11-3-2022

Survey Tools for Measuring Research or Evidence-Based Practice Constructs in Dietetics: A Narrative Review

Rosa K. Hand
Case Western Reserve University, rosa.hand@case.edu

Recommended Citation

Hand RK. Survey tools for measuring research or evidence-based practice constructs in dietetics: a narrative review. J Hum Nutr Diet. 2022;1–22. https://doi.org/10.1111/jhn.13112

Received: 30 June 2022 | Accepted: 24 October 2022

DOI: 10.1111/jhn.13112

INVITED REVIEW

JHND Journal of Human Nutrition and Dietetics | BDA The Association of UK Dietitians

Survey tools for measuring research or evidence-based practice constructs in dietetics: A narrative review

Rosa K. Hand

Department of Nutrition, Case Western Reserve University, Cleveland, OH, USA

Correspondence

Rosa K. Hand, Department of Nutrition, Case Western Reserve University, 10900 Euclid Ave., Cleveland, OH 44106, USA.
Email: rosa.hand@case.edu

Abstract

Background: Exact quantification of research conducted by dietitians and tracking the effectiveness of interventions or training programs to increase either evidence-based practice (EBP) or research behaviours have been hampered by the variety of tools used to measure these constructs.

Methods: In this narrative review, we identified and classified the various tools previously used to measure constructs related to research and/or EBP in the dietetics profession, and to summarise estimates of the constructs measured.

Results: We identified and classified 15 scored tools that had been used at least once in the dietetics profession and extracted tool parameter estimates from 22 resulting papers. We also identified six unscored tools and three qualitative studies. The most frequent constructs measured were attitudes and behaviours. Very few tools measured objective knowledge (skills). No objective measures of research outputs were identified. Several tools were closely related to one another.

Conclusions: Even when tools were used across multiple papers, reporting method varied making comparisons difficult. This review should encourage future researchers to utilise existing tools when possible, and encourage the development or adaptation and testing of tools that fill identified gaps. The constructs measured by the tools identified may also provide a starting point for the development of educational interventions aiming to increase research or EBP skills among dietitians. Only by using consistent tools will the dietetics profession be able to track the progress in increasing research conduct and EBP implementation over time.

KEYWORDS

dietetics, evidence-based practice, narrative review, research conduct

Key points

In this narrative review, we identified 15 scored tools and nine unscored or qualitative tools for assessing research and/or evidence-based practice knowledge and or conduct by dietitians. No tool was identified as a gold standard. Many tools measured overlapping constructs and/or had evolved over time. Few tools had objective measures of knowledge or behaviour. Researchers should strive to use consistent tools, and develop additional objective measures of these constructs.

INTRODUCTION

Research is frequently referred to as the "backbone" of the dietetics profession[1,2] because the evidence generated by research is applied to practice questions in the evidence-based practice (EBP) process.[3] The EBP process consists of four steps: "ask" a practice question, "acquire" relevant literature, "appraise" the quality and validity said literature, and "apply" the literature in the context of a patient's preferences and professional expertise.[3,4] In the USA, research and EBP are both required topics in the training of dietitians[5] and on the national certification exam.[6] Research methods and/or EBP are also a required topic of study and/or examination to become a dietitian in the UK,[7] Australia,[8] Canada,[9] and New Zealand.[10] Although included in preprofessional training, expectations for continuation of research and EBP behaviours are variable and not necessarily enforced. Although there is a generalised expectation for dietitians to use EBP, this is not frequently evaluated objectively,[11] and expectations for dietitians to participate in practice based research/evaluation vary by country and specific work setting.[12] Standardised assessment tools would allow objective evaluation of whether these expectations are being met, both profession-wide and for individual organisations or dietitians conducting competency assessments.

Indeed, despite assertions regarding the importance of research in the profession, the conduct of research (i.e., collection of primary data or systematic synthesis in a review) is relatively low among dietitians.[13] Exact quantification of research conducted by dietitians or tracking the effectiveness of interventions or training programs to increase either EBP or research behaviours have been hampered by the variety of tools used to measure these constructs. The tools used to measure research conduct by dietitians vary in their validity (or in fact whether or not they have been validated) and their measurement method and exact topic: self reported knowledge, objective tests of knowledge or attitudes, perceptions etc. Several widely used tools in this area have gone through a series of name and content changes. In addition, it is not always clear whether investigators and tools are measuring research or EBP skills because of influential models suggesting that EBP is the foundation of research participation.[14,15]

A comprehensive review is available of EBP measurement tools in medicine through 2006,[16] with a brief 2012 update,[17] but no studies have conducted a similar review in dietetics for research tools or EBP tools. Because of the intertwining of research and EBP concepts in several tools and foundational professional documents, this narrative review included tools for measuring both research and EBP. We identified and classified the various tools that have been used to measure constructs related to research and/or EBP skills in the dietetics profession and to summarise the estimates of constructs measured. This review should encourage future researchers to utilise existing tools when possible, and will encourage the development or adaptation and testing of tools that fill identified gaps. The constructs measured by said tools may also provide important intervention targets for initiatives that seek to enhance dietitian skills in research or EBP. Only by using consistent tools will the dietetics profession be able to track the progress in increasing research conduct and EBP implementation over time.

METHODS

This was a narrative review. We began with known tools in an effort to understand their evolutionary relationship to each other, and hand searched the reference lists of those papers. Then, we used the Science Citation Index to search for papers that had utilised the tools located by hand searching. The Science Citation Index searches occurred in 2019 and again in 2021. Whenever we found a new tool or new report of existing tool utilisation, we hand searched the reference list and also searched the paper in the Science Citation Index. The full text of papers with relevant titles were obtained and evaluated. Papers were limited to those published in English with full text available. There were no date limitations; we searched until no new papers were identified in the reference lists or the Science Citation Index. There were also no journal type limitations; indeed, we located several publications in allied health rather than dietetics journals. We reviewed the full text of papers reporting tools for measurement of EBP or research constructs in any health professionals, although this publication focuses exclusively on tools used at least once in the dietetics profession. Reference is made to tools used in or developed for other professions only if these tools were specifically credited as a source for adaptation within the dietetics profession.

Each included tool was classified based on the criteria in Table 1. The construct classifications were based on the schema in Shaneyfelt et al.[16] Tools could have multiple classifications applied. We used the term dietitian to incorporate the formal credential titles of a variety of countries. We extracted information about the scoring for each tool. If there was uncertainty, we contacted the authors to clarify and noted the source of information in the table. Five authors were contacted regarding six tools and four authors responded, clarifying five tools.

After classifying the tools based on the first publication in which they were utilised in dietitians, we extracted parameter estimates from any publication using the tool in dietitians. In addition to the parameter estimates,

TABLE 1 Classification system for tools measuring research or evidence-based practice (EBP) among dietitians

	Options	Definition	Number (%) of scored tools located ($n = 15$)[a]
Topic	Research	Definitions vary and are not always explicit; we utilised the topic identified by the original tool author	12 (80)
	EBP	Definitions vary and are not always explicit; we utilised the topic identified by the original tool author	3 (20)
Construct	Attitudes	Beliefs, perceptions or opinions. More details on the specific attitude are provided, for example self-efficacy, confidence or belief in the value of a behaviour	7 (46.7)
	Behaviours	Self-reported current or anticipated future utilisation in practice[16] Timeframe for behaviours listed if available, if unavailable, specified as such	7 (46.7)
	Knowledge	Self-reported measures of knowledge	4 (26.7)
	Skills	Objective, tested measures of knowledge[16]	2 (13.3)
	Supports and/or barriers	Resources and/or barriers to engaging in a behaviour	1 (6.7)
Validation status	Validated in dietitians	Tool validated in dietitians	8 (53.3)
	Validated in other health professionals	Tool validated in other health professionals	8 (53.3)
	Not validated/unclear	Tool validation not discussed in publication	1 (53.3)

[a]More than one classification could be applied to each too; thus percentages may sum to >100. Percentages have been rounded.

we report the dietetics population (practitioner vs. student, more details if available) and study design (cross-sectional, pre/postintervention or randomised controlled trial).

