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Blurred Lines: Emerging Practice for Registered Dietitian-Nutritionists in Integrative and Functional Nutrition

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Abstract

Abstract Background: This study explored the health philosophy and practice orientation of RDNs in the United States. **Methods:** A randomly selected group of RDNs were recruited to take an online survey using a reduced version of Integrative Medicine practice (IM-30). Confirmatory factor analysis, analyses of variance, and non-parametric tests were used to investigate the relationships between dietetic professionals' personal health philosophy, lifestyle, and orientation to Integrative Medicine. **Results:** Overall construct validity of the IM-26 scale was demonstrated by Cronbach's α with reliabilities ranging from .766-.89. Results from chi-square test of goodness-of-fit test ($N = 477$, $\chi^2 = 228.72$, $p = .123$) and RMSEA of .016 showed good model fit. IM orientation varied significantly by work setting and certification in one or more CAM therapies. **Conclusions:** The orientation towards Integrative Medicine for a majority of US dietitians is in the awareness and learning phases of adoption.

Keywords	Integrative and Functional Medicine; Health Philosophy; Wellness, Registered Dietitian Nutritionists; Complementary and Alternative Nutrition
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1. Introduction

The pre-and post-professional education of dietitians has lagged behind popular consumer interest in integrative therapies.¹⁻³ The pace of growth in integrative and functional modalities and their movement into mainstream healthcare is challenging the profession of dietetics to adequately describe the scope of wellness practice of dietitians in health promotion, sports nutrition, and integrative nutrition therapy.⁴⁻⁶ The lifestyle advice offered by dietitians has crossed into areas that reach beyond traditional boundaries, such as mind-body and spiritual well-being.⁷ Critics of the current evidence-base for integrative practice point out gaps in the literature for the efficacy of complementary and alternative medical nutrition therapies for cancer treatment⁸, but others recognize the important role nutrition, physical activity, and mind-body techniques play for alleviating anxiety, depression, pain, and cancer treatment-related side effects.^{9,10} Demonstration of the effectiveness of complementary approaches in gastroenterology

have recently ushered complementary and alternative medicine (CAM) techniques, such as the use of probiotics, and mindfulness meditation, into mainstream practice.^{11,12} Holistic-minded dietitians are adding mental wellness into medical nutrition objectives, rather than merely focusing on nutrient requirements or repletion as primary therapeutic goals.^{13,14} The role of dietitians in physical activity coaching and counseling for sports performance and fitness has also greatly expanded in the last 10 years.¹⁵ Student dietitians today expect to receive training on complementary and alternative approaches and use them in their future practice.¹⁶

Practitioners of integrative medicine view these talents as healing-oriented, but not “alternative” to other forms of medical treatment. Instead, functional and integrative approaches take into account the whole-person through the evaluation of body, mind, spirit, and the support community of the patient as a complement to standard diagnostic evaluations. This patient-centered care approach is based on a philosophy that the patient has a role in making treatment decisions and that the long-range goal is optimal health and healing. Integrative Medicine delivers personalized care, favoring the most effective interventions that are natural or less invasive. Because there is no standardized national system for credentialing practitioners and few academic programs provide pre-professional training, most health professionals must commit to pursuing self-development of integrative medical knowledge and skills. This has led to formal and informal collaboration and resource sharing to develop evidence-based practice and protocols between like-minded health professionals.

In our study, we explored the adoption of integrative dietetic practice as being influenced by health philosophy and daily practice, whether professional or in the personal lifestyles of Registered Dietitian Nutritionists (RDNs). Health conception is a philosophical construct developed by Judith A. Baigis (Smith), RN, PhD as a framework for modeling health and illness

beliefs.¹⁷ Based on this work, Laffrey developed a health concept measurement tool, the Laffrey's Health Conception Scale (LHCS), and upon testing reported a positive association between health "conception" and the practice of health-promoting behaviors.^{17,18} Our prediction was that health philosophy, as defined by the LHCS, was also a determinant for a dietitian choosing an integrative style of practice. The reduced version of Laffrey's Health Conception Scale (LHCS) scale was selected because prior studies found it a reliable instrument to identify one's personal definition of health as wellness or clinically oriented.¹⁹⁻²¹ The Integrative Medicine (IM-30) was selected as a measure of practice, but the scale had not been validated with dietitians. Some revision was needed as one subscale fell outside of the scope of practice of dietitians. This left 4 intact subscales of 2630 of the original questionnaire items. The reduced questionnaire represented various professional practice patterns along a continuum of styles from traditional to integrative medicine practice.^{22,23} The IM-30 questionnaire was developed from qualitative research of a sample which included acupuncturists, chiropractors, and physicians. The original field testing of the IM-30 scale found it to be internally consistent with subscale reliabilities of 0.70 or greater. The subscales include the following: awareness and openness to working with practitioners from other paradigms, readiness to refer patients to other paradigms, learning from alternate paradigms, patient-centered care, and safety of integrative medicine. It has subsequently been used for studies of dentists in India and found to be reliable.²²⁻²⁴ The summed scale or index represents the clinician's orientation toward integrative medicine, and in the physician and dental samples response data was negatively skewed indicating that integrative medicine practice was still in an early phase of adoption among clinicians.^{25,26}

