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Application of the Rasch Model to Measure Five Dimensions of Wellness in Community-Dwelling Older Adults

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Background and Purpose: Nurse researchers and practicing nurses need reliable and valid instruments to measure key clinical concepts. The purpose of this research was to develop an innovative method to measure dimensions of wellness among older adults. **Method:** A sample of 5,604 community-dwelling older adults was drawn from members of the COLLAGE consortium. The Wellness Assessment Tool (WEL) of the COLLAGE assessment system provided the data used to create the scores. Application of the Rasch analysis and Masters' partial credit method resulted in logit values for each item within the five dimensions of wellness as well as logit values for each person in the sample. **Results:** The items fit the Rasch model, and the composite scores for each dimension demonstrated high reliability (1.00). The person reliability was low: social (.19), intellectual (.33), physical (.29), emotional (.20), and spiritual (.29). The small number of items within each dimension and the homogenous sample appear to have contributed to this low reliability. **Conclusion:** Ongoing research using multidimensional tools to measure dimensions of wellness among older adults is needed to advance wellness science and wellness promotion in nursing practice.

Keywords: wellness; multidimensional wellness; holistic; aging adults; older adults

Promoting wellness among aging adults needs to be a priority for nurses both today and in the future (Institute of Medicine [IOM], 2011). Testing interventions designed to promote wellness among older adults is becoming increasingly important as the number of adults entering old age is growing exponentially. Baby boomers, those born between 1946 and 1964, started turning 65 years old in 2011; they represent 20% of the United States population (Federal Interagency Forum on Aging-Related Statistics, 2010; Hartman-Stein & Potkanowicz, 2003). As adults age, their risk for chronic disease, functional decline, and cognitive decline increases (Federal Interagency Forum on Aging-Related Statistics, 2010). These increased risks affect quality of life, increase health care costs, and limit older adults' ability to remain living independently in the community (Federal Interagency Forum on Aging-Related Statistics, 2010). The recent Future of Nursing Report for the IOM (2011) expects a transformed health care system where nurses *intentionally* promote wellness and disease prevention, reliably improve health outcomes, and provide compassionate care across the life span (IOM, 2011, para. 1).

Promoting wellness among older adult populations forces a paradigm shift in health care delivery from disease-focused or deficit-based care to well-focused or asset-based care. The goal for the future of nursing is to shift sick-focused care to wellness care through creative, innovative, holistic, and multidimensional wellness interventions in the community (IOM, 2011). Nurses play a critical role in wellness program development, evaluation, and education (IOM, 2011). Before nurses can design effective wellness interventions for America's aging adults, they need valid and reliable methods to measure the multidimensional concept of wellness. The purpose of this article is to present a multidimensional wellness measurement tool and scoring method designed specifically for older adults.

BACKGROUND

The concept of wellness is not universally defined (Mackey, 2009). Theorists, however, agree that wellness is a complex and holistic state of being that innately strives to expand and achieve one's full potential (Adams, Bezner, Steinhardt, 1997; Hattie, Myers, & Sweeney, 2004; Hettler, 1976; National Wellness Institute, 2010; Nenn & Vaisberg, 2010; Witmer & Sweeney, 1992). Wellness is a multidimensional structure encompassing five to seven dimensions: social, occupational, spiritual, physical, intellectual, environmental, and psychological (Adams et al., 1997; Becker, Dolbier, Durham, Glascoff, & Adams, 2008; Hattie et al., 2004; Hettler, 1976; Nenn & Vaisberg, 2010; Witmer & Sweeney, 1992). Each dimension interconnects and represents the whole person (Hettler, 1976). High-level wellness, or magnitude in one dimension, can positively influence other dimensions, and balance within dimensions can positively influence total wellness (Adams et al., 1997). In addition, imbalance in one dimension may negatively influence other dimensions (Nenn & Vaisberg, 2010). Wellness aligns with holism philosophy: nurses cannot understand a patient's wellness without assessing the whole patient in multiple dimensions (Godfrey-Smith, 2003). To achieve the IOM's vision to intentionally promote wellness and to meet the needs of the aging population, nurses must begin to examine patient populations using multidimensional, holistic wellness measurement tools in research.

The research in wellness program development and wellness interventions is not designed in a holistic or multidimensional wellness framework (Brubaker, Witta, & Angelopoulos, 2003; Hatch & Lusardi, 2010; Milani & Lavie, 2009; Palumbo, Wu, Shaner-McRae, Rambur, & McIntosh, 2012; Turner, Thomas, Wagner, & Moseley, 2008). Characteristically, prior research, almost exclusively, has targeted the physical dimension of wellness by improving nutrition or increasing physical activity (Brubaker et al., 2003; Hatch & Lusardi, 2010; Milani & Lavie, 2009; Palumbo et al., 2012; Turner et al., 2008). Wellness is commonly operationalized using the SF-36 (Brubaker et al., 2003; Chafetz, White, Collins-Bride, Cooper, & Nickens, 2008; Hatch & Lusardi, 2010; Joslin, Lowe, & Peterson, 2006; Milani & Lavie, 2009; Palumbo et al., 2012; Turner et al., 2008). Although the 36-Item Short Form Health Survey (SF-36) is a valid and reliable measurement tool across general and specific populations, the tool is designed to compare the burden of disease and differentiate health benefits of specific treatments or interventions (Ware, 2011). The SF-36 does not examine the multidimensional concept of wellness.