For papers that report on these topics and constructs but were not scored or were qualitative, we summarised their methods and findings in brief narratives.

RESULTS

We located 15 scored tools that had been utilised in dietitians[2,14,15,17–24] (Table 2). The number of tools classified into each topic and construct is presented in Table 1. Because each tool could have multiple classifications applied, Table 1 sums to more than 15 (likewise, some papers introduced more than one tool). The most frequent constructs measured, with seven tools each, were attitudes[2,15,17,20,23] and behaviours[2,14,17–19,21,22] (Table 1). Only two tools[21,24] measured skills (via objective knowledge assessments) (Tables 1 and 2). One tool[18] measured barriers and supports to behaviours (Tables 1 and 2).

We found 22 papers[2,14,15,18–20,22–24,26,27,29–32,39,40] that utilised the 15 scored tools in dietitians (Table 2). The most commonly used tool was the Research Capacity in Context (RCC) (five papers[18,23,29–31]), followed by various versions and updates of the Dietitian Research Involvement Survey (DRIS) (four papers[14,25–27]) (Table 2). Four tools[17,23–25] were each used in only a single paper (Table 2).

The tools we identified not only consistently demonstrated positive attitudes about research conduct and EBP utilisation among dietitians, but also demonstrated that dietitians have limited skills in these areas and use these skills relatively infrequently. No tool can currently be considered the "gold standard" for measurement of any research construct at this point. The Knowledge of Research and Evidence Competencies (K-REC) tool may be a "gold standard" for measuring EBP knowledge, although there are still limitations of this tool, as discussed below, and various versions of the K-REC have been utilised in dietetics.

Comparisons of the constructs between tools and within tools across time are difficult as a result of changes that were made to several of the tools between each administration located and/or variability in the reporting method even within the same tool. For example, in the five papers utilising the RCC, two reported a mean of success scores in the individual domain,[18,29] two reported individual item scores but not a mean for the domains,[30,31] three reported the most frequent current or past 6 months activities[23,29,30] and one reported the most common barriers/motivators/supports.[23] Similarly, the initial Research Involvement Questionnaire (RIQ) paper[19] does not report overall sample scores, but rather reports only scores based on predicted level of research achievement for validation purposes. Later uses of the RIQ are more consistent in reporting and range from 25.33 ± 18.76 in Newell and Troxel's[32] dietetic internship directors to 30.3 ± 21.9 in Hand et al.'s[23] dietitian

TABLE 2 Classification of scored tools and parameter estimates for constructs measuring research conduct or evidence-based practice in dietitians, ordered by date of first published utilisation in dietetics, except in cases where there are multiple versions of the same tool in which case subsequent versions are presented sequentially

Tool name/Author and year of original mention in dietetics/validation status and/or history	Topic/construct/ reporting interval	Scoring	Author and year of parameter estimate study	Population measured/Study design for parameter estimate study	Parameter estimates
Perceptions, Attitudes, Knowledge (PAK) Byham-Gray et al., 2005[15] Validated in dietitians	**Research Knowledge, attitudes** (value of and support for EBP) Reporting interval not specified	12 perceptions regarding availability of resources for research and EBP rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) Perceptions subscore max possible = 60 10 attitudes regarding value of and support for EBP rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) Attitudes subscore max possible = 50 6 knowledge items regarding database familiarity rated on a 4-point scale (1 = unaware to 4 = use, 7 knowledge items regarding training and access to resources rated on a dichotomous scale (1 = no, 2 = yes), 4 knowledge items related to understanding on a 5-point Likert scale (1 = strongly	Byham-Gray et al., 2005[15]	US **dietitians** from specific practice areas ($n = 258$) (same sample as Byham-Gray et al., 2006[14]) **Cross-sectional**	Mean overall score: 125.0 ± 19.3 Mean perceptions subscore: 39.9 ± 8.7 Mean attitudes subscore: 39.0 ± 8.7 Mean knowledge subscore: 46.2 ± 8.7

TABLE 2 (Continued)

Tool name/Author and year of original mention in dietetics/validation status and/or history	Topic/construct/ reporting interval	Scoring	Author and year of parameter estimate study	Population measured/Study design for parameter estimate study	Parameter estimates
		disagree to 5 = strongly agree), 7 knowledge items regarding definitions of terms rated on a 3-point scale (1 = don't understand to 3 = do understand) Knowledge subscore max possible = 79 Overall max possible score = 189			
Perceptions, Attitudes, Knowledge (PAK) version 2 Vogt, Byham-Gray & Touger-Decker 2013[20] Re-validated in dietitians	**Research Knowledge, attitudes** (value of and support for EBP) Reporting interval not specified	12 perceptions regarding availability of resources for research and EBP rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) Perceptions subscore max possible = 60 10 attitudes regarding value of and support for EBP rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) Attitudes subscore max possible = 50 3 knowledge items regarding understanding of statistical analysis and what to do	Vogt, Byham-Gray & Touger-Decker, 2013[20]	US **dietitians** in clinical practice ($n = 213$) **Cross-sectional**	Mean overall score: 127.1 ± 13.9 Mean perceptions subscore: 45.8 ± 6.6 Mean attitudes subscore: 43.4 ± 4.6 Mean knowledge subscore: 37.5 ± 6.4

(Continues)

TABLE 2 (Continued)

Tool name/Author and year of original mention in dietetics/validation status and/or history	Topic/construct/ reporting interval	Scoring	Author and year of parameter estimate study	Population measured/Study design for parameter estimate study	Parameter estimates
		when articles conflict rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), 2 knowledge items regarding training attendance rated on a dichotomous scale (1 = no 2 = yes), 6 items regarding database awareness rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), 6 items regarding understanding of terms rated on a 4-point Likert scale (1 = no understanding to 4 = understand and can explain) (only 4/6 items were reported in the paper, absolute risk and relative risk were excluded from reporting due to scoring 0, per email with original authors 8/31/22) Knowledge subscore max possible = 80 Overall and subscores are a sum of individual item			

TABLE 2 (Continued)

Tool name/Author and year of original mention in dietetics/validation status and/or history	Topic/construct/ reporting interval	Scoring	Author and year of parameter estimate study	Population measured/Study design for parameter estimate study	Parameter estimates
		scores, over max possible score = 190 per the authors, updates from PAK version 1 were to incorporate use of electronic databases. Changes in scoring were also made			
Dietitian Research Involvement Survey (DRIS) Byham-Gray et al., 2006[14] Validated in dietitians	**Research Behaviours** Reporting interval not specified but items primarily written in present tense	3 activities in each of 4 levels (total 12 activities), rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) Overall score is a sum of ratings for all activities, max possible score = 60 Subscores are a sum of activity ratings for each level, max possible score = 15 Scores and subscores can be presented as raw values or a percentage of max possible	Byham-Gray et al., 2006[14]	US **dietitians** from specific practice areas (n = 258) (same sample as Byham-Gray et al., 2005[15]) **Cross-sectional**	Mean overall score: 26.9 ± 9.5 (44.8% of max possible) Mean level 1 score: 10.8 ± 2.7 Mean level 2 score: 6.2 ± 3.1 Mean level 3 score: 5.6 ± 3.1 Mean level 4 score: 4.3 ± 2.5
Dietitian Research Involvement Survey (DRIS) version 2 King et al., 2014[25]	**Research Behaviours** Reporting interval not specified	3 activities in each of 4 levels (total 12 activities), rated on a 5-point Likert scale (1 = never, 5 = always) Overall score is a sum of ratings for all	King et al., 2014[25]	US **dietitians** (at baseline n = 272 at post intervention: intervention group 1 n = 64 intervention group 2 n = 80 control n = 128)	Mean overall score in the entire sample: Baseline: 23.0 ± 5.0 (38.3% of max possible) Postintervention: 23.1 ± 5.8 (38.5% of max possible) 3-month follow-up: 23.4 ± 6.0 (39% of max possible)

