Chapter 7

Development of Short Quality of Life Screeners

This chapter discusses approaches to developing short self-report quality of life (QOL) measurements that are a subset of the 11-domain, 54-item set that we created. Some of the impetus for this effort was dictated by an interest in including direct resident-reported measures in the next version of the nursing home Minimum Data Set, the draft version of which was released in the 2003.

Several approaches are feasible to create shorter QOL measures. For example, a selection of domains could be used to emphasize domains of greatest interest for particular purposes. Similarly, more analysis could be done on the structure of the relationships of the domains to identify closely overlapping domains for possible eliminations or mergers.

A key decision in shortening the battery is determining whether a multidimensional versus a uni-dimensional scale is desired. Taking the arbitrary goal of developing a tool with no more than 14 items, we examined what a 14-item uni-dimensional scale might look like, and also performed analyses to determine whether a dimensional structure might be maintained within a 14-item scale. This chapter reports on the development of both a uni-dimensional and a multidimensional 14-item scale with particular attention to possible inclusion in the MDS. It also describes approaches to other multidimensional variants that fall between 14 items and the full battery; in that regard, we also present a 34-item instrument with 9 domains.

Issues

Data Collection Circumstances

Our work on resident self-report QOL measures (described in chapter 3) was developed so as to include as many resident respondents as possible, including those with cognitive

impairment. Similarly, shortened scales should have that capability. Any shortened scale would require that standardized questions be asked directly of the residents, which is a departure from the rating process used to complete many other parts of the MDS. To accurately collect a self-report QOL measure, even the short 14-item versions presented here, it would be crucial for the data collector to set the stage by seeking a private interview with the resident, establishing rapport, explaining the general purpose of the questions, and establishing an unhurried atmosphere for the administration of the questions. Residents often need to reflect and ruminate aloud on these kinds of questions before offering their responses and it is imperative that interviewers be trained in non-biasing ways of conducting the interview.

Our QOL work has also revealed that MDS-derived cognitive scores are an imperfect way of determining who is capable of providing QOL interviews. We were able to conduct direct interviews with residents whose cognitive scores suggested substantial cognitive impairment. We recommend that residents not be screened out from attempts to interview them on QOL unless they are comatose or in a vegetative state. All others should have the opportunity to try to respond. If CMS wishes, we can provide protocols for determining when a resident who has been approached is unable to be interviewed. On average across 100 facilities, 40% of nursing home residents could not complete our long QOL interviews; this percentage varied by facility; we expect a much greater number to be able to complete short 14-item or 16-item scales, particularly with binary response choices. At the end of the chapter we discuss possible protocols for applying a short tool.

Response Formats

In our QOL work in general, we have used 4-point Likert response formats for almost all items (typically, using the choices “often, sometimes, rarely, never”), and have permitted

residents who cannot cope with that complexity because of cognitive impairment to use a binary "mostly yes" or "mostly no" response. For our original research purposes, we developed a mechanism to extrapolate binary responses into the Likert responses, using 3.8 for "mostly yes" answers and 3.5 for "mostly no" answers.

To avoid the training needed for interviewers to systematically move between the two response sets and to maximize the proportion of residents likely to respond in a nationwide administration of QOL measures, we recommend that QOL items added to the MDS be posed at the outset as dichotomous questions to be answered "mostly yes" or "mostly no." It may be important to avoid absolute "yes" or "no" response choices because the resident's experience is often varied and has both positive and negative elements. After a resident considers an item and discusses its pros and cons, the interviewer is taught to use a probe that repeats the question such as "taking all that into account, as far as liking the food, would you say your answer for having the kind of foods you prefer is mostly yes or mostly no?"

To explore the use of binary data for MDS applications, we reversed some of our previous steps. Whereas we previously used an empirically-identified way to interpolate dichotomous responses into the Likert formats, the current goal required us to collapse the Likert responses into dichotomous responses. Our 4-part Likert responses could be "dichotomized" in 3 ways. We tested the results of all 3 possibilities, seeking the solution that would give us variation and clear cut scores. Given the variation in our Likert responses, the most satisfactory solution was to re-code the "often" and "sometimes" responses as "mostly yes" and the "rarely" and "never" responses as "mostly no." Any "dichotomized" version of scales used in analyses presented in Chapter 2 and Chapter 3, are based on that solution. In developing shorter scales, as described in the subsequent chapters, we began with Likert responses, tested the resulting scales with

interpolated scores that combined Likert and binary, and then redid the scales to convert all Likert responses to binary responses, creating what we allude to as "dichotomized" scales. The multidimensional scales presented in Chapter 2 maintained stable factor structure regardless of the samples used and the switch to the dichotomized format.

Although we recommend using binary response categories for an MDS application, a caveat is necessary. We have not actually administered the scales to a large sample using dichotomous items at the outset. Rather, our results are based on re-calibrating our Likert scales into binary scales. We recommend a test of the actual administration of short, dichotomous scales to see if variation on the items remains adequate and to further refine the approach to administering these instruments in a shortened version.