MULTIDIMENSIONAL WELLNESS MEASUREMENT TOOLS

To identify tools that measure the concept of wellness in multiple dimensions, we conducted a search of the Health and Psychosocial Instrument (HaPI) database using the keywords wellness, multidimensional, and holistic. We reviewed tools specifically designed to measure wellness and tools that measured at least five of the seven dimensions (social, occupational, spiritual, physical, intellectual, environmental, and psychological) identified by wellness theorists. Four multidimensional wellness measurement tools were revealed: Perceived Wellness Survey (PWS), Salutogenic Wellness Promotion Scale (SWPS), TestWell Lifestyle Assessment Questionnaire (LAQ), and Five Factor Wellness (5F-Wel; Adams, Bezner, Garner, & Woodruff, 1998; Adams et al., 1997; Becker, Dolbier, et al., 2008; Becker, Whetstone, Glascoff, & Moore, 2008; Hattie et al., 2004; TestWell Online Assessment Tools, 2008). The psychometric testing of the PWS, SWPS, and 5F-Wel focused on adolescent, young adults, and middle-aged adults. Published research that examines the reliability and validity of these measurement tools for older adult populations is notably absent (Adams et al., 1998; Adams et al., 1997; Becker, Dolbier, et al., 2008; Becker, Whetstone, et al., 2008; Hattie et al., 2004; TestWell Online Assessment Tools, 2008). An older adult version of the LAQ is available; however, this measurement tool is designed for wellness program development and personal wellness improvement. The tool is proprietary, and there is no available data on the reliability and validity of this measurement tool. Measurement methods for older adults are at a critical juncture to advance wellness science in nursing. The Wellness Assessment Tool (WEL) of the COLLAGE assessment system is responsive to this need because it is a multidimensional tool designed to measure wellness among aging adults.

WELLNESS ASSESSMENT TOOL

The WEL was developed collaboratively by COLLAGE administrators and interRAI in response to the needs of the COLLAGE consortium. COLLAGE is a national member consortium of continuing care retirement communities (CCRC) and was established to achieve two goals: (a) Improve the quality of life for older adults and (b) establish COLLAGE as the leading model for keeping older adults across all socioeconomic levels active and independent (COLLAGE, *The Art and Science of Healthy Aging*, 2008). InterRAI instruments are developed through an extensive process of consultation with leading researchers, representing more than 30 countries and collaborating with hundreds of health administrators, policy developers, and organizations around the world. Critical assessments of instruments in the interRAI series are completed before release for public use (Hirdes et al., 2008). The interRAI suite demonstrates internal, test-retest, and inter-rater reliability as well as face, content, criterion, and predictive validity (Hirdes et al., 1999; Hirdes et al., 2008).

Description of the Wellness Assessment Tool

The WEL was designed for older adults living independently in the community to focus their attention on wellness and facilitate the process of developing healthy aging plans—an individualized roadmap toward wellness. It also provides data to the community and

affiliate organizations that develop and evaluate wellness-based programs and services. The WEL allows older adults to respond to specific items that address the dimensions of wellness and express interest or intention to participate in wellness activities. Responses are summarized and discussed with the older adult. According to an in-depth and detailed concept analysis of wellness by McMahon and Fleury (2012), wellness among older adults focuses on three qualities: the adult's values and strengths, individualism, and partnership with health care professionals. The WEL addresses each of these qualities.

The WEL contains items that cover nine core areas: exercise and physical fitness, nutrition, social relationships, emotional, spiritual, practices affecting health and well-being, recreation, sleep, and goals for wellness service planning. The assessment data are collected through a one-on-one conversation with a qualified and trained staff member at least once, annually. The trained staff member guides the older adult in a conversation and learns about his or her involvement, preference, and satisfaction with items included on the WEL. The WEL provides a goal-planning section that allows the older adult to identify personal wellness goals. Trained staff members enter the results of the WEL in an electronic database, and the data is stored in a repository (COLLAGE, The Art and Science of Healthy Aging, 2008).

Although the WEL is a comprehensive approach to examine wellness among older adults, the items currently are not scored to identify more or less wellness. The availability of scored scales within the WEL offers the opportunity to profile older adults' wellness across multiple dimensions. Researchers then may serve to identify specific wellness qualities that protect older adults' health and improve their quality of life. The purpose of this research was to create composite scores for five dimensions of wellness. The institutional review board at Northeastern University and University of Phoenix provided approval of this work.

THEORETICAL FRAMEWORK

The Six Dimensions of Wellness by Hettler (1976) guided the development of scales for the WEL. According to this framework, wellness is an ever-changing process that encompasses six dimensions: social, intellectual, physical, emotional, spiritual, and occupational (Hettler, 1976). *The Six Dimensions of Wellness* interconnect to represent a person. For the purposes of this research, occupational wellness was excluded because of the limited variability of this dimension in an older adult population. The sample consisted of retired adults. The theoretical definitions that guided this research are listed in Table 1.

METHOD

Sample Selection

Data from older adults residing in member organizations of the COLLAGE consortium with a completed WEL between the years 2007 and 2012 were used in the analysis. The original sample contained 7,985 adults. Adults younger than 60 years who were living in the community at the time of the assessment were excluded. The final sample included 5,604 community-dwelling adults from 72 CCRCs located in 24 states.

TABLE 1. Theoretical Definitions for Five Dimensions of Wellness

Dimension of Wellness	Definition
Social wellness	Ability to form and maintain positive personal and community relationships
Intellectual wellness	Commitment to lifelong learning through continuous acquisition of skills and knowledge
Physical wellness	Commitment to self-care through regular participation in physical activity and healthy eating
Emotional wellness	Ability to acknowledge personal responsibility for life decisions and their outcomes with emotional stability and positively
Spiritual wellness	Having purpose in life and a value system

Note. Adapted from Hettler, W. (1976). *The six dimensions of wellness model*. Stevens Point, WI: National Wellness Institute. Copyright 2014 by the National Wellness Institute.

Approach

To create scales for the five dimensions of wellness, 22 items from the WEL that align with the theoretical definitions from five dimensions of wellness were selected for the analysis. Table 2 lists the wellness dimension and the corresponding items from the WEL. The items included in the analysis represent nominal and ordinal levels of measurement. To achieve basic fundamental measurement comparisons, interval-level measurement is essential (Andrich, 1988). Rasch analysis was used to convert ordinal and dichotomous data into interval-level data.

Measurement

Rasch analysis offers the ability to compute the degree of wellness a person possesses using a logit value (Andrich, 1988). A logit is determined by comparing the subject's ability with item difficulty (Andrich, 1988). In this research, the person's ability was the level of wellness the person demonstrated, and the item difficulty is the level of wellness associated with item. The logit in the Rasch analysis asserts that the probability of wellness depends on the level of wellness a person demonstrates relative to the level of wellness associated with the item (Andrich, 1988).