(Continues)

TABLE 2 (Continued)

Tool name/Author and year of original mention in dietetics/validation status and/or history	Topic/construct/ reporting interval	Scoring	Author and year of parameter estimate study	Population measured/Study design for parameter estimate study	Parameter estimates
		activities, max possible score = 60 Subscores are a sum of activity ratings for each level, max possible score = 15 Scores and subscores can be presented as raw values or a percentage of max possible The authors maintained the same activities as DRIS version 1 but changed the Likert scale from agreement to frequency		**Randomised controlled trial**	
			King, Parrott & Hand, 2016[26]	US **dietitians** ($n = 322$; divided between Dietetics Practice Based Research Network members $n = 152$ and researcher $n = 170$); also **students** ($n = 33$) **Cross-sectional**	Mean overall score in the entire sample: 36.1 ± 11.6 (60.2% of max possible) Mean level 1 score: 9.6 ± 2.6 Mean level 2 score: 9.6 ± 3.2 Mean level 3 score: 9.5 ± 4.1 Mean level 4 score: 7.4 ± 4.6 Mean overall score in researchers: 39.8 ± 10.9 (66.3% of max possible) Mean overall score in DPBRN members: 33.6 ± 11.6 (56% of max possible) Mean overall score in students: 27.9 ± 7.7 (46.5% of max possible)
			Boyd et al., 2016[27]	US **dietitians** who completed the baseline questionnaire for King et al., 2014[25] ($n = 520$) (there is overlap between the 272 completers in King et al., 2014[25] and about 1/3 of this sample) **Cross-sectional**	Mean overall score: 23.5 ± 6.0. (39.2% of max possible). Mean level 1 score: 8.3 ± 2.2 Mean level 2 score: 7.4 ± 2.2 Mean level 3 score: 4.3 ± 2.1 Mean level 4 subscore: 3.5 ± 1.3
Evidence-Based Practice Questionnaire (EBPQ) Upton & Upton, 2012[17] Validated in other professions: Primarily nurses but may have included some other unspecified allied	**EBP Knowledge, attitudes** (availability of time, and willingness to conduct EBP), **behaviours**	6 frequency of practice questions, 4 attitude questions, 14 knowledge questions. All self-rated on a 1–7 scale (options unspecified).	Upton & Upton, 2012[17]	Newly credentialed Scottish practitioners (total $n = 136$, **dietitian** $n = 7$) **Cross-sectional**	Mean practice score for dietitians: 4.9 ± 1.0 Mean attitude score for dietitians: 5.0 ± 0.4 Mean knowledge score for dietitians (Note referred to by the authors as skills but called knowledge here based on Table 1 classification and self-rated status): 5.3 ± 0.4

TABLE 2 (Continued)

Tool name/Author and year of original mention in dietetics/validation status and/or history	Topic/construct/ reporting interval	Scoring	Author and year of parameter estimate study	Population measured/Study design for parameter estimate study	Parameter estimates
health professionals (Upton and Upton, 2006[28])	No reporting interval specified although "day to day" is mentioned	Mean rating on each scale is determined (max 7).			
Research Capacity in Context (RCC) Holden et al., 2012[18] Validated in other professions: combined allied health professions including some Australian dietitians	**Research Knowledge, supports or barriers, behaviours** Current or past 12 months	4 sections: Research skill/success rated on a 1–10 scale for 14 items on organisation level, 9 items on team/department level, 14 items on individual level Each level then averaged out of 10 18 barriers, 17 motivators with the option to choose all that apply 10 research activities with current or past 12 months involvement rated dichotomously (yes/no) Dichotomous (yes/no) assessment of whether research is a portion of job description, and 7 supportive structures for research for those who choose yes only.	Holden et al., 2012[18]	Australian allied health credentialed practitioners (total $n = 134$, **dietitian** $n = 10$) **Cross-sectional**	For entire sample: Mean score individual research success domain: 3.9 (IQR 2.9–6) No data on other sections (recent activities, barriers, facilitators) reported.
			Howard et al., 2013[29]	Australian **dietitians** ($n = 130$) **Cross-sectional**	Mean individual success in research: 5.1 ± 1.7 Most frequent activity in the last 6 months: collecting data (42%) Least frequent activity in the last 6 months: other (3%) and secured funding (6%) No data on barriers or enablers or organisational factors reported.
			Williams et al., 2015[30]	**Australian** credentialed practitioners (total $n = 520$, **dietitian** $n = 61$) **Cross-sectional**	47% of those with an organisational research lead were involved in data collection. Individual item scores reported for organisation/team/individual but no total RCC scores were reported.
			Boyd et al., 2019[31]	US **dietitians** who had authored a paper in the last 2 years (identified through hand searching of journals) and who spent at least 20% time in clinical (practice) work ($n = 29$) **Cross-sectional**	Individual item scores reported for organisation/team/individual but no total or domain level RCC scores were reported.

(Continues)

TABLE 2 (Continued)

Tool name/Author and year of original mention in dietetics/validation status and/or history	Topic/construct/ reporting interval	Scoring	Author and year of parameter estimate study	Population measured/Study design for parameter estimate study	Parameter estimates
			Hand, Sears & Harris, 2020[23]	US **dietitians** who completed a combined Master's degree/ dietetic internship program with a research emphasis ($n = 35$) **Cross-sectional**	Most frequent barrier: prioritisation of other work roles (68.6%) Most frequent motivator: to develop skills (62.9%) Mean number of barriers: 3.8 ± 2.3 Mean number of motivators: 5.2 ± 3.8 Among the 9 who reported that research was part of their job description, most frequent provision made to support their accomplishment of research: time (25.7%) The most common current or past 6-months research activity: writing a research report for publication or presentation (34.3%) and collecting data (34.3%). Did not administer/report the individual/team/organisation success ratings
Research Involvement Questionnaire (RIQ) Whelan et al., 2013[19] Validated in dietitians	**Research Behaviours** Current	6 activities in each of 4 levels (total 24 activities) rated on a 5-point Likert scale for current involvement in activity (0 = not at all, 1 = a little, 2 = quite a bit, 3 = a lot, and 4 = a great deal) Overall score is a sum of ratings for all activities, max possible score = 96 Subscores are a sum of activity ratings for each level, max possible score = 24 Can assign a research "level" based on cutpoints: Level 1 if score ≥1, Level 2 if Level 2 score ≥6, Level 3 if level 3 score ≥9, and Level 4 if Level 4 score ≥15.	Whelan et al., 2013[19]	UK **dietitians** who were purposively sampled to represent different levels of research participation ($n = 110$) **Cross-sectional**	Mean (95% CI) overall score of dietitians expected to be in level 1: 11.7 (9.7, 13.8) Mean (95% CI) overall score of dietitians expected to be in level 2: 30.2 (25.5, 34.9) Mean (95% CI) overall score of dietitians expected to be in level 3: 55.7 (8.5, 62.8) Mean (95% CI) overall score of dietitians expected to be in level 4: 70.6 (62.3, 78.9) No characteristics for the entire sample reported, only reported by predicted level
			Hand, Sears & Harris, 2020[23]	US **dietitians** who completed a combined Master's degree/ dietetic internship program with a research emphasis ($n = 35$) **Cross-sectional**	Mean overall score: 30.3 ± 21.9 (31.6% of max possible) Mean level 1 score: 12.4 ± 5.1 Mean level 2 score: 6.9 ± 5.7 Mean level 3 score: 5.3 ± 6.2 Mean level 4 score: 5.6 ± 6.4
			Newell & Troxel, 2021[32]	US **dietitians** serving as dietetic internship directors ($n = 96$) **Cross-sectional**	Mean overall score: 25.3 ± 18.8 (26.4% of max possible) Mean level 1 score: 10.2 ± 5.5 Mean level 2 score: 6.3 ± 5.1 Mean level 3 score: 5.0 ± 5.4 Mean level 4 score: 3.8 ± 4.2

