1 (7)
Botanical Medicines	9 (64)	0 (0)	3 (21)	0 (0)	2 (14)	0 (0)
Therapeutic Elimination Diets	3 (21)	3 (21)	4 (29)	1 (7)	3 (21)	0 (0)
Nutritional Genomics	9 (64)	4 (29)	0 (0)	0 (0)	1 (7)	0 (0)
Detoxification Programs	9 (64)	1 (7)	1 (7)	1 (7)	1 (7)	1 (7)
Other (Please Specify)	12 (86)	0 (0)	1 (7)	0 (0)	1 (7)	0 (0)

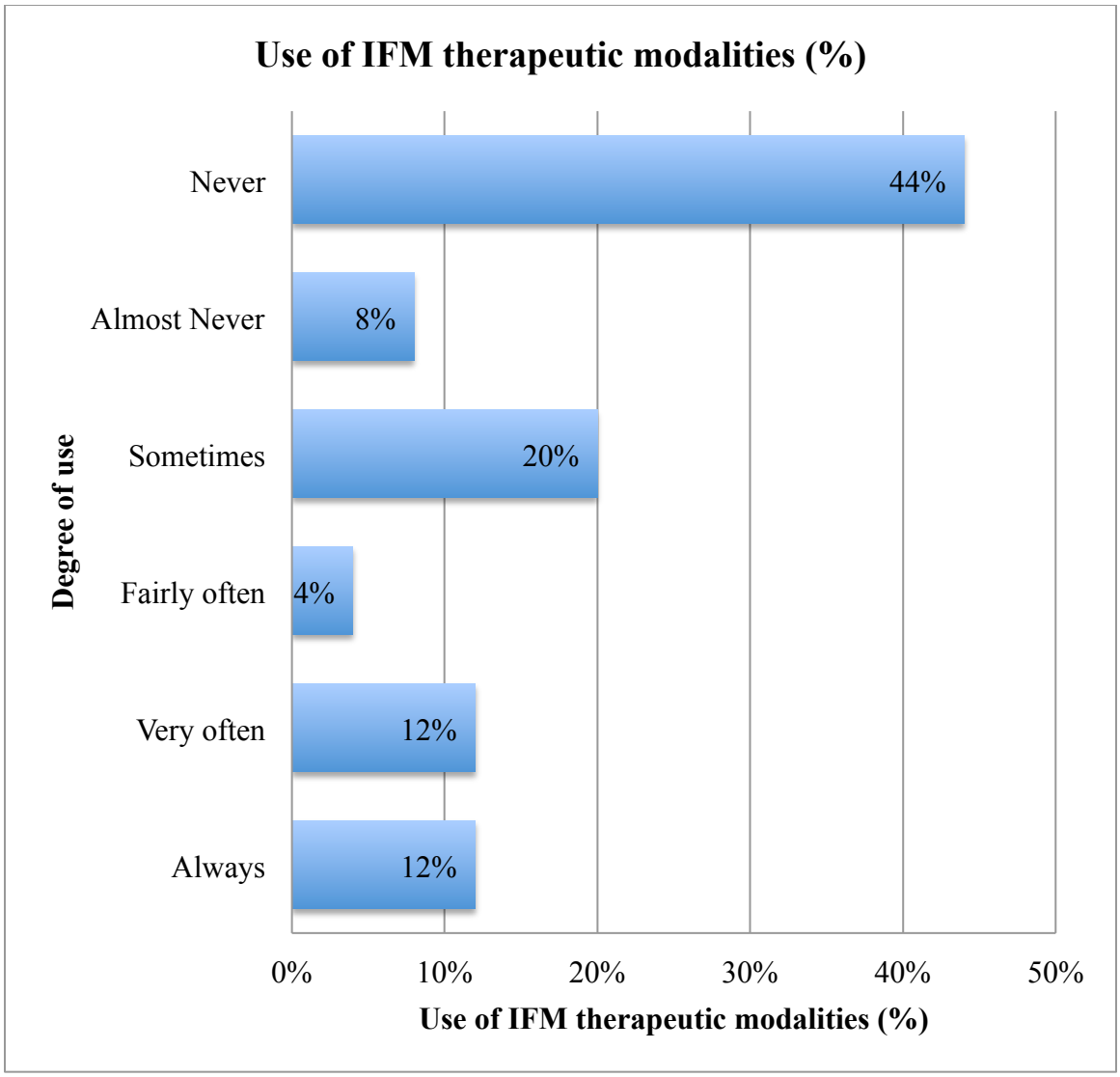

Figure 2. Use of IFM and/or Recommendation of IFM Therapeutic Modalities to Patients in Dietetic Practice Setting.