Note, too, that these short scales are <u>not</u> designed to replace the longer versions developed in Wave 1 or the 54-item battery developed in Wave 2. Longer scales and the dual administration with the Likert response pattern and the binary-response fall-back are still suitable for more in-depth examination of QOL in a facility. Moreover, we used as a strong criterion for identifying items for an MDS application the ability of items to distinguish among the 100 facilities where we collected data. Some of the items and domains not selected because they fail to differentiate facilities show a great deal of intra-facility variation that might be important for clinical and quality improvement purposes. For example, the dignity items varied more within nursing homes than across them and, thus, do not appear in either 14-item scale; they may, nevertheless, be of importance to CMS because dignity is an important aspect of quality standards for nursing homes.

Summary of Shortened Scales

In this section, we summarize 3 shorter scales. Then we discuss the strategies used to develop each.

Beginning with a premise that CMS might want to maintain the multidimensional structure of the Q54-item QOL scales in a shorter version; we developed a 34-item instrument that will yield 9 domain scores. In this solution, the Relationship domain is dropped (because it was highly related to Individuality) and items from the Meaningful Activity and Spiritual Well-being Scales are combined into an Activity Scale.

If a shorter multidimensional scale is desired (e.g., for the MDS), we created a subset of 14-items that fell into 4 factors (QOL-MD14); these factors or domains are Security, Enjoyment, Privacy, and the new Activity domain that incorporates religious activity items). Because the form was developed using items only from the domains that discriminated among facilities during both waves of data collection, the subscales of QOL-MD14 have a strong ability to discriminate among nursing homes.

The uni-dimensional 14-item scale (QOL-14) started from a different premise with the goal of identifying a short scale to measure the overall QOL construct. Again it began by using the 7 domains that discriminated among facilities in both waves of data collection. From each of those domains, we selected the two items that varied most by facility. The results were a 14-item scale with reasonable scale consistency.

Both shortening approaches began with Likert scales, then were tested with interpolations of binary responses into the 4-point Likert scales, and finally were tested after all the Likert scales were dichotomized into binary scales. Below we provide more detail about how the shorter multidimensional and uni-dimensional scales were created.

Table 7.1 summarizes the domain structure and Table 7.2 the items for three options for shorter scales; two multidimensional options and one overall QOL measure. It is noteworthy that the two 14-item instruments have 8 items in common. The uni-dimensional QOL-14 includes 2 items from the relationship domain, whereas the Relationship domain is not retained in either the 34-item or the 14-item multidimensional scale.

Table 7.1. Domain Structure of Three Shortened Scales

34-item 9-domain scale		**14-item 4-domain scale (QOL-MD14)**		**QOL-14**
Domain	**# items**	**Domain**	**# items**	Confirmatory factor analysis showed a single QOL construct for these 14 items. The items themselves were drawn from 7 of the 11 a priori theoretical domains: privacy, spiritual well-being, meaningful activity, relationships, individuality, security, and enjoyment (2 items taken from each domain). Domains not represented in this uni-dimensional scale are Comfort, Functional Competence, Autonomy, and Dignity.
Privacy	4	Privacy	4	
Enjoyment	3	Enjoyment	3	
Security	3	Security	3	
Activity (SWB)[a]	4	Activity (SWB)[a]	4	
Comfort	4			
Dignity	4			
Autonomy	4			
Functional Competence	4			
Individuality	4			

[a]Two items from Meaningful Activity and the two activity-oriented items from Spiritual Well-Being (attending religious activities, and finding religious observances personally meaningful) factored strongly together.

Table 7.2: Comparison of Items in 3 Shortened QOL Scales

Item	34-item, 9-domain	14-item, 4-domain (QOL-MD14)	14-item, single domain (QOL-14)
CMF. How often are you too cold here?	x		
CMF. How often are you so long in the same position that it hurts?	x		
CMF. How often are you in physical pain?	x		
CMF. How often are you bothered by noise when you are in your room?	x		
FC. Is it easy for you to get around in your room by yourself?	x		
FC. Can you easily reach the things that you need?	x		
FC. Can you easily reach your toilet articles and things you want to use in your bathroom?	x		
FC. Do you do as much to take care of your own things and room as you can and want?	x		
PRI. Can you find a place to be alone when you wish?	x	x	
PRI. Can you make a private phone call?	x	x	x
PRI. When you have a visitor, can you find a place to visit in private?	x	x	x
PRI. Can you be together in private with another resident (other than your roommate)?	x	x	
DIG. Do staff here treat you politely?	x		
DIG. Do you feel that you are treated with respect here?	x		
DIG. Do staff here handle you gently while giving you care?	x		
DIG. Does staff here respect your modesty?	x		
SWB. Do you participate in religious activities here?	x	x	x
SWB. Do the religious observances here have personal meaning for you?	x	x	x
MACT. Do you enjoy the organized activities here at the nursing home?	x	x	x
MACT. Outside of religious activities, do you have enjoyable things to do at the nursing home during the weekends?	x	x	
MACT. Despite your health condition, do you give help to others, such as other residents, your family, people at this nursing home, or the outside community?			x
ENJ. Do you like the food here?	x	x	x
ENJ. Do you enjoy mealtimes here?	x	x	x
ENJ. Can you get your favorite foods here?	x	x	
AUT. Can you go to bed at the time you want?	x		
AUT. Can you get up in the morning at the time you want?	x		
AUT. Can you decide what clothes to wear?	x		
AUT. Have you been successful in making changes in things you do not like?	x		
AUT. Taking all staff together, nurses, aides, and others, does the staff know about your interests and what you like?	x		x
IND. Do staff members know you as a person?	x		
IND. Are people working here interested in your experiences and the things you have done in your life?	x		x
IND. Do residents here know you as a person?	x		
SEC. Do you feel that your possessions are safe at this nursing home?	x	x	x
SEC. Do your clothes get lost or damaged in the laundry?	x	x	
SEC. Do you feel safe and secure?	x	x	
REL. Do you feel confident that you can get help when you need it?			x
REL. Do you consider any staff member here to be your friend?			x
REL. In the last month, have people who worked here stopped just to have a friendly conversation with you?			x