The Rasch rating scale for dichotomous variables follows a "pass" or "fail" structure. If a person answers favorably to an item that represents a high level of wellness, he or she scores a "1." If the person responds with any other answer, he or she scores a "0." Individuals will earn credit for the "favorable" answers, and they will not earn credit for any other answer. When a person's level of wellness increases, the probability of answering favorably moves closer to 1. Rasch model is

$$\frac{P_{in_1}}{P_{in_0} + P_{in_1}} = \frac{e^{(\beta_n - \delta_i)}}{1 + e^{(\beta_n - \delta_i)}}$$

P_{in_1} is the probability of person n scoring 1 on item i . P_{in_0} is the probability of person n scoring 0 on item i . β_n is the ability of person n and δ_i is the difficulty of the item (Masters,

TABLE 2. Items from Wellness Assessment Tool, Corresponding Dimension of Wellness, Number of Items, and Coding and Recode Sequence

Dimension of Wellness	No. of Items From WEL	Item	Original Code	Recode Sequence
Intellectual wellness	6	Interested or involved in computerized games	(0, 1, 2)	(0, 2, 1)
		Interested or involved in crossword puzzles	(0, 1, 2)	(0, 2, 1)
		Interested or involved in educational courses	(0, 1, 2)	(0, 2, 1)
		Interested or involved in genealogy	(0, 1, 2)	(0, 2, 1)
		Interested or involved in writing	(0, 1, 2)	(0, 2, 1)
		Physical wellness	4	Participates in fitness/exercise program
Weight: Do you consider yourself?	(0, 1, 2, 3)			(1, 2, 3, 4, 0)
Number of glasses of fluid consumed per day	(0, 1, 2, 3)			(3, 2, 1, 0)
Do you feel you're eating a healthy diet?	(0, 1)			N/A
Emotional wellness	4	How satisfied are you with your life as a whole in the last 3 days?	(0, 1, 2, 3, 4, 5)	(5, 4, 3, 2, 1)
		Do you feel valued?	(0, 1)	N/A
		Do you look forward to being challenged by new opportunities?	(0, 1, 2)	N/A
		Does stress have a negative effect on your quality of life?	(0, 1)	(1, 0)
Spiritual wellness	3	Finds meaning in day-to-day life	(0, 1)	N/A
		Do you feel your spiritual needs are being met?	(0, 1)	N/A
		How do you view your spirituality?	(0, 1, 2, 3)	(3, 2, 1, 0)

Note. WEL = Wellness Assessment Tool.

1982). Traditional Rasch method does not award credit for responses closer to the “best” response (Masters, 1982).

The response options on the WEL reflect various degrees of wellness. For example, one of the items from the emotional dimension asks the subject, “How satisfied are you with your life as a whole in the last 3 days?” The response options are “delighted,” “pleased,” “mostly satisfied,” “mixed,” “mostly dissatisfied,” and “unhappy.” The response that represents the highest level of wellness is delighted. However, the response pleased is better than mostly satisfied and mostly satisfied is better than mixed and so on. The Masters’ partial credit model extends traditional Rasch model by awarding partial credit for success on items closer to the best response, which is a more precise measure of a person’s ability or level of wellness than the “pass/fail” method (Masters, 1982). In addition, the items selected from the WEL that correspond with the five dimensions of wellness contained different response choices; some items include dichotomous scores, whereas others may range from 0 to 5. Masters’ partial credit model allows each item to contain different response patterns (Bond & Fox, 2001). Therefore, the Rasch partial credit model was applied. The Rasch partial credit model is defined by

$$\Pr\{X_{ni} = x\} = \frac{e^{\sum_{k=0}^x (\beta_n - \tau_{ki})}}{1 + \sum_{k=0}^m e^{\sum_{k=0}^x (\beta_n - \tau_{ki})}}$$

where X_{ni} is a random variable that can take on integer values between 0 and a maximum scale value of m , τ_{ki} represents the k threshold location of question i on the constructed variable, and β_n is the location of person n on the same constructed variable continuum. Partial credit model permits co-calibration of sets of items with different rating scale structures.

Missing Data

Logit values for items within five dimensions of wellness were created: social, intellectual, physical, emotional, and spiritual. The physical dimension had one subject who had missing values on all items. The emotional dimension had two subjects who had missing values on all items. A value of 0 was inserted for missing responses before conducting the analysis. A value of 0 does not influence the partial credit model given $m = 0$ to maximum of 5 depending on the item scale. This method is preferred when missing items for persons are rare or when there are limited to few items within the scales (Linacre, 2012). The social and intellectual dimensions of wellness did not contain any missing values.

Reverse Coding

Several items required reverse coding in the original data set, and these items, their original code, WEL variable name, and recode sequence are listed in Table 2. The five dimensions of wellness comprised different number of questions and response options (after recoding), which are listed in Table 2.

RESULTS

The average age of the final sample of 5,604 community-dwelling older adults was 83 years with a standard deviation of 6.52 with 70% female. Three percent of the