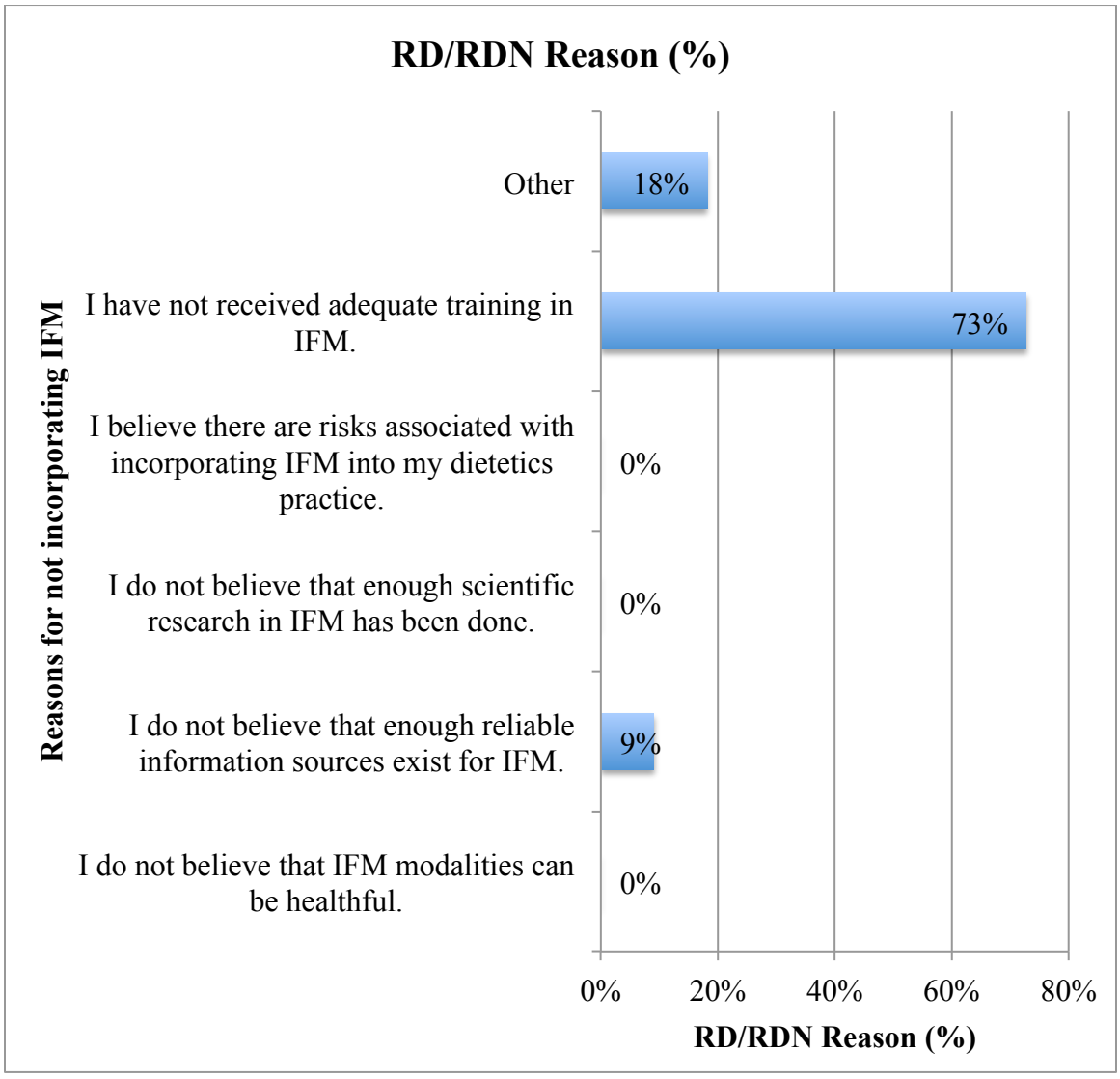

Figure 3. Reasons for Not Incorporating IFM in Dietetic Practice

