Perspectives on App Use Among Nutrition and Dietetics Professionals

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Abstract: Despite the proliferation and use of handheld technology tools (such as Smartphones and Tablet PCs) along with software applications within the general US populace, little is known regarding their specific use by dietetics practitioners and instructors. As part of a dietetics informatics project to develop useful visualizations from nutrition datasets, the researchers sought first to explore how those in the field viewed the use of these handheld devices. The authors describe an exploratory survey study intended to investigate the current uses of new technology tools such as personal digital assistants like Smartphones and Tablet PCs by dietetic practitioners and instructors (from institutes of higher education and from Extension programs). Results revealed that a majority either do not own the latest technology or, if they do, use it primarily for personal use. Results also demonstrated that the target audiences had minimal experience with emerging technologies such as apps and visualizations. However, results showed that the target audiences did have a strong interest in learning the use of these tools and applications within their field. Respondents offered many ideas for useful applications while indicating that they required more instruction in how to utilize nutrition visualizations and apps within their classroom or field.

Keywords: Applications, dietetics, informatics, nutrition, technology.

INTRODUCTION

The US healthcare industry is becoming progressively reliant on the technological advances in handheld computing. Some companies have developed applications specific for use in the industry with tablet computers and Smartphones. These initial forays into application development have been aimed at the unique needs of medical professions, such as patient tracking, drug databases, treatment information, and medical news [1]. Personal digital assistants (PDAs) have been shown to aid diagnosis and drug selection with some studies concluding that when patients use PDAs to record their symptoms, they communicate more effectively with hospitals during follow-up visits. PDAs and other hand-held devices linked via wireless network to the main hospital IT network offer an ideal way for healthcare professionals to access medical information when they are away from their desks or computer terminals [2]. A study by de Groote and Doranski noted that "health sciences PDA literature shows that while PDAs are popular, the ways in which they are used lack depth" [3].

PDAs are increasingly being used by physicians, nurses and other health professionals for patient tracking, patient data management, disease management, e-prescribing, billing, medical references and drug information [4-9]. Kailas, Chong and Watanabe claim that over 7000 documented cases of Smartphone health apps are available [9]. Free, Phillips, Felix, Galli, Patel and Edwards as well as Terry also reviewed use of mobile phones and handheld computing devices in health and clinical practice [10, 11]. These authors noted portability, continuous uninterrupted data streaming, and support of multimedia software applications as making mobile phones advantageous over other similar handheld technologies [10, 11]. Although many apps are deemed valuable in accessing information and tracking data, they may not incorporate features consistent with theories of behavior change. Azar *et al*. evaluated some of the diet/nutrition and anthropometric tracking apps available for weight management and reported that all of the eligible apps received low overall scores for inclusion of behavioral theory-based strategies [12]. Similar results were also noted by Conroy, Wang and Maher along with Cowan *et al*. when they analyzed behavior-changing techniques in mobile apps for physical activity [13, 14]. In addition, Zanteson reported that "Today's RDs are actively tapping into technology as an effective way to. . . help their clients and patients reach their health goals." However, this author also noted that there is a "void that's in need of nutrition-related applications" that employ accurate tools backed by sound research [15]. Lieffers, Vance and Hanning also noted in their survey study of Canadian dietitians that respondents were enthused about dietetics related app use, however, found them problematic at times due to content quality, ease of use, and cost [16]. Pagoto, Schneider, Jojic, Debiasse and Mann investigated the degree to which commercially developed weight-loss apps included research-based behavioral strategies or evidenced-based weight-loss interventions, found that in the thirty apps they reviewed these typically lacked the behavioral strategies that improve motivation, reduce stress, and assist with problem solving.

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Additionally, these reviewed apps included only a few of the evidenced-based weight-loss interventions while a majority included barcode scanners and social network features [17].

Nutrition and Dietetics is not only an integral part of healthcare, but also a field striving to utilize the latest technology for practicing dietetics, for teaching content, and for improving student learning. Keeping up with this advancement, the dietetic professionals are increasingly launching their own websites and blogs, participating in social networks to connect with the public and disseminate nutrition information, as well as employing technology in the classrooms. The National Institutes of Health provides many nutrition-related applications for use by dietetic professionals, for example, health education materials, clinical guidelines, nutrient database and calculators [18]. Charney noted that with the rapid technological advances currently being experienced, dietetics professionals need to continually upgrade their skill and knowledge of emerging apps and technology in order to not only stay competitive in the field, but, also, to provide their patients with the best care available which includes the use of technology tools [19].