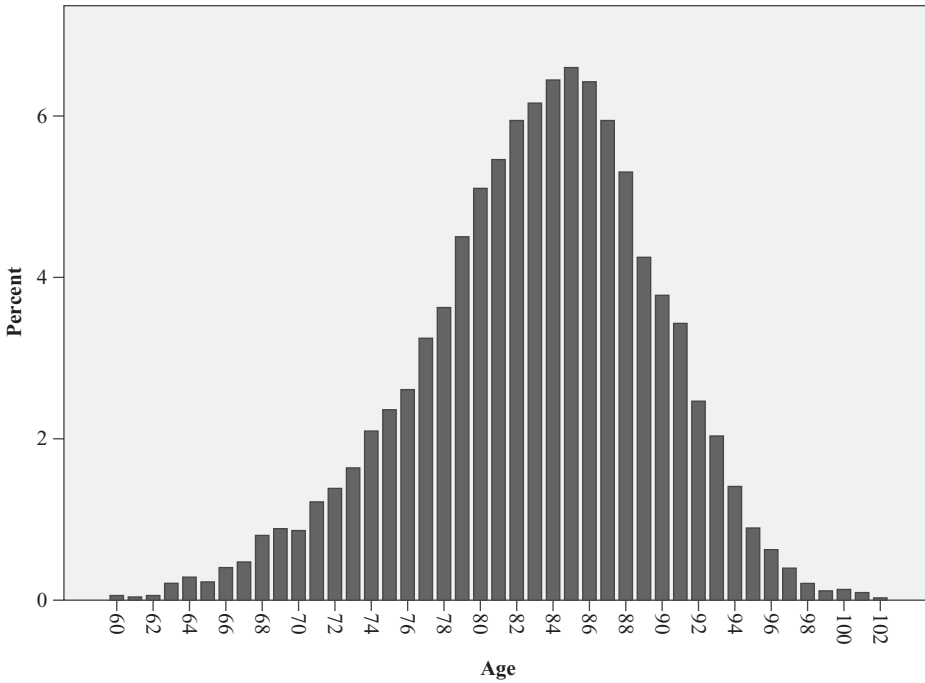


Figure 1. Distribution of age at time of wellness assessment. $N = 5,604$, $\bar{X} = 83$, $s = 6.2$.

sample completed Grades 8–11, 12% completed high school, 5% trade school, 15% attended some college, 34% earned a bachelor’s degree, and 31.6% earned a graduate degree or higher. Eighty six percent of the sample was White, and 14% represented Hawaiian, Black, Asian, American Indian, Hispanic, and other. The results of the analysis for each of the items within the five dimensions of wellness and the fit statistics are reported in Table 3. Higher logit values for each item represent higher levels of wellness.

Social Wellness

Figure 1 presents the Rasch analysis results for social dimension of wellness. The map illustrates the level of wellness the sample demonstrated alongside the level of wellness associated with each item. The symbols represent the number of persons who represent various degrees of social wellness. Persons near the top of the map demonstrate higher levels of social wellness compared to persons near the bottom of the map. The level of wellness the sample demonstrated is displayed on the left, and the level of wellness associated with each item is displayed on the right. Items at the top of the map are associated with higher level wellness, and items near the bottom of the map are associated with lower level wellness. Item 1, “has close friends in the community” is located at the top of the map, which indicates this item demonstrates the highest level of wellness. However, as shown in Figure 2, more than 250 adults in the sample remain “above” this item, meaning the level of wellness demonstrated by the sample exceeds the level of wellness associated with the item. In order of higher level wellness to lower level wellness, the items that represent the social dimension of wellness are as follows: “feels can count on friends for

(Continued)

Measure	Person	Map	Item
	<more>		<rare>
-3	•	—	—
	•		
	•		
	•		
-4	•	—	—
	•		
	•		
-5	•	—	—
	<less>		<frequent>

Note. Level of wellness associated with sample on left. Persons demonstrating more social wellness are located near the top of the map; persons demonstrating less social wellness are located near the bottom of the map. Level of wellness associated with item on right. Items representing more wellness are located near top of map; items representing less wellness are located near bottom of map. Item 1 demonstrates the most wellness; Item 3 demonstrates the least amount of wellness. T = two standard deviations from the person or item mean; S = one standard deviation from the person or item mean; M = mean of person or item distribution. Each “□” is 127 persons. Each “•” is 1–126 persons.

Figure 2. Social dimension of wellness item and person map. (Continued)

Intellectual Wellness

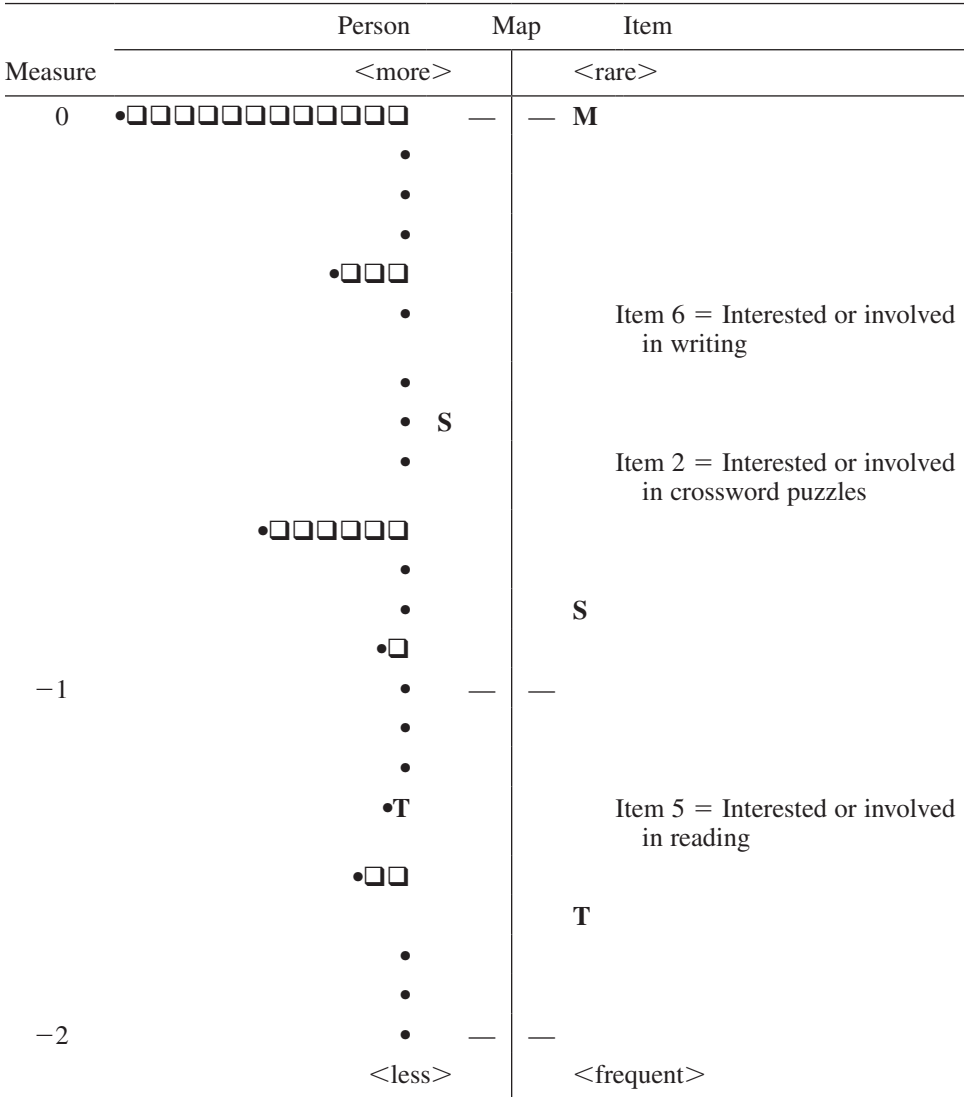
Figure 3 displays the results for the intellectual dimension of wellness. The map illustrates the level of wellness the sample demonstrated alongside the level of wellness associated with each item. The symbols represent the number of persons who represent various degrees of intellectual wellness. Persons near the top of the map demonstrate higher levels of intellectual wellness compared to persons near the bottom of the map. The level of intellectual wellness the sample demonstrated is displayed on the left, and the level of intellectual wellness associated with each item is displayed on the right. Items at the top of the map are associated with higher levels of intellectual wellness, and items near the bottom of the map are associated with lower level intellectual wellness. Item 4, “interested or involved in genealogy” demonstrates the highest level of wellness within the intellectual dimension; followed by: Item 3, “interested or involved in educational courses”; Item 1, “interested or involved in computerized games”; Item 6, “interested or involved in writing”; and Item 2, “interested or involved in crossword puzzles.” Item 5, “interested or involved in reading” represents the least amount of wellness. As displayed in Figure 3, although Item 5 is associated with the least amount of wellness, this item remains below some adults’ level of wellness. Item 4 is associated with the highest level of wellness, and more than 600 older adults in this sample remain “below” this level of wellness. Data from items within the intellectual dimension of wellness appear to fit the Rasch model. As shown in Table 3, Item 4, “interested or involved in genealogy” is slightly out of the 0.50–1.50 range, with a fit value of 1.58 suggesting that the sample does not respond to Item 5 in a predictable way.