TABLE 2 (Continued)

Tool name/Author and year of original mention in dietetics/validation status and/or history	Topic/construct/ reporting interval	Scoring	Author and year of parameter estimate study	Population measured/Study design for parameter estimate study	Parameter estimates
		Scores and subscores can be presented as raw values or a percentage of max possible			
Nursing Research Self-Efficacy Scale (NURSES) King et al., 2014[25] Validated in nurses (Swenson-Britt, 2013[33]) Validity re-established in dietitians by King 2014,[25] after modification of rating scale	**Research Attitudes** (self-efficacy) Reporting interval not specified	6 items regarding obtaining science-based knowledge resources, 6 items regarding critically reading and evaluating quantitative research literature, 7 items regarding critically reading and evaluating qualitative research literature, 9 items regarding understanding and applying theory, 10 items regarding collective self-efficacy Each item rated on a 5-point Likert scale (1 = very little to 5 = quite a lot). Overall score is a sum of all individual item ratings. (Note it is unclear what the max possible score is for the original tool; for the theory scale, the authors indicate that there are 9 items but	King et al., 2014[25]	US **dietitians** (at baseline $n = 272$ at postintervention: intervention group 1 $n = 64$ intervention group 2 $n = 80$ control $n = 128$) **Randomised controlled trial**	Mean score in the entire sample: Baseline: 94.5 ± 15.4 Postintervention: 100.0 ± 14.6 3-month follow-up: 101.0 ± 15.2 Estimates for intervention groups vs control are provided and were significantly improved postintervention but not on 3-month follow up

(Continues)

TABLE 2 (Continued)

Tool name/Author and year of original mention in dietetics/validation status and/or history	Topic/construct/ reporting interval	Scoring	Author and year of parameter estimate study	Population measured/Study design for parameter estimate study	Parameter estimates
		then list 10 individual items for a total of 38 or 39 items. Authors did not respond to an inquiry regarding this inconsistency) King et al.[25] did not include the collective-self efficacy scale for a total of 28 items and additionally modified the rating scale to 1 = strongly not confident to 5 = very confident Overall max possible score for King's version = 140			
Research Outcome Expectations Questionnaire (ROEQ) King et al., 2014[25] Validated in psychology grad students by Bishop and Bieschke 1995–2000[34–36]; Validity re-established in dietitians by King, 2014[25] after minor modification of items to reflect clinical practice vs. psychology (C. King, personal	**Research Attitudes** (expecta-tions) Reporting interval not specified	20 items regarding expectations of participating in research rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) 18 items are positive using the scale above, 2 are negative and reverse coded (1 = strongly agree) Overall score is a sum of individual item scores, max possible score = 100	King et al., 2014[25]	US **dietitians** (at baseline $n = 272$ at postintervention: intervention group 1 $n = 64$ intervention group 2 $n = 80$ control $n = 128$) **Randomised controlled trial**	Mean score in the entire sample: Baseline: 69.8 ± 9.0 Postintervention: 68.4 ± 9.2 3-month follow-up: 67.8 ± 9.4 Estimates for intervention groups vs control are provided but were not statistically different at 3-month follow-up
			King, Parrott & Hand, 2016[26]	US **dietitians** ($n = 322$; divided between Dietetics Practice Based Research Network (DPBRN)	Mean score in the entire sample: 81.4 ± 9.8 Mean score in researchers: 84.1 ± 8.8 Mean score in DPBRN members: 78.5 ± 10.5 Mean score in students: 80.5 ± 6.5

TABLE 2 (Continued)

Tool name/Author and year of original mention in dietetics/validation status and/or history	Topic/construct/ reporting interval	Scoring	Author and year of parameter estimate study	Population measured/Study design for parameter estimate study	Parameter estimates
communication, 9/2/2022)				members $n = 152$ and researcher $n = 170$); also **students** ($n = 33$) **Cross-sectional**	
Interest in Research Questionnaire (IRQ) King et al., 2014[25] Validated in psychology doctoral students and faculty by Bishop and Bieschke 1995–1998[34,35,37] Validity re-established in dietitians by King, 2014[25] after minor modification of items to reflect clinical practice vs. psychology (C. King, personal communication, 9/2/2022)	**Research Attitudes** (interests) Reporting interval not specified	17 questions items regarding interest in research participation rated on a 5-point Likert scale (1 = very disinterested to 5 = very interested) Overall score is a sum of individual item score, max possible score = 85	King et al., 2014[25]	US **dietitians** (at baseline $n = 272$ at postintervention: intervention group 1 $n = 64$ intervention group 2 $n = 80$ control $n = 128$) **Randomised controlled trial**	Mean score in the entire sample: Baseline: 54.6 ± 11.4 Postintervention: 53.9 ± 11.1 3-month follow-up: 52.7 ± 11.5 Estimates for intervention groups vs control are provided but were not statistically different at 3-month follow-up.
			Boyd et al., 2016[27]	US **dietitians** who completed the baseline questionnaire for King et al., 2014[25] ($n = 520$) (there is overlap between the 272 completers in King et al., 2014[25] and about 1/3 of this sample) **Cross-sectional**	Median score: 56.0 ± 11.8 Highest reported interest activities were: reading peer-reviewed journals (81.1%) Discussing research findings with colleagues (79.9%)
Knowledge of Research and Evidence Competencies (K-REC) Vogt et al., 2016[21] Validated in physical therapy students by Lewis 2011.[38]	**EBP Skills** Reporting interval not specified	Primarily multiple choice knowledge items and one multi-part open-ended item covering the first three steps of evidence-based practice (ask,	Vogt et al., 2016[21]	US **dietitians** (control $n = 35$, intervention $n = 22$) **Randomised controlled trial**	Mean scores: Intervention group baseline: 9.0 ± 1.9 Waitlist control baseline: 9.1 ± 2.1 Intervention group postintervention: 10.0 ± 1.7 Waitlist control postintervention: 9.2 ± 1.7 No significant changes in overall scores between groups.
			Hinrichs, 2018[39]	US **students** (dietetic interns) ($n = 16$)	Mean score: 7.8 ± 1.3

(Continues)

TABLE 2 (Continued)