34-item and 14-Item Multidimensional Instruments

Goal

The goal of the work described in this chapter was to create shorter QOL scales that preserved as much as possible the multi-dimensionality of the original longer formats.

Although we perceive merits to using Likert scales in many applications of QOL tools, we judged that this technique would be too complex for routine administration and analysis if applied to the MDS or similar comprehensive data collection efforts. Therefore, we also needed to model the best way to change the Likert data into a binary format. This chapter describes the methods and results in 5 steps.

Step 1. Develop Brief Multidimensional Instrument using Likert and Interpolated Binary Responses.

For this analysis, we used 955 cases with no missing or "don't know" responses for any of the 54 items used in Wave 2. An approximate "best subset" approach based on comparing several hundred "supposedly" good models was used. We tried to preserve as many original domains as possible but set the constraint that we have no fewer than 3 and no more than 4 items per domain. In cases when the original domains did not support an orthogonal structure, we attempted to combine domains. Items were selected to have highest possible loadings on the corresponding factors/domains and lowest possible loadings on other factors/domains (after varimax rotation).

The resulting varimax rotated component matrix is presented in Table 7.3. (The item numbers refer to the items in the Wave 2 Questionnaire, which is found in Appendix P.) Blank cells have loadings less than 0.2. For this and subsequent factor analyses in this chapter, the extraction method is Principal Components Analysis and the rotation method is Varimax with Kaiser Normalization.

Table 7.3. Factor analysis for 955 Wave 2 Cases for Likert Responses with No Missing Items

Item	Component								
	1	2	3	4	5	6	7	8	9
FC1. Is it easy for you to get around by yourself in your room?		**.762**							
FC2. Can you easily reach the things you need?		**.788**							
FC4. Can you easily reach your toilet articles and things you want to use in your bathroom?		**.771**							
FC5. Do you do as much to take care of your own things and room as you can and want?		**.743**		.211					
Pri1. Can you find a place to be alone when you wish?				**.721**					
Pri2. Can you make a private phone call?		.203		**.565**					
Pri3. When you have a visitor, can you find a place to visit in private?				**.865**					
Pri4. Can you be together in private with another resident (other than your roommate)?				**.821**			.251		
MA3. Do you enjoy the organized activities here?			**.616**			.239			
MA4. Outside of religious activities, do you have enjoyable things to do during the weekend?			**.539**				.218		
SWB1. Do you participate in religious activities here?			**.865**						
SWB2. Do the religious observances here have personal meaning for you?			**.821**						
Enj1. Do you like the food here?						**.841**			
Enj2. Do you enjoy meal times at NAME OF NF?						**.775**			
Enj3. Can you get your favorite foods here?						**.648**	.248		
Aut1. Can you go to bed at the time you want?							**.738**		
Aut2. Can you get up in the morning at the time you want?							**.743**		
Aut 3. Can you decide what clothes to wear?							**.548**		
Aut 4. Have you been successful in changing things you do not like?							**.430**		
Cmf1 How often are you too cold here.								**.579**	
Cmf2 How often are you so long in the same position that it hurts?								**.751**	
Cmf3. How often are you in physical pain?								**.718**	
Cmf 4. How often are you bothered by noise when you are in your room?								**.522**	.200
Ind1. Taking all staff together, . . ., does the staff know about your interests & what you like?					**.674**				
Ind2. Do staff members know you as a person?					**.773**				
Ind3.Are people working here interested in your experiences and what you have done in your life?					**.649**				
Ind5.Do residents here know you as a person?					**.641**				
Dig1. Do staff here treat you politely?	**.796**								
Dig2. Do you feel that you are treated with respect here?	**.794**								
Dig3. Do staff here treat you gently while giving you care?	**.676**								
Dig4. Do staff here respect your modesty?	**.737**								.203
Sec1. Do you feel your possessions are safe at this NF?									.675
Sec2. Do your clothes get lost or damaged in the laundry?									.774
SecSum. How would you rate your QOL with respect to feeling safe and secure?	.299								.412

One domain (Relationships) was not used because it was highly correlated with Individuality and could not be preserved as a distinct factor. Two domains (Meaningful Activity and Spiritual Well-being) were combined into a new domain because these four questions could not be separated; they stayed together in all tested models). It is noteworthy that the two Spiritual Well-being items that joined in a factor with meaningful activity items are those dealing with religious observances, which constitute an activity. The items reflecting a more general spiritual well being did not load with the factor. Finally, one overall summary rating item on security was added to obtain the smallest acceptable security domain with three items because the remaining security items did not stay together. The result was a 9-factor/domain instrument with 34 items.