TABLE 3. Rasch Item Level of Wellness Measure and Fit Statistics for Five Dimensions of Wellness

Dimension of Wellness	Item	Count	Rasch Item Measure	Outfit Mean Square
Social wellness	Has close friends in the community	5,581	0.78	0.44
	Feels can count on friends for companionship	5,581	0.59	0.35
	Has opportunity to give and receive affection	5,532	-0.13	1.11
	Feels community environment is supportive	5,556	0.54	0.44
	Participates as a volunteer on campus	5,548	-0.61	2.42
Intellectual wellness	Interested or involved in computerized games	5,537	0.35	0.97
	Interested or involved in crossword puzzles	5,510	-0.54	0.90
	Interested or involved in educational courses	5,524	0.43	0.90
	Interested or involved in genealogy	5,508	1.33	1.58
	Interested or involved in reading	5,561	-1.23	0.61
	Interested or involved in writing	5,521	-0.34	1.28
Physical wellness	Participates in fitness/exercise program	5,575	-0.74	1.48
	Weight: Do you consider yourself?	5,585	-1.53	0.83
	Number of glasses of fluid consumed per day	5,581	0.10	0.76
	Do you feel you're eating a healthy diet?	5,575	2.71	0.47
Emotional wellness	How satisfied are you with your life as a whole in the last 3 days?	5,577	-7.47	0.90
	Do you feel valued?	5,565	2.38	3.43
	Do you look forward to being challenged by new opportunities?	5,517	-1.20	1.17
	Does stress have a negative effect on your quality of life?	5,583	6.29	9.90
Spiritual wellness	Finds meaning in day-to-day life	5,604	1.53	0.68
	Do you feel your spiritual needs are being met?	5,604	1.69	0.72
	How do you view your spirituality?	5,604	-3.22	2.32

Note. Higher positive Rasch item measures = higher level of wellness. Negative Rasch item measure = lower level wellness. Mean-square fit statistics, 0.5–1.5 = productive for measurement.

(Continued)



Note. Level of wellness associated with sample on left. Persons demonstrating more intellectual wellness are located near the top of the map; persons demonstrating less intellectual wellness are located near the bottom of the map. Level of wellness associated with item on right. Items representing more wellness are located near top of map; items representing less wellness are located near bottom of map. Item 4 demonstrates the most wellness; Item 5 demonstrates the least amount of wellness. T = two standard deviations from the person or item mean; S = one standard deviation from the person or item mean; M = mean of person or item distribution. Each “□” is 87. Each “•” is 1–86.

Figure 3. Intellectual dimension of wellness item and person map. (Continued)

(Continued)

Measure	Person	Map	Item
	<more>		<rare>
			T
-3		—	—
	•		
	•		
-4	•	—	—
	•		
-5		—	—
	•		
-6	•	—	—
	•		
	<less>		<frequent>

Note. Level of wellness associated with sample on left. Persons demonstrating more physical wellness are located near the top of the map; persons demonstrating less physical wellness are located near the bottom of the map. Level of wellness associated with item on right. Items representing more wellness are located near top of map; items representing less wellness are located near bottom of map. Item 4 demonstrates the most wellness; Item 2 demonstrates the least amount of wellness. T = two standard deviations from the person or item mean; S = one standard deviation from the person or item mean; M = mean of person or item distribution. Each “□” is 72 persons. Each “•” is 1–71 persons.