The first published article that examined the role of PDAs in medical nutrition was by DiDonato in 1983 [20]. This study reported that using a PDA to help prepare formulas for parenteral nutrition was not only effective and efficient, but also reduced errors. Later in 1994, Orta and Reinarts recognized that PDAs could be used for anthropometric, biochemical, and dietary assessment, as well as for providing calculation support [21]. Even though some pioneers such as Frederico Arts LLC *Food Focus: Fruits* and Back to Basics Nutrition Consulting have used this technology to create their own apps, the use of PDAs in dietetics is still extremely low [22]. There have been many reports on the use of PDAs in medicine and nursing, but to the best of our knowledge, there have been only two published studies on the use of PDAs among dietetic professionals. Turner, Burgin, Funderburg, Van Grevenhof and Knehans assessed the use of PDAs among dietitians and dietetic students in 2008 and reported that dietitians as well as dietetic students expressed an interest not only in using the PDAs, but also in receiving training in their use [23]. More recently, Fang and Fireovid examined the prevalence of PDA use among clinical dietitians and found that the use of PDAs is not common among these professionals. Their analysis also revealed that age and years of clinical experience does not influence their tendency to use the PDAs [24]. This brief communication describes the survey research undertaken to ascertain the current usage of personal digital assistants within the dietetics field and higher education dietetics programs in order to establish the next steps in a partnership between computer scientists and dietetics professionals that will propel the profession into the age of informatics.

METHOD

As one component of preliminary research performed to provide foundational knowledge for further explorations in dietetics/nutrition informatics, the objective of this survey study was to identify the extent of PDA usage among dietetic professionals (both professionally and personally) as well as the type of PDAs used among said professionals. For the purpose of this study, a personal digital assistant (PDA) was defined as a mobile device that functions as a personal information manager such as a Smartphone or tablet computer. The study also sought to identify the extent and type of app usage among dietetics/nutrition professionals, instructors, and students. Approval was obtained for this study through a commercial institutional review board.

The target population for this survey study was comprised of the following four distinct groups: faculty of distance learning in dietetics higher education programs; Extension Specialists who worked directly with dietetics and nutrition programs; faculty in dietetics higher education programs (non-distance learning); Dietetics practitioners (typically employed in hospital programs); and, students enrolled in higher education dietetics programs. Surveys were developed and administered to these audiences that included approximately 6,300 Extension agents, 46,614 dietetic practitioners, 2,555 faculty, and 10,190 students nationwide (Table **1**).

The office of the United States Department of Agriculture (USDA) was contacted to get a nationwide listing of 315 Extension Specialists each of whom in turn was requested to forward the surveys to approximately 20 Extension agents under his or her jurisdiction for a total of 6,300 agents. Coordinators of 18 Dietetic Practice Groups of the Academy of Nutrition and Dietetics (Table **2**) were contacted *via* respective list-serves and requested to forward the survey to a total of approximately 46,614 dietetic practitioners.

Each of the four surveys consisted of seven questions with wording revisions to best match the intended audience for each survey. The first four questions were forced-choice items relating to the following: app familiarity, frequency of app use, level of expertise with app use, and if respondents were familiar with apps for use in their work, and if said apps were available, would they use them. The next three questions were open-ended responses. These questions asked respondents to name apps and visualizations already utilized for personal use and for nutrition conceptual acquisition. For those who did not make regular use of apps for instruction or in the workplace, the respondents were asked to provide an explanation. Demographic data was not collected. A total of 515 surveys were returned. Data were tabulated and represented using percentage analysis.

RESULTS

Although, most respondents could name only a small number of different applications that they used regularly in their personal and sometimes professional lives, they did have many ideas regarding applications that they would find helpful in the field of nutrition education. Many respondents also noted that software application tools easily connecting the user to informatics data and useful visualizations is ultimately a direction in which they see the field of nutrition and dietetics should be moving. A majority of respondents indicated that they would indeed be interested in learning about and acquiring skills in informatics as they relate to data visualizations (Fig. **1**).

Table 1. Participants in the study.