Dietitians who seek and adopt transdisciplinary approaches are motivated by an inner desire to improve patient outcomes. Because their training is primarily acute care or disease prevention

focused, they must seek out opportunities for evidence-based information. Professional competency evolves over-time fostered by mentorship from more experienced practitioners.^{27,28}

The authors hope that the outcomes of this study will be used as a guide for the Accreditation Council for Education in Nutrition and Dietetics (ACEND[®]) and dietetic educators for future revisions of entry-level and advanced practice preparation for integrative and functional nutrition therapy.

2. Methods

A correlational design was used to examine the relationship between health conception and four subscales of the IM-30. The study received exempt status from the Rocky Mountain University of Health Professions institutional review board, as well as a waiver for to substitute an online opt-in consent for the written consent requirement. The Commission on Dietetic Registration (CDR) provided a listing of 5,000 emails which was randomly selected from the registry of 89,300 registered dietitians.²⁹ The effect size of 0.50 was chosen for a medium to large effect of health conception on professional practice^{30,31}. Using G*Power 3 software, the minimum sample was 176 at power = 0.95 (1- β err prob).^{32,33} The response to the email solicitation resulted in 520 complete survey submissions resulting in a response rate of 11%. The flow diagram of survey recruitment and selection is outlined in Figure 1.

[Insert Figure 1]

This paper presents an exploratory study which examined determinants satisfaction with life of US dietitians. We theorized that health philosophy is a motivator for choices in professional practice and lifestyle, and ultimately impacts wellbeing. The Integrative Medicine (IM-30) scale was chosen to measure professional practice patterns along a continuum of traditional to integrative and functional styles of practice.²³ The “safety of integrative medicine subscale” was

not included in this study because it asked for judgements which are outside the scope of practice of dietitians, thus leaving 26 questions and 4 complete subscales²³. The responses for this instrument were primarily a 4 point strongly agree-strongly disagree scale for the “Awareness” and “Readiness” subscales, and a 5 point never-always response for how frequent the participant practiced outside one’s own medical paradigm item. The responses for the “Learning” subscale were evaluated along “Never” to “More than once a week” frequency dimensions. The last subscale, “Patient-Centered Care” used a 5-point response range of “Never” to “Always.” The survey also included demographic questions and items to identify the dietitian’s role identities through additional licenses, certifications, or memberships in dietetic practice groups. The reduced version of Laffrey’s Health Conception Scale (LHCS) scale was used to identify the dietitian’s personal definition of health or health philosophy on a 6 point scale of “Strongly agree” to “Strongly disagree.”²⁰ The Satisfaction with Life Scale (SWLS) captures one’s global assessment of life satisfaction and is a 5 item measure with a 7 point scale of strongly agree-strongly disagree.³⁴ Lastly, Healthy Lifestyles and Personal Control Questionnaire (HLPCQ) is a 25 item measure of lifestyle practices and empowerment with a 4 point scale of “Rarely or never” to “Always.”³⁵

The web-based survey was administered during the month of September 2016 using Qualtrics[©] commercial software.³⁶ The survey remained open for one month with a reminder email sent after 2 weeks to those non-responders. Survey responses were reviewed for opt-in, opt-out, non-completers, duplicate submissions, and those included in the final analysis (Figure 1). Missing data represented fewer than 5%, and depending on the extent of missing responses, either a pairwise deletion of cases, or single imputation of mean substitution was selected.