Tool name/Author and year of original mention in dietetics/validation status and/or history	Topic/construct/ reporting interval	Scoring	Author and year of parameter estimate study	Population measured/Study design for parameter estimate study	Parameter estimates
Modified to include dietetics specific examples and other new items by Vogt[21] but re-validation not specified.		acquire, appraise). Items receive 0.5–1 point for a correct response; max possible score = 12.	Hand, Torres & Watowicz, 2020[40]	**Cross-sectional** US **students** (combined Master's degree/ dietetic internship) ($n = 23$) **Pre/postintervention**	Mean score: Preintervention: 8.3 ± 1.5 Postintervention: 9.9 ± 0.8 Significant improvement postintervention
Behaviours portion of the **Knowledge, Attitudes, Behaviours Questionnaire for EBP (KAB)** Vogt et al., 2016[21] Validated in medical students by Johnston, 2003[41] then modified to focus on the personal application section by Vogt[21] but revalidation not specified	**EBP Behaviours** Reporting interval not specified	9 items regarding frequency of behaviours in ask, apply, appraise and apply literature each rated on a 6-point Likert-scale for frequency (1 = never, 2 = less than monthly, 3 = monthly, 4 = weekly, 5 = every other day, 6 = daily) Overall score is a sum of ratings for all activities max possible score = 56	Vogt et al., 2016[21]	US **dietitians** (control $n = 35$, intervention $n = 22$) **Randomised controlled trial**	Mean score: Intervention group baseline: 23.9 ± 6.8 Waitlist control baseline: 22.4 ± 6.1 Intervention group postintervention: 23.9 ± 8.0 Waitlist control postintervention: 24 ± 7.4 No difference in frequency of conducting any behaviours in practice postintervention
			Hinrichs 2018[39]	US **students** (dietetic interns) ($n = 16$) **Cross-sectional**	Mean score: 29 ± 7.2 (Hinrichs[39] changed the Vogt et al.[21] KAB from a 6-point Likert scale to a 5-point Likert scale (still measuring frequency). New max possible score = 45.)
			Hand, Torres & Watowicz, 2020[40]	US **students** (combined Master's degree/ dietetic internship) ($n = 23$) **Pre/postintervention**	Mean score: Preintervention: 28.5 ± 4.6 Postintervention: 37.3 ± 4.7 Improvement was significant at $p < 0.001$. (Hand, Torres & Watowicz[40] changed the Hinrichs[39] KAB from 1 to 5 frequency to 1 to 5 confidence. Max possible score still 45).
Practice-Based Dietitian Research Involvement Survey (PBDRIS) Plant et al., 2017[22] Validated in dietitians	**Research Behaviours** Reporting interval not specified; items written as gerund phrases	4 activities on each of 4 levels (total 16 activities), rated on a 5-point Likert scale for frequency (1 = never to 5 = always) Overall score is a sum of ratings for all activities max possible score = 80	Plant et al., 2017[22]	US **dietitians** who provide direct nutrition care for at least 20% of time ($n = 79$) **Cross-sectional**	Mean overall score: 39.4 ± 10.3 (49% of max possible) Mean level 1 score: 14.7 ± 2.8 Mean level 2 score: 11.0 ± 3.1 Mean level 3 score: 8.0 ± 4.0 Mean level 4 score: 7.5 ± 2.3
			Boyd et al., 2019[31]	US **dietitians** who had authored a paper in the last 2 years	Mean overall score: 64.2 ± 8.8 (80.3% of max possible)

TABLE 2 (Continued)

Tool name/Author and year of original mention in dietetics/validation status and/or history	Topic/construct/ reporting interval	Scoring	Author and year of parameter estimate study	Population measured/Study design for parameter estimate study	Parameter estimates
		Subscores are a sum of activity ratings for each level max possible score = 20 Scores and subscores can be presented as raw values or a percentage of max possible		(identified through hand searching of journals) and who spent at least 20% time in clinical (practice) work (n = 29) **Cross-sectional**	
Clinical Research Appraisal Inventory (19 item version) (CRAI-19) Hand, Sears & Harris, 2020[23] Validated in early career researchers from underrepresented groups (Jeffe 2017).[42] Not revalidated in dietitians.	**Research Attitudes** (self-efficacy) Reporting interval not specified	19 research activities, grouped into subscales of writing, study design/data analysis, collaboration/ grants, consent, rated based on confidence in ability to complete each activity (0 = no confidence, 10 = total confidence). Overall score is average of item ratings, max possible score = 10 Subscores are an average of item ratings within each category, max possible score = 10	Hand, Sears & Harris, 2020[23]	US **dietitians** who completed a Master's of Science/Dietetic Internship program with a research emphasis (n = 35) **Cross-sectional**	Overall mean score: 5.4 ± 2.2 Highest subscore: grants/collaborations (6.3 ± 2.7) Lowest subscore: data and design (4.9 ± 2.2)
Unnamed tool Chughtai & Tanweer, 2020[24] Validation not specified	**Research Skills** Reporting interval not specified	16 multiple choice items related to quantitative research, max possible score = 16	Chughtai & Tanweer, 2020[24]	Pakistani **dietitians** in Pakistan (n = 34 for quantitative section, n = 30	Scores on the questions regarding quantitative research: Preintervention: 12.0 ± 2.5 Postintervention: 15.8 ± 0.5 Scores on the questions regarding qualitative research: Preintervention: 2.7 ± 1.8 Postintervention: 7.6 ± 1.7

(Continues)

TABLE 2 (Continued)

Tool name/Author and year of original mention in dietetics/validation status and/or history	Topic/construct/reporting interval	Scoring	Author and year of parameter estimate study	Population measured/Study design for parameter estimate study	Parameter estimates
		10 multiple choice items related to qualitative research, max possible score = 10 Presented as 2 separate raw scores and/or as a percentage of max possible		for qualitative section) **Pre/postintervention**	

Abbreviations: CI, confidence interval; IQR, interquartile range.

graduates from a specialised research program. Three studies reported in four papers used the DRIS and report overall scores ranging from 23.0 ± 5.0 in the preintervention cohort of King et al[25] to 39.8 ± 10.9 in Research Dietetic Practice Group members surveyed by King et al.[26] The RIQ,[19] DRIS,[14] and Practice-Based Dietitian Research Involvement Survey (PBDRIS)[22] are similar in their approach and constructs measured, but have different scales and numbers of items, leading to different maximum scores. However, scores can be compared across these three tools if they are converted to a percentage of maximum points.

Another challenge is that tools have been modified over time, meaning that authors who are reporting on tools of the same name may actually be using drastically different versions. In particular, DRIS,[14,25–27] Perceptions, Attitudes, Knowledge (PAK)[15,20] and Knowledge, Attitudes, Behaviours Questionnaire for EBP (KAB)[21,39,40] have gone through several versions in different papers, making elements of these tools difficult to track through time.

The K-REC appears to be relatively consistent over time, both in elements and reporting. K-REC scores vary from 7.8 ± 1.3 in Hinrichs'[39] dietetic intern sample to 10.0 ± 1.72 in the postintervention practitioner sample of Vogt et al.[21]

In addition to scored tools, some papers contain other elements. For example, Vogt et al.[20] report on the frequency of various EBP behaviours such as reading professional journals in a way that may be useful to other investigators but is outside their main outcome of the PAK.

Along with the scored tools described above, we located seven studies[13,19,43–48] describing six unscored but quantitative tools and three qualitative studies.[12,31,49] These studies are summarised and classified in Table 3. Only one of these studies addressed the EBP topic.[49] One of the tools[47] appeared to have potential as a scored scale, but the results were reported on an individual question basis so they were included in the unscored category.