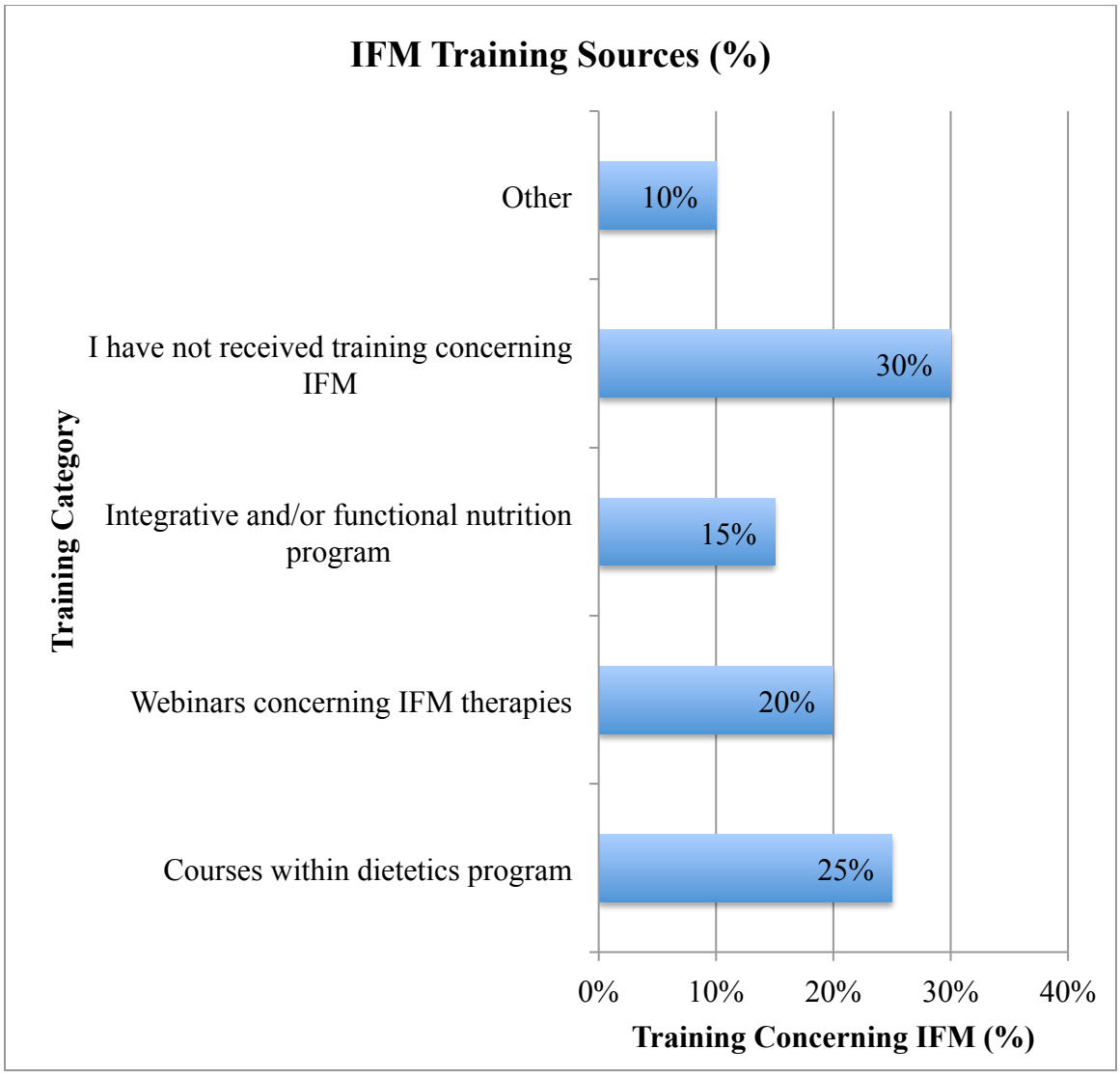

Figure 4. Training Sources Used for IFM

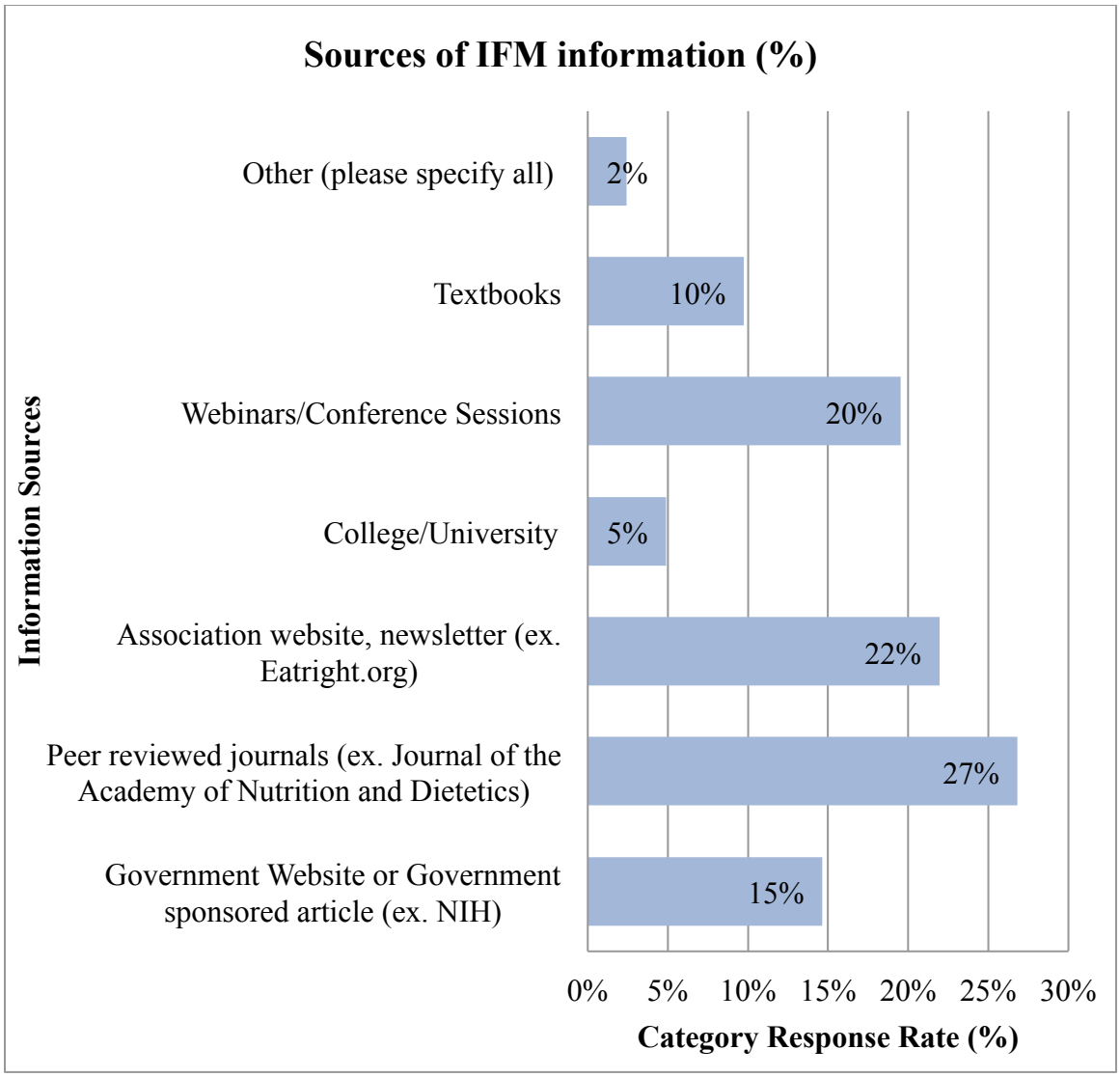