3. Results

A total of 520 dietitians completed the questionnaire. The number of male dietitians differed from the published figures by the Commission on Dietetic Registration and the Academy of Nutrition and Dietetics (Table 1) with male dietitians representing 4.04% of the study sample. This was marginally greater than the 3.54% published in the Commission on Dietetic Registration listing for 2013, and comparable to the response rate to the AND annual compensation survey^{29,37}. Dietetic practitioners in our sample were more likely to be in a community or public health position than responders to the 2015 AND compensation survey, 42.5% compared to 10%. Some email addresses from the CDR list were blocked by firewalls set up by their employers and returned undelivered. In spite of this, our response rate of 11% was similar to previous convenience sample online surveys for this professional group^{3,38}

[Insert Table 1]

An exploratory factor analysis, with Varimax rotation was reviewed for the Health Conception Scale. Dietitian responses to the health conception scale resulted in three factor loadings of 6.563, 3.326, and 1.519 which explained a total of 71.3% of the total variance: The resulting clinical, functional/adaptive, and a wellness health philosophy dimensions varied from the two factor solution (clinical/wellness) reported by Lusk, et al.²⁰ Replication by other researchers has demonstrated factor invariance across samples.¹⁹ The reliability analysis for the IM-26 suggested that removal of four items from the “Readiness to Practice” subscale would improve the overall scale reliability. The decision to retain these items was supported by a Cronbach’s alpha greater than .70, and the desire to maintain the theoretical integrity of the original instrument. The Integrative Medicine-26 item reduced scale was evaluated by both exploratory and confirmatory factor analysis in both SPSS and AMOS, version 23.^{39,40} The factor loadings

reflected the original subscales for awareness, readiness, learning, and patient centered care obtained from a convenience sample of 295 physicians and acupuncturists with Cronbach's alpha, with reliabilities ranging from .766-.891(Table 2).²³

[Insert Table 2]

The means and SD for the IM-26 subscales, as well as their ranges is found in Table 3. There were no significant differences in integrative medicine practice between groups by level of education. There was a small, negative skew to the IM-26 index measure and two of its subscales, "Awareness" and "Readiness". None of the cases fell outside of the range identified through the outlier labeling technique formula of interquartile range $\pm 2.2*(Q3-Q1)$, therefore the entire sample was used for the analyses.

[Insert Table 3]

There were medium to large zero-order correlations between the latent factors and the IM-26 summed score (Table 4), and these ranged from .261 and .878, indicating good discriminant validity.

[Insert Table 4]

Finally, the latent structure of the IM-26 was evaluated with confirmatory factor analyses (CFAs). Of particular interest was the comparative fit and interpretability of a four-factor use of the Integrative Medicine scale, and to develop a reliable and valid instrument to measure integrative medicine orientation in allied health professionals. This study also examined other goodness-of-fit indices to be sure that they were consistent with reported our previously reported results. The CFA model was estimated using AMOS analytic software using a maximum likelihood estimation.⁴⁰

A confirmatory factor analysis supported the originally derived a priori factor structure of the IM-26 for this geographically diverse sample using an online data collection method. Analyses also demonstrated better internal consistency than in the original analysis. Model fit was assessed using a combination of fit indicators including the χ^2 and χ^2/df ratio, the comparative fit index (CFI), the Tucker–Lewis index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR) as shown in Table 3. Using these indices in combination provides a more comprehensive evaluation of model fit. A χ^2/df ratio less than 3 indicates good fit.⁴¹ In addition, CFI and TLI values were greater than .90, RMSEA values less than .10, and SRMR values less than .08 indicate excellent model fit.^{42,43} The data supports the original factor structure and reliability of the four subscale IM-26 to use as a measure of dietetic practice orientation.

[Insert Table 5]

The original study hypotheses posited relationships between health philosophy, healthy lifestyle and personal control (HLPCQ), IM-26, and life satisfaction. Contrary to our prediction, a linear regression analysis did not support a significant direct effect of the practice of IM on life satisfaction ($b=.192$, $t(519)=.420$, $p=.675$). Table 6 displays the results of subsequent analyses which found a significant but small effect of two of the IM-26 dimensions, Awareness and Patient-Centered Care, predicting a dietitian’s healthy lifestyle behaviors (HPLCQ) ($R^2 = .032$, $F(5,517) = 5.047$, $p<.000$). Together the Awareness and Patient-Centered Care subscales predicted only 3.8% of the variance in healthy lifestyle. As more dietitians fully embrace integrative medicine into their daily practice and lifestyle they may expect a modest positive effect on their personal health behaviors and well-being. Laffrey’s health conception scale was developed as a determinant of a health-promoting lifestyle as measured by another instrument,

the Health Promoting Lifestyle Profile II.⁴⁴ In our study the HLPCQ scale demonstrated a moderate association with satisfaction with life in a group of dietitians during the active career phase of their lives. Although the HLPCQ contains items that addressed routine habits, physical activity, nutrition, interpersonal relations, and stress management, it lacks items for friendship, spirituality, preventive screening, and self-care measures. The questionnaire may be adequate to measure lifestyle in a healthy professional population, but it should be revised for a chronically ill population.