DISCUSSION

In this narrative review, we located a wide variety of scored and unscored survey tools used in dietetics to quantify the conduct of research and use of research for EBP. Limitations of our review primarily center around its narrative structure. We relied on the Science Citation Index and hand searching, and used these methods until saturation was reached; that is, no new tools were identified. However, we cannot be certain that we included all available tools. In particular, we may have missed tools or results reported only in abstracts or the non-peer reviewed literature such as dietetics newsletters. In the course

TABLE 3 Classification of unscored tools or qualitative studies evaluating research conduct or evidence-based practice in dietitians

Author, year	Topic/Construct/ Reporting Interval	Tool description	Population	Results
Peterson, Hays-Kimmons & Cole, 2008[43]	**Research** **Attitudes** (interest, confidence), **Behaviours** Behaviours in past year	Survey with 11 research activities, each rated in 4 ways: (1) knowledge (options: accomplished, adequate, in need of training) (2) interest (options: highly interested, somewhat interested, not at all interested), (3) participation in past year (options: yes, no, unsure), (4) necessity for dietitians to know (options: yes, no, unsure) An additional 8 statements related to interest, confidence, and behaviours in research were rated on a 5-point Likert scale for agreement but the statements were not converted into an overall score, they were simply presented as mean for each item (C. Peterson, personal communication providing tool, 9/8/2022)	US **dietitians** who were recent graduates of one of three Coordinated Undergraduate Programs before or after changes in accreditation standards ($n = 57$)	Results were presented as percent of participants selecting each rating rather than an overall scale. Mean score was 4.3 (no SD reported) for belief in the benefits of participating in outcomes research. 68% thought professionals need to be involved in research. Students who completed a program with specific outcomes research training were more interested in writing articles and presenting at conferences than those who attended a program without this training
Anchondo, Campbell & Zoellner, 2014[44]	**Research** **Behaviours** Past 5 years	17 multiple choice question survey about the members' research activities (preparing research proposals, designing and conducting studies, presenting publishing research or supervising research), funding and publication history, research roles, and topics of research interest within the 5- year period	US **dietitians** who were members of the Research Dietetic Practice Group, had participated in research in the previous 5 years and had a Doctoral degree ($n = 492$) or Master's degree ($n = 72$)	Research Dietetic Practice Group members with doctorate degrees were more involved in academics while members with master's degrees spent more of their professional time on funded projects
Dougherty, Burrowes & Hand, 2015[13]	**Research** **Attitudes** (importance of research, interest), **Supports and barriers, behaviours** Ever and past year	56 question survey about research experience (ever and past year), barriers and supports/resources for research Many of the survey questions were based on Byham-Gray's research pyramid[14] but did not use the DRIS	US **dietitians** who were members of the Academy of Nutrition and Dietetics ($n = 4134$)	Structural rather than knowledge barriers were the primary obstacles for research There was a disconnect between dietitians' value of research application vs research participation dietitians tended to be either continuously involved in research or never involved in research
Abad-Jorge & Butcher, 2016[45]	**Research** **Behaviours** Reporting interval not specified	Survey covering research activities (as listed in the methods: designing studies, developing proposals, conducting research, or collecting data). In the results, two more activities are listed (report research at conferences and write manuscripts)	US **dietitians** who completed their dietetic internship in 2007 or 2008 ($n = 96$)	27 participants were involved in research as part of their job responsibilities. Dietitians with a Master's degree or currently involved in graduate school were significantly more likely to be involved in research than those with only a Bachelor's degree. The most common activity was collect data for research (85% of those involved in research)

(Continues)

TABLE 3 (Continued)

Author, year	Topic/Construct/ Reporting Interval	Tool description	Population	Results
Johnson, Black & Koh, 2016[46]	**Research** **Attitudes** (benefits of participating), **Barriers** Reporting interval not specified	11 survey questions including demographic characteristics and Likert-scale multiple choice questions addressing experience with the program, reasons for participation, and perceived benefits	Canadian **dietitians** who worked in the first four cohorts of the Practice-based Research Challenge (RC), a research training program for selected teams of nurses or allied health professionals that provided year-long support through education, funding, and mentoring for the development, execution, and presentation of a project ($n = 14$)	Improving patient care, increasing their knowledge, and exploring a project interest were the leading reasons for the dietitians' participation in the RC. The primary perceived benefits of participation included professional development in addition to gaining skills, knowledge, and experience for future research
Harvey et al., 2016[12]	**Research** **Supports and barriers** Entire career	Individual, 60- to 90-minute interviews covering key events in research involvement from early career through to the present	Australian **allied health professionals (including nutrition and dietetics)** with varying research experience who had received a grant, conducted a study, or published a manuscript during their careers despite no strong desire for research participation prior to workplace entry ($n = 15$)	Proposed a four phase "clinician researcher career trajectory": debut, building momentum, expanding one's track record, and emerging as an established clinician researcher. Enablers included funding, positive research relationships, a research-friendly workplace, personality, and rewards. Barriers (constraints) included lack of supportive relationships, an unhelpful workplace, time, funding, and personality—which affected the individuals' participation in research
Tan et al., 2017[47]	**Research** **Attitudes** (interest in research, value of research, confidence), **Behaviours** Entire work or educational career (R. Tucker, personal communication providing tool, 9/8/2022)	Survey was reviewed for face and content validity, test-retest reliability was established, and poorly performing items were removed. Behaviour questions (ever participated) were choose all that apply. Attitude questions were on a 5-point Likert scale with a neutral midpoint (R. Tucker, personal communication providing tool, 9/8/2022) and internal reliability for scales of affect, value, and ability are reported, however the reporting in the 2017 paper is limited to individual questions rather than scales	US and Australian **dietitians** and **students** (total $n = 762$)	In general, the Australian respondents were more positive about research. Those who had exposure to research through coursework or experience were also more positive. Comparisons between groups are reported as p-values only; no mean/SD or n (%)
Boyd et al., 2019[31]	**Research** **Supports and barriers** Entire career	Semi-structured interview was conducted with a small subsample, with questions based on the clinician researcher career trajectory developed by Harvey et al.[12]	US **dietitians** who were established clinician researchers demonstrated by being published in selected journals between January 2015 and December 2016, working at least 20% of their professional time in clinical practice,	Exposure (educational, environmental, and mentorship), curiosity (desire to answer a question, interest in continued learning, and interest in the research process), and dedication (professional drive and self-advocacy) were identified

TABLE 3 (Continued)

Author, year	Topic/Construct/ Reporting Interval	Tool description	Population	Results
			and scoring ≥ 41.0 on the Practice Based Dietitian Research Involvement Survey (PBDRIS) ($n = 10$)	as key themes and subthemes which drove research involvement in the sample of dietitians
Soguel et al., 2019[49]	**Evidence-based practice (EBP)** **Attitudes** (preferred information sources, benefits of EBP and research)**, Supports and barriers** Reporting interval not specified	Interviews followed by focus groups, conducted in French or German	Swiss **dietitians** who had a diploma to practice in Switzerland, practiced in a non-university hospital or private practice, were in contact with patients, and did not teach more than 12 h per year ($n = 15$)	The top information sources for knowledge included continuing professional development activities, scientific articles and journals, and colleagues, experts, and professional networks. The dietitians viewed EBP positively and supported integrating the patients' values and preferences into decision making, but time was a barrier and published research was not always relevant to their work
Arts et al., 2020[48]	**Research** **Attitudes** (interests, confidence) Reporting interval not specified	Modified Peterson survey[43]	US **students** enrolled in a non-thesis online Master's of Science program with 4 research courses and a dietetic internship ($n = 55$). Pre/post evaluation	Prior to the program, the activity with the highest proportion of confidence was defining objectives (83.7%) and the activity with the lowest proportion of confidence: publishing (12.7%). After the program, the activities with the highest proportion of confidence were conducting a literature review and defining objectives (both 96.4%) and the activity with the lowest proportion of confidence continued to be publishing, but confidence had improved (36.4%)

of revising this paper, we identified one additional relevant paper that was published in the intervening time period. Specifically, Van Horn et al.[50] developed a tool combining measures of knowledge and skills from several tools reviewed in this paper to develop the "Evidence-Based Dietetic Practice Questionnaire (EBDPQ)." This tool was validated by content experts; the knowledge questions had good internal reliability, and both knowledge and skill questions had good test–retest reliability.[50] However, only validation statistics were reported, not parameter estimates.[50]