Step 2. Test the Local Optimality (Goodness) of the Obtained Instrument using the Same Sample

Optimality was tested from two different viewpoints.

1. We first examined whether it is possible to increase the number of domains from 9 to 10 without losing the orthogonal structure. We found that all attempts to add 3-4 items (to the 34-item instrument) that might represent the 10^{th} domain corrupted the dimensional structure.

2. We then examined whether it would be possible to replace any one of the selected items with another item that belongs to the same domain and, thus, to improve the distribution of loadings in the 9-domain instrument. For example, Item Autonomy #4 and the Security summary item had relatively low loadings on the corresponding factors (see Table 2.1) and might have been good candidates for replacement. All 20 items that were in the original 54-item instrument and not included into 34-item version were tested one-by-one. This procedure indicated that no single item should be replaced.

Step 3. Test the 34-item Instrument Using a Larger Sample

For this step 1219 cases with complete responses across the 34 items were used, combining Likert and interpolated binary responses across the 34 items using the point extrapolations that we had conventionally used in our previous analysis (3.8 for “mostly yes” and 1.5 for “mostly no”). Table 7.4 shows that adding 264 cases and interpolating binary responses into the Likert scales left the structure almost completely unchanged.

Step 4. Test the Dichotomized Instrument Using the Large Sample (1219 Cases)

Here we tested the effect of turning the Likert items into dichotomous items. After we experimentally examined the effects of various ways of splitting the 4-point Likert responses, we utilized the best approach (combining “often and sometimes” as the positive response and “rarely and never” as the negative ones, with reversals as appropriate. Thus, all responses were dichotomized using the following template.

```
COMPUTE xxxb1 = (fxxx1<=2)*0+(fxxx1>2)*1.
```

Table 7.5 shows that dichotomization of Likert items did not change the structure.

Table 7.4. Factor Analysis of Wave 2 Data Interpolating Binary with Likert Responses for 1219 Cases

	Component								
	1	2	3	4	5	6	7	8	9
Cmf1 How often are you too cold here.								**.573**	
Cmf2 How often are you so long in the same position that it hurts?								**.759**	
CmfF3. How often are you in physical pain?								**.725**	
Cmf 4. How often are you bothered by noise when you are in your room?								**.493**	.314
FC1. Is it easy for you to get around by yourself in your room?	**.757**								
FC2. Can you easily reach the things you need?	**.779**								
FC4. Can you easily reach your toilet articles and things you want to use in your bathroom?	**.776**								
FC5. Do you do as much to take care of your own things and room as you can and want?	**.734**								
Pri1. Can you find a place to be alone when you wish?					**.722**				
Pri2. Can you make a private phone call?					**.605**				
Pri3. When you have a visitor, can you find a place to visit in private?					**.782**				
Pri4. Can you be together in private with another resident (other than your roommate)?					**.661**		.235		
Dig1. Do staff here treat you politely?		**.795**							
Dig2. Do you feel that you are treated with respect here?		**.791**							
Dig3. Do staff here treat you gently while giving you care?		**.673**							
Dig4. Do staff here respect your modesty?		**.711**							.217
SWB1. Do you participate in religious activities here?				**.856**					
SWB2. Do the religious observances here have personal meaning for you?				**.813**					.217
MA3. Do you enjoy the organized activities here?		.		**.621**		.213			
MA4. Outside of religious activities, do you have enjoyable things to do during the weekend?				**.519**			.205		
Enj1. Do you like the food here?				.		**.846**			
Enj2. Do you enjoy meal times at NAME OF NF?						**.785**			
Enj3. Can you get your favorite foods here?						**.650**	.237		
Aut1. Can you go to bed at the time you want?							**.751**		
Aut2. Can you get up in the morning at the time you want?							**.771**		
Aut 3. Can you decide what clothes to wear?							**.672**		
Aut 4. Have you been successful in changing things you do not like?			.276				**.642**		
Ind1. Taking all staff together, . . . , does the staff know about your interests & what you like?			**.711**						
Ind2. Do staff members know you as a person?			**.771**						
Ind3.Are people working here interested in your experiences & what you have done . . .?			**.672**						
Ind5.Do residents here know you as a person?			**.642**						
Sec1. Do you feel your possessions are safe at this nursing home?		.219							**.675**
Sec2. Do your clothes get lost or damaged in the laundry?									**.754**
SecSum. How would you rate your QOL with respect to feeling safe and secure?		.250							**.465**

Table 7.5. Factor Analysis of Wave 2 Data with "Dichotomization" of Likert Items for 1219 Cases