Figure 4. Physical dimension of wellness item and person map. (Continued)

levels of physical wellness compared to persons near the bottom of the map. The level of physical wellness the sample demonstrated is displayed on the left, and the level of physical wellness associated with each item is displayed on the right. Items at the top of the map are associated with higher levels of physical wellness, and items near the bottom of the map are associated with lower level physical wellness. The items in order from highest level of wellness to lowest level wellness follow: Item 4, “Do you feel you’re eating a healthy diet?”; Item 3, “number of glasses of fluid consumed per day”; Item 1, “participates in fitness/exercise program”; and Item 2, “Weight: Do you consider yourself?” As displayed in Figure 4, item 4, “Do you feel you’re eating a healthy diet?” demonstrates the highest level of wellness, whereas Item 2 is above 400 adults’ level of wellness. As outlined in Table 3, the data from the items within the physical dimension of wellness fit the Rasch model. Items 1–3 fall within the acceptable fit range. Item 4 falls slightly out of range with a fit of 0.47, suggesting that responses to Item 4 are too predictive among this sample and likely results from most believing they eat a healthy diet.

Emotional Wellness

Figure 5 presents the results for the emotional dimension of wellness. The map illustrates the level of emotional wellness the sample demonstrated alongside the level of emotional wellness associated with each item. The symbols represent the number of persons

(Continued)

Measure	Person	Map	Item
	<more>		<rare>
-8	•	—	—
	•		
-9		—	—
-10	•	—	— T
-11		—	—
-12		—	—
-13	•	—	—
-14		—	—
-15		—	—
-16	•	—	—
	<less>		<frequent>

Note. Level of wellness associated with sample on left. Persons demonstrating more emotional wellness are located near the top of the map; persons demonstrating less emotional wellness are located near the bottom of the map. Level of wellness associated with item on right. Items representing more wellness are located near top of map; items representing less wellness are located near bottom of map. Item 4 demonstrates the most wellness; Item 1 demonstrates the least amount of wellness. S = one standard deviation from the person or item mean; M = mean of person or item distribution; T = two standard deviations from the person or item mean. Each “□” is 171. Each “•” is 1–170.

Figure 5. Emotional dimension of wellness item and person map. (Continued)

who represent various degrees of emotional wellness. Persons near the top of the map demonstrate higher levels of emotional wellness compared to persons near the bottom of the map. The level of emotional wellness the sample demonstrated is displayed on the left, and the level of intellectual wellness associated with each item is displayed on the right. Items at the top of the map are associated with higher levels of emotional wellness, and items near the bottom of the map are associated with lower level emotional wellness. The items in order from highest level of wellness to lowest level of wellness follow: Item 4, “Does stress have a negative effect on your quality of life?”; Item 2, “Do you feel valued?”; Item 3, “Do you look forward to being challenged by new opportunities?”; and Item 1, “How satisfied are you with your life as a whole in the last 3 days.” As displayed in Figure 5, Item 4 demonstrates the highest level of wellness in this sample. Item 1 is beyond the level of wellness of more than 800 older adults in this sample. As listed in Table 3, the data for the items within the emotional dimension of wellness do not fit the Rasch model well. Items 1, “How satisfied are you with your life as a whole in the last 3 days?” and 3, “Do you look forward to being challenged by new opportunities?” fall within the recommended fit ranges; however, Item 2, “Do you feel valued?” and Item 4, “Does stress have a negative effect on your quality of life?” are well outside the range at 3.43 and 9.90, respectively. Responses on Items 2 and 4 are unpredictable among this sample.

Spiritual Wellness

Figure 6 presents the results from the spiritual dimension of wellness. The map illustrates the level of spiritual wellness the sample demonstrated alongside the level of spiritual wellness associated with each item. The symbols represent the number of persons who represent various degrees of spiritual wellness. Persons near the top of the map demonstrate higher levels of spiritual wellness compared to persons near the bottom of the map. The level of spiritual wellness the sample demonstrated is displayed on the left, and the level of spiritual wellness associated with each item is displayed on the right. Items at the top of the map are associated with higher levels of spiritual wellness, and items near the bottom of the map are associated with lower level spiritual wellness. Item 2, "Do you feel your spiritual needs are being met?" is the associated with the highest level of wellness, followed by Item 1, "finds meaning in day-to-day life." Item 3, "How do you view your spirituality?" is associated with the least amount of wellness. Item 3 is beyond the ability of more than 400 older adults in this sample. As listed in Table 3, data from Items 1, "finds meaning in day-to-day life," and 2, "How do you view your spirituality?" fit the Rasch model well; however, Item 3, "How do you view your spirituality?" exceeds the recommended range at 2.32. Responses to Item 3 are too unpredictable among this sample of older adults.

Reliability

The item internal consistency reliability for each dimension of wellness is excellent. Each dimension of wellness, social, intellectual, physical, emotional, and spiritual, has item reliability at 1.00. This verifies the item hierarchy. In Rasch analysis, item reproducibility or reliability can be determined without examining differences in person ability. The items that construct the dimension scales have wide difficulty variance among this population, meaning the level of wellness associated with each item is wide (Linacre, 2012). These data support the Rasch assumption that the data should fit the Rasch model, which they do. This also supports the construct validation of the five dimensions: social, intellectual, physical, emotional, and spiritual (Linacre, 2012). The high item reliability is supported by the large sample size ($N = 5,604$) (Linacre, 2012).

In contrast, person reliability for each dimension is poor. The Winsteps reliability outputs for each dimension follow: social (.19), intellectual (.33), physical (.29), emotional (.20), and spiritual (.29). The low person reliability means that the level of wellness demonstrated by the sample did not generate a wide variance of "high" and "low" wellness, which negatively influences the person reliability (Linacre, 2012). The low person reliability reflects the homogeneity of the sample; the sample was skewed toward positive wellness because all were living independently in the community. The number of items used to create each dimension of wellness also influenced the person reliability; each dimension of wellness included fewer than five items from the WEL. The length of rating scores can negatively influence person reliability in the Rasch model (Linacre, 2012). Scales with more items generate larger person reliabilities (Linacre, 2012).