The large number of tools identified provides flexibility in the specific construct of EBP and research measured but further limits comparability across studies. In addition, few tools use objective measures of knowledge or behaviours, potentially leading to over-estimations of research participation due to "sense of competence."[11,51,52] Thus, the dietetics profession may need to generate other methods for confirming skills and behaviours. Other professions have utilised audio recording audits, electronic medical record audits or recalls of the contents of research papers to objectively confirm skills and behaviours.[16,52] These objective measures are particularly important because in a mixed sample of allied health professions, self-rated success on the RCC did not always correlate to objective measures of success.[53]

In addition to objective measures of skills, another gap is objective measures of research outputs (publications and presentations). This is a gap open for development and would be useful for quantifying research experience/expertise. However, the ideal tool would need to adjust for length of time in the field because 20 papers over a 30-year career is different to 20 papers over 5 years. Although there is an objective measure of EBP skills, the K-REC only measures the ask, acquire, and appraise steps of EBP, and does not test the apply step. EBP tools from other professions focus primarily on acquire and appraise,[54] and so the fact that K-REC also includes ask is an improvement, but an objective tool assessing apply skills is an area for development. The EBDPQ also does not include questions related to the apply step of EBP in its skill measures.[50]

Future researchers, educators and professional associations investigating and/or promoting EBP and/or research topics in dietitians are encouraged to:

- Use the categories in Table 1 to identify and describe intervention targets (e.g., attitudes, behaviours, knowledge skills, etc.), outcomes of interest, and appropriate tools for measuring outcomes.
- Use existing, validated tool(s)
  - Keep valid tools consistent over time or clearly delineate the changes in subsequent versions.
    - Consider adopting a single tool as a gold standard for each topic and construct.
- Only generate and validate a new tool when a true gap in tools exists.
  - When developing new tools, provide a full and consistent description of its characteristics, including reporting interval and scoring method.
    - Utilise the categories presented in Table 1 to provide consistent and complete descriptions of tool characteristics.

As dietetics maintains its status as an evidence-based profession and continues conducting research that forms the evidence-base, measuring knowledge, attitudes and behaviours regarding these topic areas will be an important line of research. The tools reviewed here can be used to assess baseline measures and test the efficacy of interventions in both dietitians and students. They can be used in both research and in planning and evaluating academic programs or standards, using the concept of "backward design." They may also provide useful self-assessment tools for dietitians who are planning their own professional development or considering a job change. However, these lines of inquiry will be most useful if measurements are made with valid tools that remain consistent over time, a goal that has not always been achieved in the past. Utilising the tools cited here as appropriate and developing new tools only when gaps remain should assist in measuring and eventually developing these important skills in the dietetics profession.

AUTHOR CONTRIBUTIONS

Rosa K. Hand conceived this paper, performed the search, abstracted the data, drafted and revised the paper, and approved the final version submitted for publication.

ACKNOWLEDGEMENTS

Catherine Phillips, an undergraduate student at Case Western Reserve University, assisted with updating the search in 2021 and abstracting information from the qualitative studies.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

TRANSPARENCY DECLARATION

The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported. The lead author affirms that no important aspects of the study have been omitted and that any discrepancies from the study as planned have been explained.

PEER REVIEW

The peer review history for this article is available at https://publons.com/publon/10.1111/jhn.13112.

REFERENCES

1. Byham-Gray LD. Research: a review of the "Body" and the "Backbone" for the dietetics profession. Top Clin Nutr. 2005;20:2–15.
2. King C, Byham-Gray L, O'Sullivan Maillet J, Scott Parrott J, Splett P, Roberts MM. Dietitians and research: facilitating involvement: history of dietitian involvement in dietetics research in the U.S. Top Clin Nutr. 2014;29:227–38.
3. Hand RK, Davis AM, Thompson KL, Knol LL, Thomas A, Proaño GV. Updates to the definition of evidence-based (dietetics) practice: providing clarity for practice. J Acad Nutr Diet. 2021;121:1565–73.
4. Albarqouni L, Hoffmann T, Straus S, Olsen NR, Young T, Ilic D, et al. Core competencies in evidence-based practice for health professionals: consensus statement based on a systematic review and Delphi survey. JAMA Netw Open. 2018;1:e180281.
5. Accreditation Council for Education in Nutrition and Dietetics (ACEND). ACEND accreditation standards for nutrition and dietetics internship programs (DI). https://www.eatrightpro.org/-/media/eatrightpro-files/acend/accreditation-standards/2022standardsdsi-82021–1.pdf?la%3Den%26hash%3DA20E5B7F7C5FDB8C83F20766CB524D1AD44A52C4 (2021).
6. Commission on Dietetic Registration. Registration examination for dietitians: study outline–2022–2026 [WWW Document]. https://admin.cdrnet.org/vault/2459/web/1459973360990/Study%20Outline%202022-2026%20RD%20Final%20EP%20Approved%209%2026%202020.pdf (2020). Accessed 12 September 2022.
7. British Dietetic Association. How to become a dietitian [WWW Document]. https://www.bda.uk.com/about-dietetics/how-become-a-dietitian.html. Accessed 12 September 2022.
8. Dietitians Australia. National competency standards for dietitians in Australia. https://dietitiansaustralia.org.au/sites/default/files/2022-03/DA_NationalCompetencyStandards_2021%20%28PDF%2C%20236KB%29.pdf (2021). Accessed 12 September 2022.
9. Alliance of Canadian Dietetic Regulatory Bodies. Canadian Dietetic Registration Examination (CDRE) Preparation Guide. https://www.collegeofdietitians.org/resources/registration/registration-exam/cdre-preparation-guide.aspx (2022).
10. New Zealand Government Tertiary Education Commission. Dietitian - How to enter the job [WWW Document]. https://www.careers.govt.nz/jobs-database/health-and-community/health/dietitian/how-to-enter-the-job (2022). Accessed 12 September 2022.
11. Hand RK, Abram JK. Sense of competence impedes uptake of new academy evidence-based practice guidelines: results of a survey. J Acad Nutr Diet. 2016;116:695–705.
12. Harvey D, Plummer D, Nielsen I, Adams R, Pain T. Becoming a clinician researcher in allied health. Aust Health Rev. 2016;40:562–9.
13. Dougherty CM, Burrowes JD, Hand RK. Why registered dietitian nutritionists are not doing research-perceptions, barriers, and participation in research from the academy's dietetics practice-based research network needs assessment survey. J Acad Nutr Diet. 2015;115:1001–7.
14. Byham-Gray LD, Gilbride JA, Dixon LB, Stage FK. Predictors for research involvement among registered dietitians. J Am Diet Assoc. 2006;106:2008–15.
15. Byham-Gray LD, Gilbride JA, Dixon LB, Stage FK. Evidence-based practice: what are dietitians' perceptions, attitudes, and knowledge? J Am Diet Assoc. 2005;105:1574–81.
16. Shaneyfelt T, Baum KD, Bell D, Feldstein D, Houston TK, Kaatz S, et al. Instruments for evaluating education in evidence-based practice: a systematic review. JAMA. 2006;296:1116–27.
17. Upton P, Scurlock-Evans L, Stephens D, Upton D. The adoption and implementation of evidence-based practice (EBP) among allied health professions. Int J Ther Rehabil. 2012;19:497–503.
18. Holden L, Pager S, Golenko X, Ware RS. Validation of the research capacity and culture (RCC) tool: measuring RCC at individual, team and organisation levels. Aust J Prim Health. 2012;18:62–7.
19. Whelan K, Copeland E, Oladitan L, Murrells T, Gandy J. Development and validation of a questionnaire to measure research involvement among registered dietitians. J Acad Nutr Diet. 2013;113:563–8.
20. Vogt EAM, Byham-Gray LD, Touger-Decker R. Perceptions, attitudes, knowledge, and clinical use of evidence-based practice among us registered dietitians: a prospective descriptive pilot study. Top Clin Nutr. 2013;28:283–94.
21. Vogt EAM, Byham-Gray LD, Denmark R, Touger-Decker R. Impact of an evidence-based practice intervention on knowledge and clinical practice behaviors among registered dietitians. Top Clin Nutr. 2016;31:111–24.
22. Plant MK, Marcus AF, Ziegler J, Byham-Gray L. Testing of a tool to measure practice-based research involvement for registered dietitian nutritionists in clinical practice. Top Clin Nutr. 2017;32:47–59.
23. Hand RK, Sears E, Harris SR. Research involvement of alumni from a combined dietetic internship/master's degree program with a research concentration. Top Clin Nutr. 2020;35:329–40.
24. Chughtai A, Tanweer A. Improving research capacity of practicing dietitians through interactive sessions: evidence from a pilot study. J Biol Educ. 2022;56(1):77–84.
25. King C, Byham-Gray L, Parrott JS, O'Sullivan Maillet J, Roberts MM, Splett P. Applying social cognitive career theory to registered dietitian research involvement: a randomized controlled trial. J Allied Health. 2014;43:201–11.
26. King C, Parrott JS, Hand R. A cross-sectional exploration of research outcome expectations: motivators for dietetics research involvement. Top Clin Nutr. 2016;31:147–67.
27. Boyd M, Byham-Gray L, Touger-Decker R, Marcus AF, King C. Research interest and research involvement among US registered dietitian nutritionists. Top Clin Nutr. 2016;31:267–77.
28. Upton D, Upton P. Development of an evidence-based practice questionnaire for nurses. J Adv Nurs. 2006;53:454–8.
29. Howard AJ, Ferguson M, Wilkinson P, Campbell KL. Involvement in research activities and factors influencing research capacity among dietitians. J Hum Nutr Diet. 2013;26:180–7.
30. Williams C, Miyazaki K, Borkowski D, McKinstry C, Cotchet M, Haines T. Research capacity and culture of the Victorian public health allied health workforce is influenced by key research support staff and location. Aust Health Rev. 2015;39:303–11.
31. Boyd M, Gall SB, Rothpletz-Puglia P, Parrott JS, King C, Byham-Gray L. Characteristics and drivers of the registered dietitian nutritionist's sustained involvement in clinical research activities: a mixed methods study. J Acad Nutr Diet. 2019;119:2099–108.
32. Newell AM, Troxel W. Influence of Research Involvement on the Interpretation and Implementation of a Research Competency in Dietetic Internship Programs. J Allied Health. 2021;50:47–53.
33. Swenson-Britt E, Berndt A. Development and psychometric testing of the Nursing Research Self-Efficacy Scale (NURSES). J Nurs Meas. 2013;21:4–22.
34. Bishop RM, Bieschke KJ. Applying social cognitive theory to interest in research among counseling psychology doctoral students: a path analysis. J Couns Psychol. 1998;45:182–8.
35. Bieschke K, Bishop R, Herbert J. Research interest among rehabilitation doctoral students. Rehabil Educ. 1995;9:51–66.
36. Bieschke KJ. Factor structure of the research outcome expectations scale. J Career Assess. 2000;8:303–13.