	Component								
	1	2	3	4	5	6	7	8	9
Cmf1 How often are you too cold here.								**.586**	
Cmf2 How often are you so long in the same position that it hurts?								**.747**	
Cmf3. How often are you in physical pain?								**.701**	
Cmf 4. How often are you bothered by noise when you are in your room?								**.431**	.366
FC1. Is it easy for you to get around by yourself in your room?	**.736**								
FC2. Can you easily reach the things you need?	**.765**								
FC4. Can you easily reach your toilet articles and things you want to use in your bathroom?	**.754**								
FC5. Do you do as much to take care of your own things and room as you can and want?	**.700**								
Pri1. Can you find a place to be alone when you wish?					**.674**				
Pri2. Can you make a private phone call?	.207				**.544**				.
Pri3. When you have a visitor, can you find a place to visit in private?					**.768**				
Pri4. Can you be together in private with another resident (other than your roommate)?					**.681**		.216		
Dig1. Do staff here treat you politely?		**.760**							
Dig2. Do you feel that you are treated with respect here?		**.763**							
Dig3. Do staff here treat you gently while giving you care?		**.638**							
Dig4. Do staff here respect your modesty?		**.708**							
SWB1. Do you participate in religious activities here?			**.840**						
SWB2. Do the religious observances here have personal meaning for you?			**.803**						
MA3. Do you enjoy the organized activities here?			**.599**			.204			
MA4. Outside of religious activities, do you have enjoyable things to do during the weekend?			**.514**						
Enj1. Do you like the food here?						**.822**			
Enj2. Do you enjoy meal times at NAME OF NF?						**.739**			
Enj3. Can you get your favorite foods here?			.202			**.601**	.224		
Aut1. Can you go to bed at the time you want?							**.751**		
Aut2. Can you get up in the morning at the time you want?							**.729**		
Aut 3. Can you decide what clothes to wear?					.204		**.466**		
Aut 4. Have you been successful in changing things you do not like?				.211			**.332**		
Ind1. Taking all staff together. . . does the staff know about your interests & what you like?				**.649**					
Ind2. Do staff members know you as a person?				**.751**					
Ind3.Are people working here interested in your experiences and what you have done in your life?				**.641**					
Ind5.Do residents here know you as a person?				**.612**					
Sec1. Do you feel your possessions are safe at this nursing home?						.209			**.618**
Sec2. Do your clothes get lost or damaged in the laundry?									**.672**
SecSum. How would you rate your QOL with respect to feeling safe and secure?		.279							**.544**

Step 5. Test Discriminative Power of the Original and Dichotomized Domain Scores

Average scores for the 9 original and dichotomized domains were computed. General linear modeling, treating "facility identifier (ID)" as a fixed and "interviewer identifier" as a random factor, was fitted to the data. Interviewer ID was used as a risk adjustor for conditions of measurement. The result is presented in Table 7.6. The domains are sorted in the descending order of their discriminative power to differentiate among nursing homes (F- and p-values and the number of homogeneous groups). The most "valuable" domains in this regard are at the top of the list and the least "valuable" ones are at the bottom. Variations of two domain scores prior to dichotomization and four domain scores after dichotomization do not depend on Interviewer ID. Generally, the dichotomization lowers the discriminative power of the measures and the effect of Interviewer_ID somewhat but the basic structure remains. The best discriminating domains (Enjoyment, Security, Privacy, and the combined Meaningful Activity/Spiritual Well-being contain 14 variables. These 14 variables could be used as a short 4-dimension multidimensional scale (hereafter called QOL-MD14).

Step 6. Test the Dimensional Structure of QOL-MD14 Using the Large Sample

As Table 7.7 shows the shortened 4-factor multidimensional instrument, QOL-MD14, has a satisfactory orthogonal structure.

Table 7.6. Mixed-Effect Model

	Response Set with Interpolation of Binary Responses				N[a]	Response Set with Dichotomized Likert Responses				N[a]
	Facility		Interviewer			Facility		Interviewer		
Domain	F-ratio	P	F-ratio	P		F-ratio	P	F-ratio	P	
Meaningful activity/ Spiritual well-being	2.01	0.001	1.19	0.243	4	1.87	0.001	1.27	0.17.	3
Enjoyment	1.97	0.001	0.78	0.765	4	1.87	0.001	0.88	0.638	3
Security	1.99	0.001	1.92	0.005	4	1.74	0.001	1.23	0.201	3
Privacy	1.83	0.001	3.87	0.001	3	1.56	0.007	3.14	0.001	3
Dignity	1.38	0.037	1.75	0.015	2	1.67	0.002	1.44	0.080	1
Autonomy	1.85	0.001	2.44	0.001	2	1.58	0.005	2.37	0.001	1
Individuality	1.65	0.002	2.42	0.001	2	1.45	0.019	1.67	0.023	1
Comfort	1.35	0.048	2.65	0.001	2	1.39	0.033	2.27	0.001	1
Functional competence	1.20	0.151	2.90	0.001	1	1.08	0.327	2.74	0.001	1

[a]N refers to number of homogenous subgroups based on Tukey's b-test; more groups reflects a better result.