[Insert Table 6]

The IM-26 mean scores were also compared by primary work setting and affiliation with different dietetic practice groups (DPG) (Tables 7 and 8). Due to the small numbers of dietitians in some of the membership categories, the Chi-square test for independence and strength of association was selected to detect the impact of setting and practice group on IM-26 scores. The relation between IM-26 and dietetic practice group membership was significant for Weight Management, ($\chi^2(1, N = 295) = 95.439$, Phi $\phi = .569$, $p < .05$), Hunger and Environmental Nutrition, ($\chi^2(1, N = 295) = 86.94$, Phi $\phi = .543$, $p < .05$), Diabetes Care and Education, ($\chi^2(1, N = 295) = 112.226$, Phi $\phi = .617$, $p < .05$), and Clinical Nutrition Management ($\chi^2(1, N = 295) = 111.67$, Phi $\phi = .615$, $p < .001$). The mean IM-26 score for Hunger and Environmental Nutrition group was significantly greater than the overall mean for RDNs ($p < .05$). A possible explanation for this observation is that high environmental awareness is positively associated with greater CAM use which was reported in a study of college students.⁴⁵ Acute care facility-based outpatient dietitians had a group mean IM-26 score that fell significantly below the overall mean ($n=520$, $\bar{x}=68$, $p < .05$), while the means for both consultant and contract management dietitians were significantly greater mean scores, $n=18$, $\bar{x}=75.2$ and $n=8$, $\bar{x}=72.6$, respectively. The

frequency of respondents from some work settings but their numbers fell below the cell minimum of 5 for use with Chi-Square analytics. A purposive sample from each category of work setting of sufficient size would have given the authors sufficient power to detect a difference. Affiliation with either diabetes, weight management, or clinical managers practice groups had a strong effect on the integrativeness of practice of its members, particularly for consultant dietitians ($\chi^2(1, N = 295) = 91.982$, Phi $\phi = .558$, $p < .05$), and dietitians working for contract food and nutrition management companies, ($\chi^2(1, N = 295) = 111.766$, Phi $\phi = .616$, $p < .001$).

[Insert Tables 7 and 8]

Lastly, a comparison was made between the integrativeness of RDNs with complementary and alternative certifications (CAM) and those with traditional, allopathic certifications (Table 9). Groupwise means were analyzed by Kruskal-Wallis H test, and there were no significant differences. An analysis of variance of the IM-26 dimensions found that the Awareness and Learning subscales were significantly greater in the CAM-certified group, $\bar{x} = 76.25$, 30.81, and 14.19, $p < .05$, respectively. There was no significant difference between groups for the Readiness and Patient-Centered Care subscales (Table 10).

[Insert Tables 9 and 10]

We did not specifically address facilitators and barriers to IM practice in our questionnaire. A literature search identified one qualitative study on patient-centered care in a sample of Canadian acute care dietitians.⁴⁶ The authors identified barriers to shared decision making, such as the hospital environment, insufficient time, unmotivated patients, and low health literacy.⁴⁶ Dietitians' intention to include the use of shared decision making into their practice was influenced by perceived lack of behavioral control, subjective norms, and moral norms for

dietetic practice.^{47,48} Dietitians in non-clinical or management roles had a lower orientation toward complementary approaches to practice as would be expected. Dietitians who were dually-certified in CAM practices were more oriented toward IM for awareness and openness to working with CAM practitioners and learning from these interactions, but less ready to refer to them and practice in a patient-centered care fashion. Lines may be blurred between professional philosophies for allopathic dietetics and those embracing complementary medicine, but medical nutrition therapy has not changed for the majority of US dietitians surveyed. This begs the question, “Are dietitians waiting for acceptance by health regulators and colleagues that determine practice guidelines to embrace these methods?” Future research should evaluate the impact of reimbursement for integrative medicine services, clinical training, patient-centered orientation of colleagues, and organizational barriers on readiness. Included in a framework for setting research for the practice of integrative nutrition therapy should include the availability of professional development opportunities on patient-centered practices, and the presence of workplace sanctions or restrictions on patient-dietitian shared decision making.