37. Bieschke KJ, Herbert JT, Bard C. Using a social cognitive model to explain research productivity among rehabilitation counselor education faculty. Rehabil Educ. 1998;12:1–16.
38. Lewis LK, Williams MT, Olds TS. Development and psychometric testing of an instrument to evaluate cognitive skills of evidence based practice in student health professionals. BMC Med Educ. 2011;11:77.
39. Hinrichs RJ. Dietetic interns' perceptions and use of evidence-based practice: an exploratory study. J Med Libr Assoc. 2018;106:65–73.
40. Hand RK, Torres SA, Watowicz RP. Design and pilot of a graduate level workshop to improve evidence-based practice skills among dietetic interns. NDEP Line. 2020;Winter:6–12.
41. Johnston JM, Leung GM, Fielding R, Tin KYK, Ho LM. The development and validation of a knowledge, attitude and behaviour questionnaire to assess undergraduate evidence-based practice teaching and learning. Med Educ. 2003;37:992–1000.
42. Jeffe DB, Rice TK, Boyington JEA, Rao DC, Jean-Louis G, Dávila-Román VG, et al. Development and evaluation of two abbreviated questionnaires for mentoring and research self-efficacy. Ethn Dis. 2017;27:179–88.
43. Peterson CA, Hays-Kimmons JE, Cole JS. Short-term effectiveness of an outcomes research training curriculum within a coordinated program. J Am Diet Assoc. 2008;108:120–4.
44. Anchondo IM, Campbell C, Zoellner J. Academy of nutrition and dietetics 2011 survey on member research activities, needs, and perceptions. J Acad Nutr Diet. 2014;114:803–10.
45. Abad-Jorge A, Butcher MF. Job satisfaction and professional characteristics of registered dietitians: a survey of the impact of educational level during entry-level practice. Top Clin Nutr. 2016;31:134–46.
46. Johnson F, Black AT, Koh JC. Practice-based research program promotes dietitians' participation in research. Can J Diet Pract Res. 2016;77:43–6.
47. Tan SY, Hemmelgarn M, Baumgardner K, Tucker RM. Attitudes towards and experiences with research: differences between dietetics students and professionals in Australia and the United States. Nutr Diet. 2017;74:388–95.
48. Arts J, Paulin C, Lofgren IE, Woodland B, English C. Evaluation of dietetic interns' research skills in an online, non-thesis master's program. Top Clin Nutr. 2020;35:277–84.
49. Soguel L, Vaucher C, Bengough T, Burnand B, Desroches S. Knowledge translation and evidence-based practice: a qualitative study on clinical dietitians' perceptions and practices in Switzerland. J Acad Nutr Diet. 2019;119:1882–9.
50. Van Horn LT, Wright L, Arikawa AY, Sealey-Potts C. Validity and reliability of a questionnaire measuring EBDPs among registered dietitian nutritionist. J Hum Nutr Diet. 2022. https://doi.org/10.1111/jhn.13024
51. Baker R, Camosso-Stefinovic J, Gillies C, et al. Tailored interventions to overcome identified barriers to change: effects on professional practice and health care outcomes. Cochrane Database Syst Rev. 2010;3:CD005470. https://doi.org/10.1002/14651858.CD005470.pub2
52. Davis DA, Mazmanian PE, Fordis M, Van Harrison R, Thorpe KE, Perrier L. Accuracy of physician self-assessment compared with observed measures of competence: a systematic review. JAMA. 2006;296:1094–102.
53. Wenke RJ, Mickan S, Bisset L. A cross sectional observational study of research activity of allied health teams: is there a link with self-reported success, motivators and barriers to undertaking research? BMC Health Serv Res. 2017;17:114. https://doi.org/10.1186/s12913-017-1996-7
54. Upton D, Upton P, Scurlock-Evans L. The reach, transferability, and impact of the evidence-based practice questionnaire: a methodological and narrative literature review. Worldviews Evid Based Nurs. 2014;11:46–54.

How to cite this article: Hand RK. Survey tools for measuring research or evidence-based practice constructs in dietetics: a narrative review. J Hum Nutr Diet. 2022;1–22. https://doi.org/10.1111/jhn.13112

AUTHOR BIOGRAPHY

Rosa K. Hand, PhD, RDN, LD, FAND is an assistant professor of nutrition at Case Western Reserve University in Cleveland Ohio. Her research investigates dietetics staffing and implementation of research and evidence based practice by dietitians.