DISCUSSION

The results of this research provide support for the Rasch analysis of the Wellness tool responses as a method to measure wellness among older adults. Logit values produced by the Rasch model allow researchers to combine multiple variables that represent specific

dimensions of wellness and generate composite scores for each dimension. The composite scores are a precise method of measurement because they represent both the level of wellness each item within each dimension represents and the level of wellness the person represents. The data used to construct the five dimensions of wellness fit the Rasch model, as demonstrated by the high item reliability. Some items within each dimension demonstrate poor fit: Item 5 within the social dimension of wellness, “feels community environment is supportive”; Items 2 and 4 within the emotional dimension of wellness, “Do you feel valued?” and “Does stress have a negative effect on your quality of life?”; and Item 3 within the spiritual dimension, “How do you view your spirituality?” The probability of responding to a specific item among those with high and low levels of wellness was unpredictable for these items within this sample. The fit of these items may improve in a sample with a wider variance of responses. These items may be too broad, which may cause older adults to interpret them differently. Some may interpret “Do you feel valued?” as valuing themselves, whereas others may interpret the question as feeling valued by their family members, peers, or health care providers.

The sample that generated the data used to conduct the Rasch analysis was a homogenous group and reflects a biased sample. More than 65% of the sample earned a bachelor’s degree or higher. Positive health correlates with more education (Robert Wood Johnson Foundation, 2009). Even with the large sample size ($N = 5,604$), the variance of wellness demonstrated was small; the amount of wellness the sample demonstrated was skewed toward positive wellness. The lack of variance among the responses may contribute to the low person reliability for each dimension of wellness (Linacre, 2012). To increase reliability in future analysis, Rasch analysis may be conducted on a more diverse, heterogeneous sample. In addition, each dimension is constructed with few items, that is, five or less. Fewer items tend to contribute to lower reliability estimates (Linacre, 2012). Adding additional items to each dimension of wellness may improve person reliability (Linacre, 2012), although this was not feasible given this was a secondary analysis.

Applying reliable and valid methods to measure wellness among older adults is an important, preliminary step to caring for an aging population. Wellness is a multidimensional state of being (Adams et al., 1997; Becker, Dolbier, et al., 2008; Becker, Whetstone, et al., 2008; Hattie et al., 2004; Hettler, 1976; Nenn & Vaisberg, 2010; Witmer & Sweeney, 1992); therefore, researchers and clinicians need reliable and valid multidimensional measurement tools to examine wellness. Currently, four reliable and valid multidimensional wellness tools are available: PWS, SWPS, LAQ, and 5F-Wel (Adams et al., 1998; Adams et al., 1997; Becker, Dolbier, et al., 2008; Becker, Whetstone, et al., 2008; Hattie et al., 2004; TestWell Online Assessment Tools, 2008).

The available tools to measure the wellness in multiple dimensions currently apply traditional testing methods to create composite scores for each dimension of wellness and total wellness (Adams et al., 1998; Adams et al., 1997; Becker, Dolbier, et al., 2008; Becker, Whetstone, et al., 2008; Frank-Stromberg & Olsen, 2004; Hattie et al., 2004). For example, individuals earn five points if they “strongly agree” to being an “active person,” and they earn no points if they “strongly disagree.” This method of examining wellness is limited because it does not account for the person’s level of wellness or the level of wellness associated with each item. Some items may represent more or less wellness than others. For example, being active may be a higher level of wellness than drinking the recommended number of ounces of water each day. In addition, some individuals may demonstrate more wellness than others. Using Rasch analysis to compute logit values for

items within each dimension of wellness allows researchers to compute dimension scores by summing the logit values for each item representing each dimension. This method offers an innovative and objective measurement option to examine the degree or magnitude of wellness among adults.

Tools to specifically examine the multidimensional concept of wellness among older adults are unavailable (Adams et al., 1998; Adams et al., 1997; Becker, Dolbier, et al., 2008; Becker, Whetstone, et al., 2008; Hattie et al., 2004; TestWell Online Assessment Tools, 2008). For nurses to intentionally promote wellness and support older adult's ability to remain living well in the community, they need reliable and valid tools to measure wellness (IOM, 2010). Computing a score for each dimension using logit values from Masters' partial credit, Rasch analysis provides an opportunity to profile older adults and determine how specific dimensions of wellness protect their health. For example, researchers can use composite scores for each dimension of wellness in statistical analysis to determine which dimension is most protective for preventing various adverse health outcomes common to aging adults: falls, cognitive decline, admissions to long-term care facilities, and so on. Once researchers are able to identify specific dimensions of wellness that are most predictive of protecting older adults from adverse health outcomes, they can develop interventions to increase wellness within that dimension.

Further psychometric examinations of the reliability and validity of scores within dimensions of wellness should be conducted. In future analysis, researchers should include more items within each dimension and conduct the analysis on a population with more variance in the level of wellness. Future research using the WEL should increase the number of items within each dimension to 10 to try to improve person reliability. In addition, researchers should attempt to collect data using the WEL on a heterogeneous sample of persons who represent high and low levels of wellness. However, using the WEL poses multiple challenges when attempting to generate a sample of older adults that reflect a normal distribution. Because the assessment targeted independent community-dwelling older adults, who are living primarily in CCRCs, these adults will likely represent higher levels of wellness at baseline compared to those who are living in assisted or long-term care facilities. Although adults in this sample reflect a homogenous sample, the data collected and analyzed among this population is valuable to researchers and care providers whose goals are to protect health and prevent disease among aging adults. These adults reflect the vision of the IOM (2011). Identifying how wellness contributes to keeping this population of older adults living independently and well in the community will facilitate new knowledge and creative, innovative, and holistic wellness interventions for all aging adults to prevent adverse health outcomes.

REFERENCES

- Adams, T., Bezner, J., Garner, L., & Woodruff, S. (1998). Construct validation of the perceived wellness survey. *American Journal of Health Studies, 14*(4), 212–222.
- Adams, T., Bezner, J., & Steinhart, M. (1997). The conceptualization and measurement of perceived wellness: Integrating balance across and within dimensions. *American Journal of Health Promotion, 12*, 380–388.
- Andrich, D. (1988). *Rasch models for measurement*. London, United Kingdom: Sage.
- Becker, C., Dolbier, C. L., Durham, T. W., Glascoff, M. A., & Adams, T. B. (2008). Development and preliminary evaluation of a positive health scale. *American Journal of Health Education, 39*(1), 34–41.