4. Discussion

The current study surveyed a random sample of 520 dietitians to explore factors associated with knowledge and/or practices relevant to integrative medicine. A questionnaire based on four existing instruments was administered to respondents to determine life satisfaction, integrative medicine practice and beliefs, personal health lifestyle, and wellness orientation. Additional questions identified individual characteristics, work setting, practice group membership, and evidence based sources for professional development. One of the limitations of this study was the diversity of roles represented in our sample which limited our ability to discriminate integrativeness by practice group and work setting. This study presents a case where random

sampling of participants is not necessarily the optimal choice, but it does allow us to make generalizations about the diffusion of IM within this allied health profession. The survey response was hampered by a registry that included organizational email addresses protected by firewalls blocking solicitations. As this was exploratory research it acts a guide to improve sampling strategy in the future.

Although there was no a priori hypothesis of the effect of setting and practice group affiliation, exploratory analyses suggest setting influences the practice of integrative medicine and the development of competencies new to dietetic practice. A stratified sample of dietitians recruited by work role and practice group should be undertaken in the future to study the impact of choices in professional development and work environment on practice.

Our data supports the conclusion that integrative medicine is in an awareness and learning phase for most RDNs. Transdisciplinary comparisons between US dietitians and dentists in India showed remarkable similarities (Table 11).²⁴ In this study women dentists were more patient-care oriented than men, but the difference was not significant (males, $M = 14.17$; females, $M = 12.56$, $F(1,517) = 3.027$, $p = .082$). Likewise, there was no significant difference between men and women in our sample (males, $M = 10.60$; females, $M = 10.94$, $F(912) p = .340$). To our knowledge no quantitative publication has reported gender differences in the area of medical nutrition practice.

[Insert Table 11]

Qualitative research on the development of interprofessional collaboration expertise has identified professional experience and formal learning activities as facilitators of practice behaviors, which is reflected in our data.⁴⁹ The support of healthcare administrators and medical school administrators is often cited as a barrier to integrative practice, as well as organizational

biomedical culture, provision of evidence-based IM by training physicians, and of the need to address scope of practice for IM methods within position descriptions.⁵⁰⁻⁵³ Study observations support the view that dietitians are generally aware of complementary approaches and are actively engaged in evidence-based professional development in this area. Their current status suggests an attenuated readiness to practice in an integrated manner, and reluctance to use patient-centered medical nutrition therapy approaches. Likely barriers to practice are the lack of integrative and collaborative practice training within the pre-professional curriculum, perception of low efficacy of integrative medical approaches, and the need for evidence-based guidelines by the Academy. The reluctance in readiness to refer to other IM clinicians includes lack of understanding of how their methods fit into the overall treatment plan. The boundary-spanning dietitians certified in alternative paradigms will likely facilitate change in the beliefs, attitudes, and practices of their colleagues.

The Academy of Nutrition and Dietetics should identify best practice for patient-centered medical nutrition therapy in its nutrition care manuals, and support clinical research by dietitians in this area.⁵⁴⁻⁵⁶ Integrative medicine, a paradigm that is wellness and healing oriented, is an early phase of diffusion into mainstream dietetics by both its educators and practitioners. For collaborative practice to occur, interprofessional education must include complementary and alternative medicine approaches for patient care and “meta-competencies” must be formalized within published care guidelines, and professional development opportunities accessed through the workplace, university, and the Academy.^{57,58}

List of abbreviations

Accreditation Council for Education in Nutrition and Dietetics (ACEND®)
Academy of Nutrition and Dietetics (AND)
Complementary and Alternative Medicine (CAM)
Integrative Medicine (IM)
Integrative Medicine 30 (IM-30)

Laffrey's Health Conception Scale (LHCS)

Ethics approval and consent to participate

This study was approved by the Rocky Mountain University of Health Professions institutional review board, as well as a waiver for to substitute an online opt-in consent for the written consent requirement.

Consent for publication

There is no data included in this study from individual participants. All responses are pooled averages with no identifying characteristics.

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Authors' contributions

PGF lead the development and dissemination of the study and manuscript. DPB and AG provided expertise in the development of the study and data interpretation. JD provided expertise on questionnaire development and critically reviewed the manuscript. All authors were involved in the dissemination of the survey study and critically reviewed the manuscript.

Competing interests

No authors have competing interests to declare.