Table 7.7. Dimensional Structure of 14-Item 4-Factor Scale (QOL-MD14) With Dichotomized Responses

Items and Domains	**Component**[a]			
	1	2	3	4
SWB1. Do you participate in religious activities here?	**.855**			
SWB2. Do the religious observances here have personal meaning for you?	**.822**			
MA3. Do you enjoy the organized activities here?	**.603**		.282	
MA4. Outside of religious activities, do you have enjoyable things to do during the weekend?	**.516**	.201	.225	
Enj1. Do you like the food here?			**.838**	
Enj2. Do you enjoy the meal times at NAME OF NF?			**.781**	
Enj3. Can you get your favorite foods here?			**.626**	
Sec1. Do you feel your possessions are safe in this nursing home?			.212	**.707**
Sec2. Do your clothes get lost or damaged in the laundry?				**.671**
SecSum. How would you rate your QOL with respect to feeling safe and secure?				**.631**
Pri1. Can you find a place to be alone when you wish?		**.717**		
Pri2. Can you make a private phone call?		**.596**		
Pri3. When you have a visitor, can you find a place to visit in private?		**.750**		
Pri4. Can you be together in private with another resident (other than roommate)?		**.715**		

[a]Rotated component matrix with rotation converged in 5 iterations.
Extraction Method: Principal component Analysis.
Rotation Method: Varimax with Kaiser Normalization

To summarize, the original instrument from Wave 2 with 54 items was used for development and validation of shorter multidimensional scales. The development/validation process was implemented in several steps. Listwise deletion of missing values was applied. Factors were extracted using the principal component method based on a correlation matrix that used a combination of Likert and dichotomous responses. Loadings were calculated using Varimax rotation. A 34-item scale that yielded nine orthogonal components (from the original 11) was created. Relationships dropped out and components of Meaningful Activity and Spiritual Well-being loaded together into an activity score. The ability of these scales to discriminate facilities was tested with a general linear model. These analyses were done with Likert data alone and with the interpolation of binary data into the Likert scores (using values of 3.8 for "mostly yes" and 1.5 for "mostly no"). Results held when the models were retested.

The complex models were converted to binary responses and the models retested. The nine factors remained.

A 14-item version, comprised of four domains (enjoyment, security, privacy, and the new activity/spiritual well-being domain) produced the best discrimination among facilities.

Developing a Short Uni-Dimensional QOL Scale

Goal

In an approach differing from that described in the previous section, we sought to identify a dramatically reduced number of items that form a global QOL scale with good properties that could be implemented as part of a revised MDS instrument or by state survey staff. The following two principles guided item selection:

1. The resultant scale should discriminate between facilities as much as possible
2. The scale should represent the breadth of the original 11 *a priori* identified QOL dimensions as much as possible.

Approach

A multi-step process was used to derive an overall QOL measure. In Step 1, we identified from the original 11 domains, those domains that discriminated among facilities at each Wave of data collection. This was done by using one-way ANOVA followed by Tukey's B post hoc test for homogenous subgroups. The overall findings are summarized in Table 7.8.

At Wave 1, Functional Competence, Autonomy and Comfort produced only 1 homogeneous subgroup, implying that those domain scores did not discriminate among facilities. At Wave 2, Dignity also failed to discriminate among facilities. We computed the Intra Class Correlation (ICC) for each scale, and the results were generally consistent with the one-way ANOVA. To ensure that the final scale would maximize our ability to discriminate between facilities, we ruled out sub-scales if either statistic had a null finding. Thus, four domains (dignity, functional competence, autonomy, and comfort) were eliminated from the effort to develop a short uni-dimensional scale.

Table 7.8. Number of Homogeneous Subgroups for Each Domain at Each Wave

	Wave 1		Wave 2	
Domain	Subgroups	ICC	Subgroups	ICC
Dignity	2	0	1	0
Functional competence	1	0	1	.02
Privacy	2	.03	5	.08
Autonomy	1	0	1	0
Security	2	.03	4	.03
Relationships	2	.04	2	.04
Individuality	4	.06	3	.02
Meaningful activities	2	.02	2	.02
Enjoyment	2	.03	3	.04
Spiritual well-being	3	.06	2	.05
Comfort	1	.03	1	.03

Note: Subgroups based on Tukey's B post hoc test for homogenous subgroups; ICC = Intra Class Correlation.

Note that this analysis was done using the domain scores that rely on imputation of missing items at the domain score level. Cases with 25% or fewer missing items were replaced with the item mean for that value. Cases with more missing data were dropped. For the following analysis, since the items were being used to construct a new scale score, the imputed domain scores were not helpful. Therefore, a new, complete data set was built using multiple imputation procedures. Cases with missing data on all items were excluded. Then, for each group of items by domain, data were imputed for each missing value using the procedure recommended by Little and Rubin as implemented in SPSS.

In Step 2, we used Wave 2 data to identify items for a short scale, which was then tested with Wave 1 data. The 7 domains included ranged in length from 3-5 items and comprised 13 items in total; our goal was to select the best 2 items from each domain. To do so, we constructed a data set with each pair of items within each domain. We then identified the best pairs of items from each of the 7 remaining domains to combine into a summary scale by

estimating the inter-class correlation (ICC) for each of the pairs of items. Starting arbitrarily with Privacy, the pair with the highest ICC was retained. Then, the pair from Enjoyment with the highest ICC was added, and the ICC for the resulting 4 item scale was calculated. This continued until all 7 domains were represented. Because the order in which domains are added together can affect the ICC, and hence which pair of items is selected, the order of domains was rotated until 7 different candidate scales were created. (These 7 candidate scales represent a random sample from 5,040 potential combinations of pairs of items.) The ICCs for the 7 candidate scales ranged from .0337 to .05693; the version with the highest ICC was retained. See Table 7.9 for the resulting items in what we are calling QOL-14.