Figure 5. Sources Used Most Frequently for Information on IFM

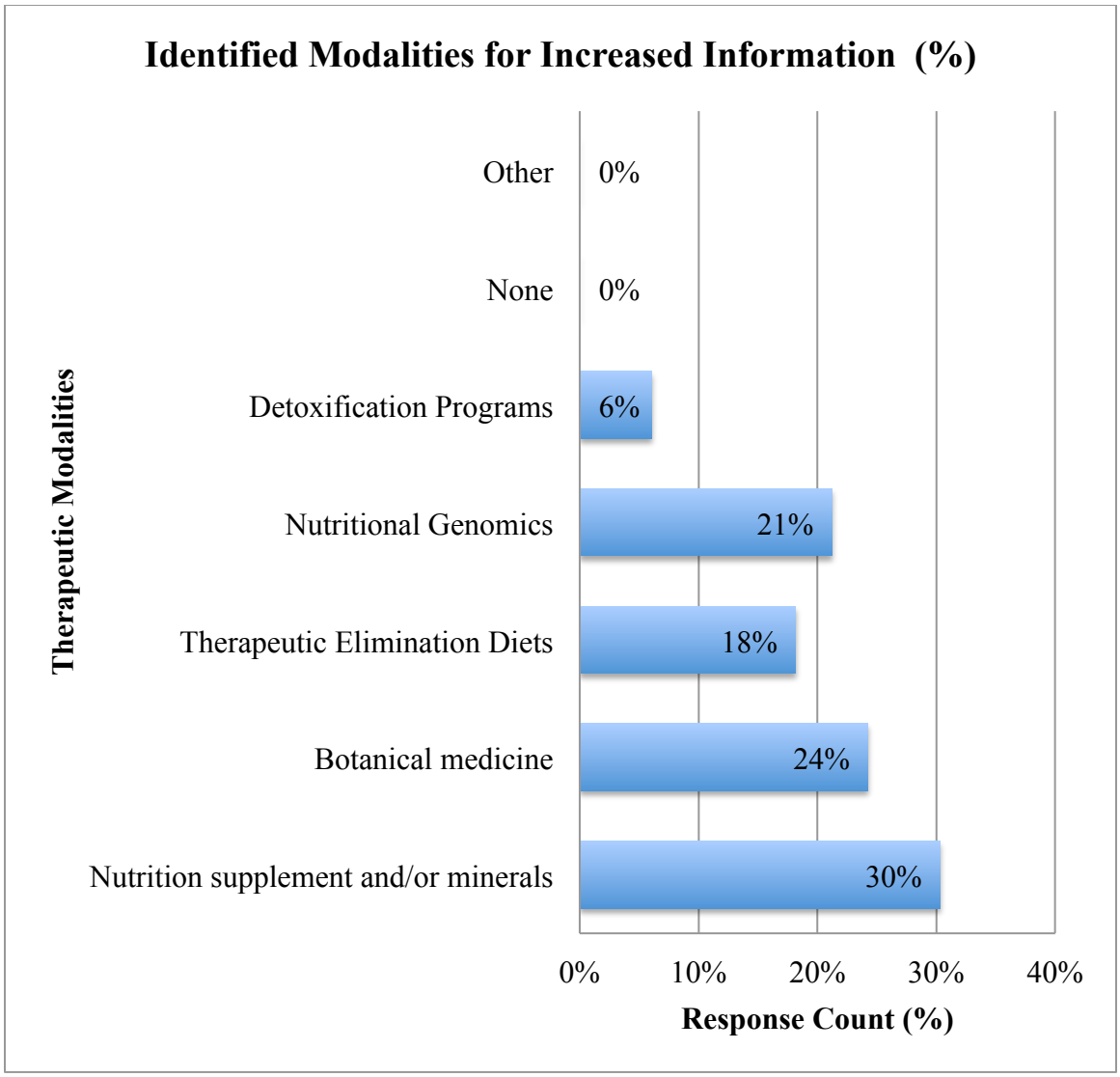

Figure 6. IFM Therapeutic Modalities RD/RDNs Would Like More Information on for Further Integration into Dietetic Practice