Target Population	Group Requested to Forward Surveys	Target Population and Number Administered (approximately)	Number Responding
Extension Agents	315 Extension Specialists	Extension Agents (315 Specialists x 20 each = 6300)	248 (3.92%)
Practitioners	18 Coordinators of Academy's* DPGs**	46614 Practitioners	43 (0.09%)
Distance Faculty	20 Program Directors (15 DI, 3 DPD, 2 CP) ***	1 Director + 2 Faculty each (20 programs x 3 each = 60)	7 (11.6%)
Campus Faculty	534 Program Directors (228 DI, 221 DPD, 50 CP)	1 Director + 4 Faculty each (499 programs x 5 each = 2495)	163 (6.49%)
Students	Through 554 Program Directors (243 DI, 224 DPD, 52 CP)	243 DI x 10 = 2430 students 224 DPD x 30 = 6720 students 52 CP x 20 = 1040 students Total 10190 students	54 (0.51%)
Total		65,659	515 (0.77%)

*Academy of Nutrition and Dietetics
** Dietetic Practice Groups
*** DI: Dietetic Internship, DPD: Didactic Program in Dietetics, CP: Coordinated Program

Table 2. Surveyed dietetic practice groups of the academy of nutrition and dietetics.

Dietetic Practice Group	Membership	Dietetic Practice Group	Membership
Clinical Nutrition Management	2056	Oncology Nutrition	1907
Diabetes Care and Education	6000	Pediatric Nutrition	3460
Dietetic Technicians in Practice	373	Public Health / Community Nutrition	1962
Dietetics in Health Care Communities	4227	Renal Dietitians	2400
Dietitians in Nutrition Support	3528	School Nutrition Services	1240
Healthy Aging	1959	Sports, Cardiovascular and Wellness Nutrition	6392
Management in Food and Nutrition Systems	1190	Vegetarian Nutrition	1200
Medical Nutrition Practice Group	1899	Weight Management	4950
Nutrition Education for the Public	1049	Women's Health	822

Table 3. Favorite apps of postsecondary faculty.

Percent using App	App Name	Percent using App	App Name
21	Facebook	2	Birdwatcher's Diary
16	Maps	2	Blood Glucose Tracker
16	Weather	2	Fooducate
8	Lose it	2	Good Reader
5	Local News	2	Accuweather
5	Pedometer	2	Trip Advisor

Results from the survey of postsecondary faculty (168 respondents) demonstrate that most faculty use applications for primarily personal use on a weekly basis. Many who responded could identify their favorite apps by name (Table **3**).

A small number of respondents (21%), however, did not use app technology during instruction nor did they integrate apps within their curricula. However, those who did make use of apps for teaching (79%) could provide a listing of these apps. A list of these apps is provided below in Table **4**.

Practitioners in the field of nutrition (n=43) who responded to their survey regarding apps and visualizations indicated they used apps for personal use (79%), however, fewer (70%) used apps and/or visualizations in their work