- Becker, C., Whetstone, L., Glascoff, M., & Moore, J. B. (2008). Evaluation of the reliability and validity of an adult version of the salutogenic wellness promotion scale (SWPS). *American Journal of Health Education, 39*(6), 322–328.
- Bond, T. G., & Fox, C. M. (2001). *Applying the Rasch model: Fundamental measurement in the human sciences*. Mahwah, NJ: Erlbaum Associates.
- Brubaker, C., Witta, L., & Angelopoulos, T. J. (2003). Maintaining exercise tolerance and quality of life by long-term participation in a hospital-based wellness program for individuals with congestive heart failure. *Journal of Cardiopulmonary Rehabilitation, 23*(5), 352–356.
- Chafetz, L., White, M., Collins-Bride, G., Cooper, B. A., & Nickens, J. (2008). Clinical trial of wellness training: Health promotion for severely mentally ill adults. *Journal of Nervous & Mental Disease, 196*(6), 475–483.
- COLLAGE, The Art and Science of Healthy Aging. (2008). *About COLLAGE*. Retrieved from <http://collageaging.kendal.org/Site/About/FAQs.aspx>
- Federal Interagency Forum on Aging-Related Statistics. (2010). *Older Americans 2010 key indicators of well-being*. Retrieved from http://www.agingstats.gov/agingstatsdotnet/main_site/default.aspx
- Frank-Stromberg, M., & Olsen, S. J. (2004). *Instruments for clinical health-care research* (3rd ed.). Mississauga, Canada: Jones and Bartlett.
- Godfrey-Smith, P. (2003). *Theory and reality: An introduction to the philosophy of science*. Chicago, IL: University of Chicago Press.
- Hartman-Stein, P. E., & Potkanowicz, E. S. (2003). Behavioral determinants of healthy aging: Good news for the baby boomer generation. *Online Journal of Issues in Nursing, 8*(2), 6. Retrieved from <http://www.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Vol142009/No3Sept09/Articles-Previous-Topics/Update-and-Baby-Boomer-Generation.html>
- Hatch, J., & Lusardi, M. (2010). Impact of participation in a wellness program on functional status and falls among aging adults in an assisted living setting. *Journal of Geriatric Physical Therapy, 33*(2), 71–77.
- Hattie, J. A., Myers, J. E., & Sweeney, T. J. (2004). A factor structure of wellness: Theory, assessment, analysis, and practice. *Journal of Counseling & Development, 82*(3), 354–364.
- Hettler, B. (1976). *The six dimensions of wellness*. Retrieved from <http://www.hettler.com/sixdimen.htm>
- Hirdes, J. P., Fries, B. E., Morris, J. N., Steel, K., Mor, V., Frijters, D., & Teare, G. (1999). Integrated health information systems based on the RAI/MDS series of instruments. *Healthcare Management Forum, 12*, 30–40.
- Hirdes, J. P., Ljunggren, G., Morris, J. N., Frijters, D. H., Finne Soveri, H., Gray, L., & Gilgen, R. (2008). Reliability of the interRAI suite of assessment instruments: A 12-country study of an integrated health information system. *BMC Health Services Research, 8*(277).
- Institute of Medicine. (2010). *The future of nursing: Leading change, advancing health*. Washington, DC. Retrieved from <http://www.iom.edu/Reports/2010/The-Future-of-Nursing-Leading-Change-Advancing-Health.aspx>
- Joslin, B., Lowe, J. B., & Peterson, N. A. (2006). Employee characteristics and participation in a worksite wellness programme. *Health Education Journal, 65*(4), 308–319.
- Linacre, J. M. (2012). *A user's guide to Winsteps Ministep Rasch-model computer programs*. Chicago, IL: MESA.
- Mackey, S. (2009). Towards an ontological theory of wellness: A discussion of conceptual foundations and implications for nursing. *Nursing Philosophy, 10*(2), 103–112. <http://dx.doi.org/10.1111/j.1466-769X.2008.00390.x>
- Masters, G. N. (1982). A Rasch model for partial credit scoring. *Psychometrika, 47*(2), 149–174.
- McMahon, S., & Fleury, J. (2012). Wellness in older adults: A concept analysis. *Nursing Forum, 47*(1), 39–51. <http://dx.doi.org/10.1111/j.1744-6198.2011.00254.x>
- Milani, R. V., & Lavie, C. J. (2009). Impact of worksite wellness intervention on cardiac risk factors and one-year health care costs. *American Journal of Cardiology, 104*, 1389–1392.
- National Wellness Institute. (2010). *Defining wellness*. Retrieved from http://www.nationalwellness.org/index.php?id_tier=2&id_c=26
- Nenn, P. J., & Vaisberg, E. (2010). Translational health and wellness. *Alternative Therapies in Health & Medicine, 16*(4), 70–72.

- Palumbo, M. V., Wu, G., Shaner-McRae, H., Rambur, B., & McIntosh, B. (2012). Tai Chi for older nurses: A workplace wellness pilot study. *Applied Nursing Research, 25*(1), 54–59. <http://dx.doi.org/10.1016/j.apnr.2010.01.002>
- Robert Wood Johnson Foundation. (2009, September). *Commission to build a healthier America* (Issue Brief No. 6: Education and Health). Retrieved from <http://www.commissiononhealth.org/PDF/c270deb3-ba42-4fbd-baeb-2cd65956f00e/Issue%20Brief%206%20Sept%2009%20-%20Education%20and%20Health.pdf>
- TestWell Online Assessment Tools. (2008). *TestWell home*. Retrieved from <http://www.testwell.org/>
- Turner, S. L., Thomas, A. M., Wagner, P. J., & Moseley, G. C. (2008). A collaborative approach to wellness: Diet, exercise, and education to impact behavior change. *Journal of the American Academy of Nurse Practitioners, 20*(6), 339–344.
- Ware, J. (2011). *SF-36 health survey update*. Retrieved from <http://www.sf-36.org/tools/sf36.shtml>
- Witmer, J. M., & Sweeney, T. J. (1992). A holistic model for wellness and prevention over the life span. *Journal of Counseling & Development, 71*(2), 140–148.

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