Appendix A

Data Collection Tool

1. Are you a New York State (NYS) registered dietitian (RD) or registered dietitian nutritionist (RDN) practicing in New York State (NYS)?
- No
- Yes

2. Which NYSAND association districts do you currently practice in? (**Please select all that apply)**
- Central NY
- Genesee
- Greater NY
- Hudson Valley
- Long Island
- Mid-Hudson
- Mohawk Regional
- Southern Tier
- Westchester Rockland
- Western NY

3. For how many years have you been practicing as a RD/RDN?
- Less than 6 months
- 6 months to less than 1 year
- 1 year to less than 3 years
- 3 to 5 years
- More than 5 years

4. What is your age range?
- <18
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65 or older

5. In what dietetic practice area(s) do you currently work? (**Please select all that apply)**

- Business/ Industry
- Clinical nutrition, general
- Community nutrition
- Communication/Publication
- Consultation/Private practice
- Diabetes care
- Education

- Food/Nutrition service management
- Gerontology
- Hunger/Environmental
- Long-term care
- Nutrition support
- Oncology
- Pediatric nutrition
- Policy/Advocacy
- Renal nutrition
- Research
- Other (Please Specify)_____

6. I currently use IFM and/or have recommended IFM therapeutic modalities to patients in my dietetic practice setting. (**Please select one)**

- Always (Survey will go to question 6)
- Very often (Survey will go to question 6)
- Fairly often (Survey will go to question 6)
- Sometimes (Survey will go to question 6)
- Almost never (Survey will go to question 6)
- Never **(Survey will go to question 5a. Then exit the survey without answering any further questions)**

7. What are your reasons for not incorporating IFM into your dietetic practice? (**Please select all that apply)**

- I do not believe that IFM modalities can be healthful.
- I do not believe that enough reliable information sources exist for IFM.
- I do not believe that enough scientific research in IFM has been done.
- I believe there are risks associated with incorporating IFM into my dietetics practice.
- I have not received adequate training in IFM.
- Other (**please specify all)**_____

Thank you for your participation!

Krista Cunningham
Dietetics Program
D'Youville College

8. How often do you use or recommend the following IFM therapeutic modalities in your dietetic practice setting? **(Please check one frequency for each therapeutic IFM modality)**

	Never	Almost Never	Sometimes	Fairly Often	Very Often	Always
Nutrition Supplements and/or Minerals						
Botanical Medicines						
Therapeutic Elimination Diets						
Nutritional Genomics						
Detoxification Programs						
Other (Please Specify) _____						

9. Have you received any training concerning IFM? **(Please select all that apply)**
   - Courses within dietetics program (**If yes, please select type of program)**
     - Didactic Program (BS)
     - Coordinated Program (Please indicate BS or MS)_____
     - Internship (Please indicate BS or MS)_____
     - Individualized Supervised Practice Pathways (ISPP)
     - Other (please specify) _____
   - Webinars concerning IFM therapies
   - Integrative and/or functional nutrition program **(please specify)**

     _____
   - Other **(please specify)**

     _____

10. What sources do you use most frequently use for information on IFM? **(Please select all that apply)**
    - Government Website or Government sponsored article (ex. NIH)
    - Peer reviewed journals (ex. Journal of the Academy of Nutrition and Dietetics)
    - Association website, newsletter (ex. Eatright.org)
    - College/University Course
    - Webinars/Conference Sessions
    - Textbooks
    - Other **(please specify)**

      _____

11. Which IFM therapeutic modalities would you like more information on for further integration into your dietetic practice setting? **(Please select all that apply)**

- Nutrition supplements and/or minerals
- Botanical Medicine
- Therapeutic Elimination Diets
- Nutritional Genomics
- Detoxification Programs
- Other **(please specify)**_____
- None

12. Do you believe that enough reliable information sources exist for IFM? (**Please select one)**

- Yes
- No

Thank you for your participation!