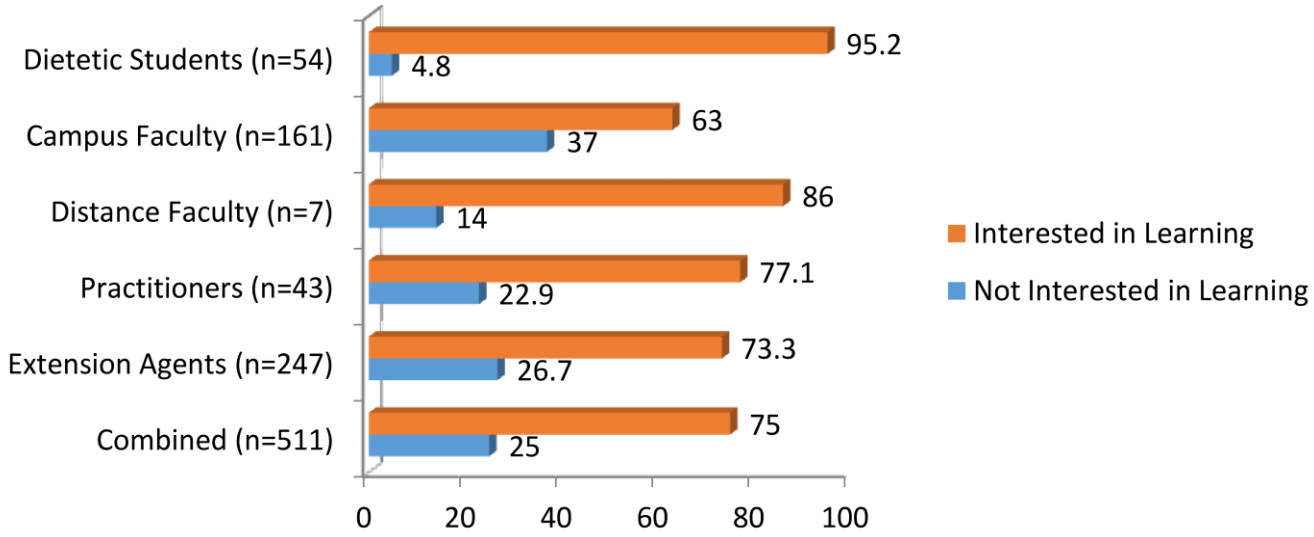

Fig. (1). Interest exhibited by respondents in learning about the use of apps.

Table 4. Apps used by postsecondary faculty.

Percent using App	App Name	Percent using App	App Name
30	My Fitness Pal	5	Medcalc
10	BMI Calculator	5	Medical Abbreviations
5	Allrecipes	5	Medscape
5	Blackboard	5	My Plate
5	Fitness Calculator	5	Office of Dietary Supplements
5	Fooducate	5	RH Med Labs
5	iMapMyRun	5	Skype

Table 5. Apps used by practitioners.

Percent using App	App name	Percent using App	App Name
27	My Fitness Pal	6	Lose It
6	BMI Calculator	6	Medical Calculator
6	Calorie King	6	My Blue Loop
6	Chrono Age	6	My Care Connect
6	Dragon Dictation	6	NW Pro (6%)
6	Go Meals	6	STAT Growth Charts
6	Live Strong	6	Tap & Track

environment. Very few respondents (28%) could name apps that they did use (Table **5**).

DISCUSSION

Overall, results from the surveys demonstrate that the target audiences had minimal experience with emerging technologies such as apps and visualizations. However, the results also indicate that the target audiences did have a strong interest in learning the use of these tools and technologies (Fig. **1**). It is interesting to note that the dietetic students (the traditionally youngest group of the four target audiences surveyed) were those most interested in learning and using the latest technology.

For the majority of faculty respondents surveyed who stated their reasons for not using apps or visualizations for instructional purposes, the reasons given are summarized as follows:

- These respondents did not have access to the technology tool with which to make use of apps or visualizations (i.e. Smart phones or Tablet PCs)
- These respondents did not have time to research current available apps to verify their usefulness, accuracy, applicability or authenticity to learning.
- Most respondents did not have the pedagogical knowledge for appropriately integrating these technologies into their instruction. That is, most respondents lacked the "best practices" knowledge of utilization.

Overall, faculty respondents made it clear that if the following conditions could be met, they would make greater use of apps and visualizations:

- Apps and visualizations were easily and readily accessible.
- Faculty were made aware of apps and visualizations that had been properly vetted and were known to be reliable and accurate.
- Faculty were adequately trained in the use of apps and visualizations.

Most of the practitioners responded that they did not employ apps in their work environment for the following reasons:

- They do not have access to Smart phones or Tablet PCs.
- They have not found a need for such use.
- They are unaware of how apps and visualizations could be useful in their work environment.
- They have not found any apps or visualizations that they deemed as useful for their work environment.

It is clear from these data that greater access by dietetics instructors, students and practitioners to technology tools such as PDAs and Tablet PCs will serve to provide the foundational awareness that these tools can be used effectively for learning and for client support. In addition to these tools, the dietetics profession needs to provide guidelines and infrastructure for developing and showcasing the needed and useful apps as well as verifying the content and testing the efficacy of new apps with their intended audience. Also, the dietetics profession needs to lead the field in offering a variety of forums for training professionals in the most appropriate and effective usage of each new app and visualization tool.

In conclusion, web-based tools are increasingly becoming commonplace in the classroom and in the workplace. The rapid proliferation and ubiquitous usage of Tablet PCs and Smartphones within society indicates that there are significant opportunities to exploit their potential in the field of dietetics. The user-friendly interface of Smart phones and Tablets combined with expanding high-speed Internet connections make it simple and easy to bring such technology tools into dietetic classrooms and workplaces. Availability of dietetic apps, including the ones that easily make available USDA and NIH databases, can certainly help increase awareness regarding the use of technology in nutrition education as well as the practice of dietetics. These tools and useful applications will allow dietetics professionals to more effectively support clients through client tracking, quicker access to databases or other hospital information, and improved self-monitoring tools for use by clients. In addition, training current dietetic professionals and higher education instructors in the use of these tools, applications and visualizations would help introduce new technology and their applications to the next generation of practitioners.