In Step 3, an alternative scale was created for comparison purposes using the 2 items with the highest ICC from each domain. This version (not shown) had an ICC of about .04, and was discarded.

Table 7.9. Items in the QOL-14

Domain	**Item**[a]
Privacy	1. Can you make a private phone call?
Privacy	2. When you have a visitor, can you find a place to visit in private?
Meaningful Activity	3. Despite your health condition, do you give help to others, such as other residents, your family, people in this nursing home, or in the outside community?
Meaningful Activity	4. Do you enjoy the organized activities here at the nursing home?
Enjoyment	5. Do you like the food at NAME OF NF?
Enjoyment	6. Do you enjoy meal times at NAME OF NF?
Individuality	7. Taking all staff together, nurses, aides and others, does the staff know about your interests and what you like?
Individuality	8. Are staff interested in your experiences and the things you have done in your life?[b]
Relationships	9. In the last month, have people who worked here stopped just to have a friendly conversation with you?
Relationships	10. Do you consider any staff member here to be your friend?
Spiritual Well-Being	11. Do you participate in religious activities here?
Spiritual Well-Being	12. Do the religious observances here have personal meaning to you?
Security	13. Do you feel that your possessions are safe at this nursing home?
Security	14. Do you feel confident that you can get help when you need it?

[a]Item response choices were often/sometimes/rarely/never for all items. In the dichotomized version, QOL-14d, the first two choices were combined as "mostly yes" and the last two as "mostly no."

In Step 4, a dichotomous version of the final scale was constructed to simulate a entirely 'yes/no' instrument using the division described in Chapter 2 (i.e., counting "often" and "sometimes" as "mostly yes" and "rarely" and "never" as "mostly no."). In the tables this scale is referred to as QOL-14D.

In Step 5, the same scale was computed using Wave 1 data. However, Question 8 from the Individuality domain that was retained in the final scale was new at Wave 2. Thus, the Wave 1 comparison uses only 13 items.

The properties of the QOL-14 were compared to the QOL-MD38 and the QOL-MD14 for both Waves. We also calculated an alternative summary scale from the residents' summary ratings for each QOL domain and compared to the QOL-14.

Results

Table 7.10 presents the mean and standard deviation, alpha reliability, ICC, and the correlation among scales for each version of the scales at each wave. As would be expected, the reliability drops when moving from 33 to 14 items. However, the new QOL-14 has good reliability and the ICC is actually higher than for the 33 item scale. Also, the dichotomous version (QOL-14D) retains these properties. The high correlations suggest that the different versions capture the same information. Finally, the performance of the QOL-14 using Wave 1 data is also adequate.

An alternative summary scale was constructed by summing the 11 Domain items. The QOL-14 correlates about .61 with this 11 item scale (or with the 7 items represented in the QOL-14). The correlation between the QOL-14 and the single item "Your Life as a Whole" is .42.

Table 7.10. Properties of Scale Versions at Wave 1 and Wave 2

	Wave 1			Wave 2		
	QOL-33[a]	**QOL-14[a]**	**QOL-14D[a]**	**QOL-33**	**QOL-14**	**QOL-14D[c]**
Reliability	0.840	0.713	0.666	0.869	0.755	0.760
ICC	0.069	0.060	0.057	0.031	0.057	0.054
Mean (SD)[b]	3.1 (.42)	3.15 (.45)	9.9 (2.4)	3.03 (.46)	3.0 (.51)	9.8 (2.9)
Correlations	**QOL-33**	**QOL-14[a]**	**QOL-14D[a]**	**QOL-33**	**QOL-14**	**QOL-14D**
QOL-33	1			1		
QOL-14	.897	1		.920	1	
QOL-14D	.834	.944	1	.869	.950	1

Notes: [a]The Wave 1 versions have 1 fewer item because one individuality item was not available at Wave 1.
[b]Scores for the Likert-type versions range from 4-1 because the points for each 4-point item are summed and divided by the number of items in the scale. Scores for the dichotomous versions range from 0 to 14 (13) and are calculated by summing all the positive responses.
[c]QOL-14D is the dichotomized version of the scale.

The QOL-14 was next compared to the multidimensional version (QOL-MD) described in the previous section. (See Table 7.11). The QOL-MD has a mean 3.05 (SD .5). Reliability is .746 and the ICC is .61.