Krista Cunningham
Dietetics Program
D'Youville College

Appendix B

Permission to use IFM Nutrition Therapy Radial

Kathie DIFM [swiftdifm@gmail.com] Actions

To: Cunningham, Krista

Thursday, November 12, 2015 4:12 PM

You forwarded this message on 11/12/2015 4:20 PM.

Absolutely Krista!
Wishing you much success in your professional endeavors!
Kathie

Sent from my iPhone

Appendix C

IRB Full Approval Letter

D'Youville COLLEGE
320 Porter Avenue
Buffalo, New York 14201-1084

TO: **Krista Cunningham**

FROM: Dr. Roger Fiedler RCF/EB
Institutional Review Board

DATE: March 24, 2016

SUBJECT: **IRB FULL APPROVAL**

I am pleased to inform you that your application to the D'Youville College Institutional Review Board entitled: *"Integrative and Functional Medicine Practice Among New York State Registered Dietitian Nutritionists"* has been granted **FULL APPROVAL** with respect to the protection of human subjects. This means that you may now begin your research unless you must first apply to the IRB at the institution where you plan to conduct the research.

Please note that you are required to report back to this IRB for further review of your research should any of the following occur:

1. a major change in the method of data collection
2. unanticipated adverse effects on the human subjects
3. unanticipated difficulties in obtaining informed consent or maintaining confidentiality
4. the research has not been completed one year from the date of this letter

Congratulations and good luck on your research!

eb

cc: Director of Graduate Studies
Dr. Charlotte Baumgart
file

(716) 829.8000
fax: (716) 829.7790

Appendix D

NYSAND Approval Letter

Hi Christa,

I am writing to inform you that we will distribute your survey to NYSAND members via our April monthly newsletter. Please send the link to the survey and the paragraph to be included in the newsletter, as soon as possible.

Thank you,

Becky Miller
Executive Director
New York State Academy of Nutrition and Dietetics
1450 Western Avenue, Suite 101
Albany, New York 12203
Phone: 518-320-7413
Fax: (518) 463-8656
Email: nysand@caphill.com
Website: www.eatrightny.org

Appendix E

Pilot Testing Form

Pilot Test Feedback Form

As a participant in the pilot test of the "Integrative and Functional Medicine Practice Among New York State Registered Dietitians and Registered Dietitian Nutritionists" study, please answer the following questions.

1. Were there any questions too difficult to understand? (If there were, please reference the question number and explain what was confusing.)

2. Did the answer choices seem adequate and appropriate for the purposes of this study?

3. Was the format of the survey easy to follow?

4. Please comment on the length of the survey: did it seem too long or too short for the purpose of this study as you understand it?

5. Any comments, suggestions, or feedback?

Appendix F

Email to Possible Participants

Email for Online Survey

Subject: Integrative and Functional Medicine Use

Dear Registered Dietitians and Registered Dietitian Nutritionists:

You are invited to participate in a survey on integrative and functional medicine practice among New York State Registered Dietitians and Registered Dietitian Nutritionists, conducted by Krista Cunningham, a graduate student in the dietetics department at D'Youville College for her master's thesis.

This survey will take approximately 10 minutes to complete and all information you provide with remain anonymous.

If you would like to participate, please click on the survey link within this email:

Thank you in advance for your time.

ADVISOR
Charlotte Baumgart, PhD, RD, CDN
Faculty Thesis Advisor
baumgartc@dyc.edu
(716) 829-7752

INVESTIGATOR
Krista Cunningham
D'Youville College dietetics student
cunnik28@dyc.edu
(386)-235-6228

Appendix G

Implied Consent Form

Implied Consent for On-line Survey

Integrative and Functional Medicine Practice Among New York State Registered Dietitians and Registered Dietitian Nutritionists

This study was approved by the D'Youville Institutional Review Board

The purpose of this study is to explore the practice of integrative and functional medicine (IFM) among New York State (NYS) Registered Dietitians and Registered Dietitian Nutritionists (RDN/RDNs). For purposes of this questionnaire, IFM is defined as a systems-oriented practice of whole-person, evidence-based medicine that integrates all appropriate conventional and alternative therapies to achieve optimal health and healing (Jones et al., 2009).