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Figure 1. Study participant flowchart

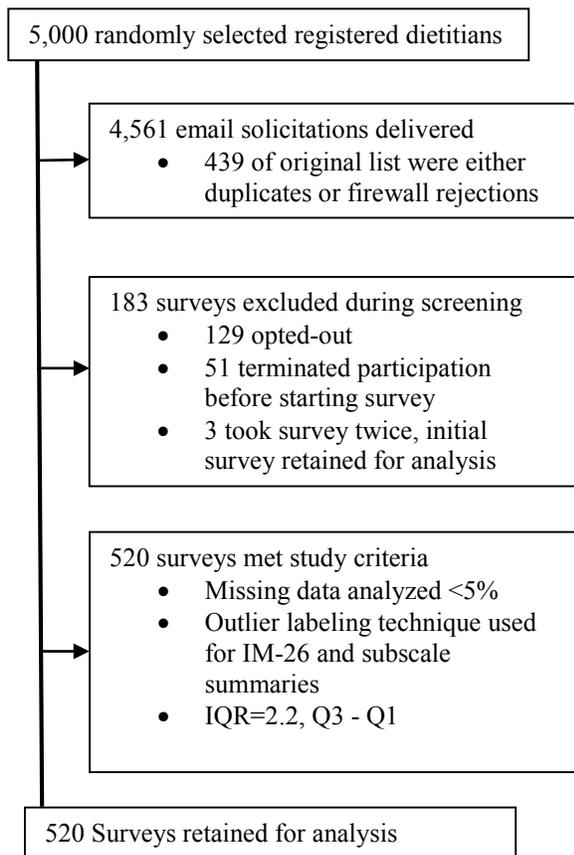


Table 1. Sociodemographic and practice-related characteristics of the sample (n = 520)

Gender		Primary Employment Setting		Years in Practice	
		←————— <i>n</i> (%) —————→			
Males	21 (4.0)	Clinical	198 (38.1)	Less than 1	27 (5.2)
Females	498 (95.8)	Community	221(42.5)	1-4	103 (19.8)
Missing	1 (0.2)	Management	25 (4.8)	5-9	87 (16.7)
Highest Degree		Education	47 (9.0)	10-14	52 (10.0)
Bachelor's	226 (43.4)	Non-RDN role	24 (4.6)	15-24	83 (16.0)
Masters	263 (50.6)	Unemployed/ Retired	4 (0.8)	25-34	107 (20.6)
Doctorate	28 (5.4)			≥35	61 (11.7)

Table 2. Internal Consistency , Reliability and Skew of Dietitian's Orientation Toward Integrative Medicine

Scale/Domain	#Items	Mean Score	SD	Skewness of Scale	Internal Consistency
Orientation toward IM-26 scale	26	70.9	12.26	-0.024	0.885
Awareness and openness to working with practitioners from other paradigms	10	25.5	6.67	-0.222	0.904
Readiness to refer patients to other paradigms	8	18.9	3.76	0.019	0.766
Learning from alternate paradigms	5	12.6	4.25	0.253	0.833
Patient-centered care	3	10.9	3.24	-1.010	0.891

Table 3. Means (SD) of IM-26 Subscales and Range of Scores (n = 520)

Integrative Medicine Dimensions (Range of Scores)	All Mean (SD)	Bachelor's	Masters	Doctorate
Awareness and Openness to Working with Practitioners from Other Paradigms (10 – 41)	25.5 (6.85)	25.24 (6.62)	25.58 (6.75)	27.50 (6.39)
Readiness to Refer Patients to Other Paradigms (7 – 28)	18.9 (3.86)	18.85 (3.54)	18.79 (3.84)	20.03 (4.62)
Learning from Alternate Paradigms (5-25)	12.62 (4.25)	12.28 (4.17)	12.84 (4.10)	13.34 (4.99)
Patient-Centered Care (3-25)	10.92 (3.19)	10.82 (3.22)	11.02 (3.09)	10.96 (3.98)
Summary Index (30 – 129)	64.65 (12.82)	64.01 (11.98)	64.80 (12.40)	64.64 (13.58)

Groupwise data were analyzed using independent samples Mann-Whitney U. All non-significant

Table 4. Bivariate Correlations of Integrative Medicine-26 index and subscales

Index and Subscales	IM-26	Awareness	Readiness	Learning
IM-26	1			
Awareness	.878**	1		
Readiness	.595**	.377**	1	
Learning	.739**	.522**	.261**	1
Patient Centered	.739**	.522**	.261**	1.000**
N	476	485	490	502

Note: * $p < .05$, ** $p < .001$

Table 5. Goodness-of-Fit Indicators of Models for IM-26

Model	χ^2	df	p	χ^2 / df	GFI	RMSEA	SRMR	TLI rho2	CFI
IM-26	228.72	205	0.12	1.116	0.96	0.016	0.031	0.994	1

Table 6. Summary of Regression Analyses Predicting Healthy Lifestyle and Personal Control (HPLCQ)