ABBREVIATIONS

PDAs = Personal Digital Assistants

PCs = Personal Computers

CONFLICT OF INTEREST

The authors report no conflict of interest.

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REFERENCES

[1] Carroll AE, Christakis DA. Pediatricians' use of and attitudes about personal digital assistants. Pediatrics 2004; 113: 238-42.

[2] Flanders AE, Wiggins RH, Gozum ME. Handheld computers in radiology. RadioGraphics 2003; 23: 1035-47.

[3] de Groote SD, Doranski M. The use of personal digital assistants in the health sciences: results of a survey. J Med Libr Assoc 2004; 92: 341-9.

[4] Burdette S, Herchline T, Richardson WS. Killing bugs at the bedside: a prospective hospital survey of how frequently personal digital assistants provide expert recommendations in the treatment of infectious diseases. Ann Clin Microbiol Antimicrob 2004; 3: 22-7.

[5] Fischer S, Stewart TE, Mehta S, Wax R, Lapinsky SE. Handheld computing in medicine. J Am Med Inform Assoc 2003; 10: 139-49.

[6] Johnson ED, Pancoast PE, Mitchell JA, Shyu CR. Design and evaluation of a personal digital assistant-based alerting service for clinicians. J Med Libr Assoc 2004; 92: 438-44.

[7] VanDenKerkhof EG, Goldstein DH, Lane J, Rimmer MJ, Van Dijk JP. Using a personal digital assistant enhances gathering of patient data on an acute pain management service: a pilot study. Can J Anaesth 2003; 50: 368-75.

[8] Volsko TA. Portable computers and applications in respiratory care. Respir Care 2004; 49: 497-506.

[9] Kailas A, Chong CC, Watanabe F. From mobile phones to personal wellness dashboards. IEEE Pulse 2010; 57-63.
[10] Free C, Phillips G, Felix L, Galli L, Patel V, Edwards P. The effectiveness of m-health technologies for improving health and health services: a systematic review protocol. BMC Res Notes 2010; 3: 250.
[11] Terry M. Medical apps for smartphones. Telemed J E Health 2010; 16: 17-22.
[12] Azar KMJ, Lessar LI, Laing BY, *et al*. Mobile applications for weight management. Am J Prev Med 2013; 45: 583-9.
[13] Conroy DE, Yang CH, Maher JP. Behavior change techniques in top-ranked mobile apps for physical activity. Am J Prev Med 2014; 46: 649-52.
[14] Cowan LT, Van Wagenen SA, Brown BA, *et al*. Apps of steel: are exercise apps providing consumers with realistic expectations? a content analysis of exercise apps for presence of behavior change theory. Health Educ Behav 2013; 40: 133-9.
[15] Zanteson L. Developing smartphone apps. Today's Dietitian 2013; 15: 60.
[16] Lieffers JRL, Vance VA, Hanning RM. Use of mobile device applications in canadian dietetic practice. Can J Diet Prac Res 2014; 75: 41-7.
[17] Pagoto S, Schneider K, Jojic M, Debiasse M, Mann D. Evidence-based strategies in weight-loss mobile apps. Am J Prev Med 2013; 45: 576-82.
[18] National Institutes of Health. U.S. National Library of Medicine, Gallery of Mobile Apps and Sites. Available from: http://www.nlm.nih.gov/mobile/
[19] Charney, P. Advanced technological applications in dietetics practice. Top Clin Nutr 2007; 22: 108-14.
[20] DiDonato LJ. Use of the handheld programmable calculator in the preparation of tpn solutions. Hosp Pharm 1983; 18: 526-8, 531-3.
[21] Orta J, Reinarts CL. Comparison of handheld computers for nutrition assessment and support. J Am Diet Assoc 1994; 94: 1409-14.
[22] Getz L. Communicating nutrition messages-there's an app for that. Today's Diet 2011; 13: 28-9.
[23] Turner PR, Burgin C, Funderburg KM, Van Grevenhof J, Knehans AW. Use of personal digital assistants among dietitians and dietetic students in oklahoma: should programs incorporate pda training into their curricula? J Allied Health 2008; 37: 196-202.
[24] Fang C, Fireovid K. The prevalence of use of personal digital assistants (pdas) by clinical dietitians in delaware valley. The FASEB J 2009; 23(Meeting Abstract Supplement): 551.2.

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