This is an anonymous survey and your participation is voluntary. Your decision whether or not to participate will not affect your future relationship with D'Youville College. Completion of this survey indicates your willingness to participate in the study. There is no penalty or loss of benefits to which you are otherwise entitled if you withdraw from the study or if you choose not to participate. Although the results of this survey may be published, no information that could identify you will be included.

The survey consists of 12 questions and should take 10 minutes to complete. Due to the survey being anonymous, it will not be possible to remove your responses once you have submitted the survey, but you may drop out of the survey by exiting the survey before it is submitted.

If during the course of the study you have questions about the research or your rights as a research subject, you may contact my thesis advisor Dr. Baumgart.

ADVISOR
Charlotte Baumgart, PhD, RD, CDN
baumgartc@dyc.edu
716-829-7752

INVESTIGATOR
Krista Cunningham
cunnik28@dyc.edu
386-235-6228

Thank you for your time.
Sincerely,
Krista Cunningham

D'Youville College Dietetics Department
By clicking "next", I confirm I have read this form and I have agreed to participate in the research study described above. The general purposes, the particulars of involvement, and possible risks and inconveniences of this study have been explained to my satisfaction. I understand that I can discontinue participation any time before the survey has been submitted. [Please feel free to print a copy of this consent form]

Appendix H

Reminder Email

Dear Registered Dietitians and Registered Dietitian Nutritionists:

This is a reminder to complete the online survey regarding RD/RDN's use of integrative and functional medicine if you have not already done so. Please see details about the study and survey listed below.

On **Month/Date at Midnight**, this survey will time out; please make time before then to complete the survey.

I appreciate your participation and will be happy to share the results of the study, excluding specific participant responses. The summary of the study's results will be provided through a NYSAND email and will also be available in the D'Youville College Library.

If you have any questions, please contact my thesis advisor, Charlotte Baumgart, at 716-829-7752 or at baumgartc@dyc.edu. Please do not contact me, the researcher, directly, because this will result in this study no longer remaining anonymous.

Link for questionnaire:

For your information, a statement of implied consent is attached to this email.

Thank you for your time.

Sincerely,
Krista Cunningham

Appendix I

Approval from WNYDA

From: **WNY Dietetic Association** wnyda@eatrightwnyda.org
Subject: Re: Inquiry- Thesis Survey
Date: April 14, 2016 at 10:46 AM
To: Krista Cunningham k2ocunningham@gmail.com

WD

Hello Krista - We can certainly send this out for you. Please send the link and cover letter and I will make sure it gets sent out. Thank you.

On Thu, Apr 14, 2016 at 9:28 AM, Krista Cunningham <k2ocunningham@gmail.com> wrote:

> Good morning,
>
> My name is Krista Cunningham and I am a 5th year Master's of Dietetics student at D'Youville College (DYC) in Buffalo, NY. I am writing to inquire about sending a thesis survey out to members of WNYDA using a Survey Monkey link embedded in an email, which would act as a cover letter.
>
> This thesis is exploring integrative and functional medicine practice among registered dietitians and registered dietitian nutritionists. The simple survey will take approximately less than 10 minutes to complete and all information provided by members would remain anonymous, even to myself as the researcher.
>
> If this is possible to do, please contact me with my information below. Please note, that approval to conduct this study has been obtained from the DYC institutional review board and thesis committee, and would be ready to sent out as soon as permission from WNYDA would be granted.
>
> Questions concerning this thesis can also be directed to my thesis advisor:
>
> Charlotte Baumgart, PhD, RD, CDN
> baumgartc@dyc.edu
> 716-829-7752
>
> Thank you for your time. I look forward to hearing from you.
>
> Regards,
>
> Krista Cunningham
> D'Youville College Dietetics
> cunnik28@dyc.edu
> (386)-235-6228