Index/Subscale	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
IM-26	-0.006	.004 ^{ns}	-.198	-	-	-
Awareness	.011	.005*	.203	.006	.002*	.116
Learning	.011	.006 ^{ns}	.017	-	-	-
Readiness	-.003	.008 ^{ns}	-.023	-	-	-
Patient-Centered Care	.019	.007	.176	.013	.005*	.125
Adjusted R^2 (Full Model)		.038			.032	
F for change in R^2		5.047**			5.047**	

Note: $n = 492$, * $p < .05$, ** $p < .001$, ns = non-significant

Table 7. Integrative Medicine Orientation by Work Setting

Primary Position Setting	N	Mean	SD
health and wellness call center	2	88.5	20.51
person centered medical home (PCMH)	4	85.3	7.59
nutrition and health testing company	1	79.0	--
private practice	19	75.7	12.42
consultant	18	75.2*	13.93
non-profit or not-for-profit agency	4	74.3	6.85
media or publishing company	2	73.5	30.41
contract food and nutrition management company	8	72.6**	15.83
home care or hospice	5	71.6	17.16
rehabilitation facility	11	69.7	9.43
Other	59	69.5	12.26
mental health or substance abuse facility	7	69.0	12.66
government agency or department (City, State or Federal)	18	68.8	12.34
ambulatory / outpatient facility (e.g. clinic, physician's office)	67	68.7	12.15
college, university or teaching-hospital faculty	40	67.6	11.11
community or public health program	40	67.5	13.07
retail, school, or restaurant food services	14	67.4	11.43
long-term, extended care or assisted living facility	40	66.2	15.22
food, nutrition or pharmaceutical products manufacturer	5	65.0	8.40
acute-care facility - inpatient	98	64.9	11.81
acute-care facility - outpatient	26	64.7*	13.51
sports medicine, wellness facility or health club	7	64.1	11.08
I am not employed in dietetics.	25	64.1	11.73
Total	520	68.0	12.80

Chi-square test for independence and strength of association, *p<.05, p<.001

Table 8. Dietetic Practice Groups (DPG) membership and Integrative Medicine orientation

	Frequency	Percent	IM-26 Mean	SD
Women's Health	1	0.2	80.00	12.80
Dietitians in Business and Communications	3	0.6	78.33	19.73
Medical Nutrition Practice Group	6	1.2	74.84	10.77
Healthy Aging	6	1.2	73.83	17.71
Sports, Cardiovascular and Wellness Nutrition	27	5.2	73.82	11.53
Nutrition Entrepreneurs	6	1.2	72.00	17.92
Hunger and Environmental Nutrition	6	1.2	71.17*	17.86
Nutrition Education for the Public	2	0.4	71.01	4.22
Nutrition Educators of Health Professionals	6	1.2	70.50	6.28
Research	7	1.3	70.43	19.20
Oncology Nutrition	9	1.7	70.00	14.05
Public Health/Community Nutrition	7	1.3	70.00	8.27
Dietitians in Integrative and Functional Medicine	11	2.1	70.00	10.69
Weight Management	20	3.8	68.15*	13.59
Diabetes Care and Education (DCE)	23	4.4	67.87*	11.78
Food & Culinary Professionals	9	1.7	67.78	8.60
Pediatric Nutrition	15	2.9	67.34	11.40
Management in Food and Nutrition Systems	3	0.6	67.33	5.86
Not a member of a dietetic practice group	277	53.1	67.22	13.05
Clinical Nutrition Management	12	2.3	67.16**	15.99
Behavioral Health Nutrition	3	0.6	67.00	2.64
Dietetics in Health Care Communities	16	3.1	66.44	13.84
Dietitians in Nutrition Support (DNS)	18	3.5	65.56	13.26
Renal Dietitians	16	3.1	64.19	11.43
School Nutrition Services	11	2.1	61.46	10.84
Total	520	100	64.65	12.82