Table 7.11. Correlations of QOL-14 with QOL-MD14

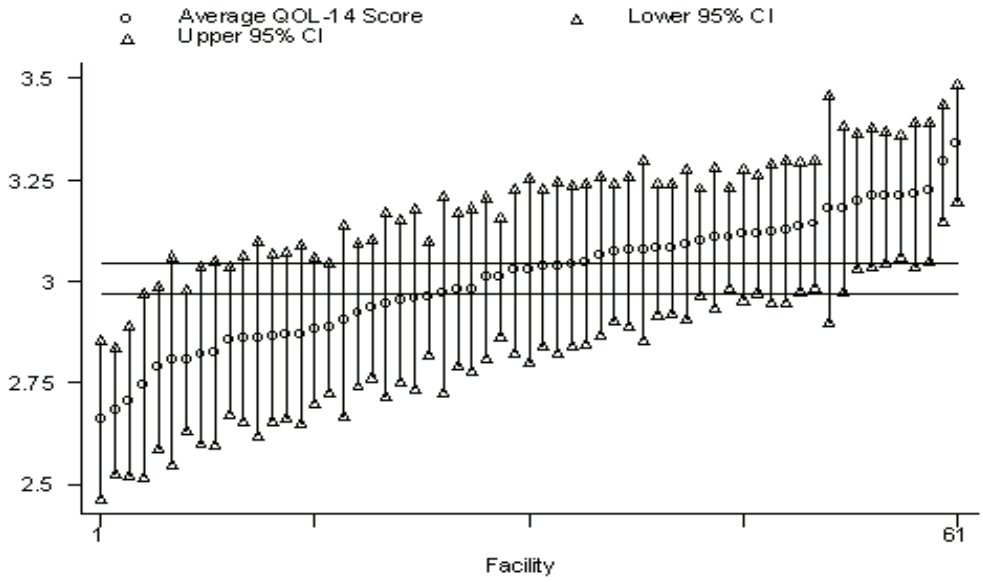
	QOL-MD14	QOL-MD14 (dichotomized)
QOL-14	.865	.832
QOL-14 (dichotomized)	.810	.848

Table 7.12 shows the correlations of the QOL-14 and each sub-scale of the QOL-MD-14 with the original 7 domain scores.

Table 7.12. Correlations of New Scales with Original Domain Scores

	QOL-14	QOL-MD	QOL-MD14 (ma/swb)	QOL-MD(enj)	QOL-MD14 (sec)	QOL-MD14 (pri)
SWB	**.657**	**.608**	**.817**	.342	.143	.129
MA	**.626**	**.618**	**.583**	.387	.218	.325
ENJ	**.603**	**.675**	.359	**1.00**	.271	.203
SEC	**.464**	**.540**	.146	.358	**.806**	.282
PRI	**.500**	**.654**	.181	.221	.215	**.966**
REL	**.683**	**.482**	.393	.313	.211	.287
IND	**.693**	**.478**	.349	.349	.260	.245

Figure 7.1 shows the distribution of Wave 2 facility means for QOL-14 and 95% confidence intervals for each facility. The horizontal lines represent the 95% confidence interval around the overall mean of 3. There is a significant number of non-overlapping facility means at both the upper and lower ends of the scale. Note, too, that it is possible to identify cut-points that define different sized subgroups of facilities, as shown in Table 7.13.



Facility Average QOL-14 Scores (Wave 2)

Table 7.13. Distribution of Facility Average QOL-14 Scores

	Range	N(%)
High QOL	Lower Bound of 95% CI>3	8 (13)
Average QOL	95% CI includes 3	47 (77)
Low QOL	Upper Bound of 95% CI<3	6 (10)

Confirmatory Factor Analysis (not presented here) shows that the items in QOL-14 form a single QOL factor.

Adding Dignity: QOL-16

The Dignity domain differentiated facilities in Wave 1 but not in Wave 2. Given that it had some ability to differentiate facilities and given the importance of dignity in the QOL regulations, we undertook the same analyses as already described to select the 2 dignity items with the best interclass correlation. These were "Do staff here treat you politely" and "Do staff here take time to listen to you when you have something you want to say." When those two items are added to the 14 item scale, the alpha changes from .72 on the 14-item scale to .74 on the 16-item scale. Thus, dignity could be added without violence to the scale properties.

In conclusion, this section presents an approach to developing a single short scale for the overall construct of QOL. First, a 33-item scale was developed that included items from the 7 domains that showed any between-facility variation. Then the QOL-14 scale was developed, which reproduces the 33-item scale closely and has acceptable reliability. Significant intra-class correlation is maintained, implying that this short form has utility in identifying outlier facilities (both good and bad). The 14-item short form is moderately correlated with the summary items for QOL ratings and with "Your Life as a Whole." Finally, the short form represents items from the 7 of the original 11 theoretically identified QOL domains that showed any between-facility variation.

Discussion

Shorter forms of the QOL scales can be used for a variety of purposes when the 54-item battery is impractical. One approach to shortening the process is simply selecting the subscales most pertinent to the purpose. In this chapter, we presented a 34-item scale that maintains dimensionality and yields 9 domain scores, and a 14-item scale (QOL-MD14) that maintains dimensionality with 4 domains. For some purposes, users of these tools may wish to have the multidimensional capability that these tools offer.

For other purposes, such as screening on the MDS, a short tool might be desired that incorporates items from a large number of domains. The QOL-14 uses items from 7 domains and is built on domains and items within domains that discriminated among facilities in both Wave 1 and Wave 2. We reasoned that for regulatory purposes and for public information about aggregated QOL in facilities, this ability to discriminate among facilities is important. This requirement of ability to discriminate among facilities may be too stringent, however, if CMS is also interested in providing facilities with tools for quality improvement. Domains that did not discriminate across facilities, nonetheless, showed variation within facilities. In particular, the dignity items varied widely within facilities and discriminated across facilities at Wave 1. Because “dignity” is reflected in regulatory goals as well, we demonstrated that several dignity items could be added to QOL-14 without harming the scale properties.