Chi-square test for independence and strength of association, *p<.05, p<.001

Table 9. Mean and Standard Deviation of IM-26 by Certifications Held

Certification	Primary	Secondary	IM-26 Mean (SD)
Acupuncturist, LAc	1		71.0
AFAA Instructor		1	71.0
Aromatherapy/Essential Oils Educator	1		91.0
Athletic Trainer	8		72.76 (4.74)
Bone Density Technologist		1	86.0
Canine Assisted/Integrative Therapist	1		67.0
Certified Health Educator Specialist		1	89.0
Certificate of Training in Adult Weight Management Program		4	83 (6.25)
Certified Culinary Professional (CCP)	2		68.5(2.12)
Certified Diabetes Educator (CDE)	52		72.12 (11.54)
Certified Dietary Manager (CDM)	3		78.67 (6.80)
Certified Food and Spirit Practitioner		1	81
Certified Foodservice Professional (CFSP)	3		73.75 (8.92)
Certified Health Educator		1	89
Certified Insulin Pump Trainer		1	68
Certified Lactation Counselor		2	70 (14.14)
Certified LEAP Therapist (CLT)	4		77.75 (13.87)
Certified Nutrition Support Clinician (CNSC®)	28		62.97 (12.73)
Chef		1	75
Clinical Genetics	1		71
Counselor, Mental Health	3		79 (11.53)
Pilates Instructor		1	67
Dance Instructor		1	59
Foodservice Management Professional (FMP)	4		69.75 (5.85)
Health Coach	29		71.66 (14.03)
Jin Shin Jyutsu® physio-philosophy		1	75

Kinesiologist	1		96
Lactation Consultant/Doula	2	2	69.69 (10.02)
Lifestyle Coach		1	83
Massage Therapist	4		74.75 (10.37)
Mind-Body Medicine	2		82.5 (13.44)
Nurse Aide Certificate (STNA)		1	65
Nurse Practitioner	1		69
Personal Trainer/Exercise Physiologist	16	1	72.0 (11.81)
Pharmacist	1		50
Physician (MD)	1		50
Professional Counselor	2		72.5 (21.92)
Psychologist (M.S.)		1	72.5
Psychologist (PhD)	1		88
Registered (Professional) Nurse	2		57.51 (14.87)
School Nutrition Specialist (SNS)		1	56.5 (7.19)
ServSafe® Food Handler or Manager	45		71.45 (12.70)
Social Worker	1		90
Specialist in Gerontological Nutrition (CSG)	5	1	60.67 (11.64)
Specialist in Oncological Nutrition (CSO)	5		73.81 (18.09)
Specialist in Pediatric Nutrition (CSP)	9		60.67 (11.64)
Specialist in Renal Nutrition (CSR)	8		69.0 (11.08)
Specialist in Sports Dietetics (CSSD)	7		67.15 (10.61)
Yoga Instructor	6		67.34 (8.80)
Yoga Therapist		1	90

Groupwise data were analyzed using independent samples Kruskal–Wallis H test. All non-significant.

Table 10. One-Way Analysis of Variance of IM-26 and Subscales between CAM-Certified and Others

		Sum of Squares (SS)	df	Mean Square	<i>F</i>	<i>p</i>
IM-26	Between Groups	810.284	1	810.284	5.354	.021
	Within Groups	78,240.35	517	151.335		
	Total	79,050.64	518			
Awareness	Between Groups	646.175	1	646.175	15.224	.000
	Within Groups	21,944.481	517			
	Total	22,590.655	518			
Learning	Between Groups	69.827	1	69.827	4.021	.045
	Within Groups	8977.120	517	17.364		
	Total	9046.947	519			
Readiness	Between Groups	.866	1	.866	.141	.708
	Within Groups	8977.120	1	6.150	.141	
	Total	9046.947	518			
Patient-Centered	Between Groups	4.717	1	4.717	.463	.496
	Within Groups	4.717	1	10.185	10.185	
	Total	4.717	518			

Table 11. Cross-Professional Comparison of Means for IM-26 Subscales and Range of Scores

Integrative Medicine Dimensions		US Dietitians	Dental Faculty ^a	Dental Post-Graduate Students ^a
Awareness and Openness to Working with Practitioners from Other Paradigms Range 10-41	Mean (SD) N	25.5 (6.85) 520	25.53 (5.39) 138	24.52 (3.94) 148
Readiness to Refer Patients to Other Paradigms Range 7-28	Mean (SD)	18.9 (3.86)	17.93 (3.41)	17.66 (3.53)
Learning from Alternate Paradigms Range 5-25	Mean (SD)	12.62 (4.25)	14.41 (3.95)	12.85 (2.71)
Patient-Centered Care Range 3-25	Mean (SD)	10.92 (3.19)	11.14 (2.60)	11.47 (2.47)
Summary IM-26 Index	Score SD Range	64.65 (12.82) 33-102	69.01 (12.40) 25-109	64.64 (13.58)

Note: Data from Madhan, et al., 2016.

Title

Blurred Lines: Emerging Practice for Registered Dietitian-Nutritionists in Integrative and Functional Nutrition

Short Title: BLURRED LINES

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