

**Evaluating the Reliability and Validity of the
Questionnaire for Situational Information: Item Analyses**

Final Report

Submitted By:

Susan M. Havercamp, PhD
Florida Center for Inclusive Communities, UCEDD
University of South Florida
13301 Bruce B. Downs Blvd. MHC 2113A
Tampa, FL 33612-3807
(813) 974-7076
SHavercamp@fmhi.usf.edu

With help from:

Steven J. Mason
Public Health doctoral student
University of South Florida

Prepared in collaboration with:

Agency for Persons with Disabilities
4030 Esplanade Way, Suite 380 S
Tallahassee, Florida 32399
(850) 488-1552

January 6, 2009

Introduction

The Agency for Persons with Disabilities (APD) is the Florida program tasked with serving the needs of Floridians with developmental disabilities. Prior to 2004, APD existed as the Developmental Disabilities Program within the Department of Children and Families. APD works in partnership with local communities and private providers to assist people who have developmental disabilities and their families. APD also provides assistance in identifying the needs of people with developmental disabilities for supports and services. An instrument, the Questionnaire for Situational Information (QSI), was developed to be used in the needs assessment process. The QSI collects information on need across multiple domains as well as demographics and situational information such as where the person lives. The intent of the QSI is to gather information to be used to plan supports. APD is also exploring the use of the QSI among other pieces of data to develop individual budgets for people receiving developmental disability services. Like Florida, states across the nation have developed needs assessment procedures to help allocate resources to better meet the needs of individuals and make costs more predictable.

As recommended by the Standards for Educational and Psychological Testing (Joint Committee on Standards for Educational and Psychological Testing, 1999), APD commissioned a series of studies to evaluate the psychometric properties of this new instrument before using the QSI to make important decisions about individual services and budgets. The series includes the following reports: item analyses, inter-interviewer reliability, test-retest reliability, content validity, and concurrent validity. This report is the first in the series and presents the item analyses for the QSI. The QSI is a multidimensional instrument that is designed to measure how much support the person is anticipated to need over the next 12-month period, as expressed by an overall score that is generated from three sub-scores, or factors. The three factors are as follows: *Functional Status*: need for assistance during the normal course of a routine day, *Behavioral Intervention and Support Status*: the extent to which the person

needs support to manage challenging behavior, *Physical Status*: life situations and physical conditions that may pose a need for medical interventions or health care for the person.

Methods

Measure

The Questionnaire for Situational Information (QSI) was developed by Florida's Agency for Persons with Disabilities (APD), with the assistance of a private contractor, Human Systems and Outcomes, Inc. The assessment instrument was the combination of several instruments used by APD that were updated and enhanced over the course of the past 10 years. The QSI focuses on the support needs in 3 domains: functional status, behavioral status, and physical status. The individual's support plan, then, would be based on information from the QSI, the person's preferences, and the extent to which certain personal outcomes and basic assurances are being met.

Participants

These analyses were based on a sample of 501 individuals receiving developmental disability services in Florida who had a recently administered QSI assessment on file. Of these participants, 37.3% were female and 62.7% were male. The sample was 72.9% white, 25.3% black, .2% Asian and 1.6% unknown. Ethnicity was listed as follows: 99% United States, .2% Nicaraguan, and .8% unknown. The majority of the sample (97.6%) had a primary diagnosis of mental retardation and 2.4% had a primary diagnosis of autism. Ages ranged from 14 to 79, with a mean of 43.3 and a standard deviation of 13.7. Participants were selected from every geographic area in the state of Florida.

QSI Sources of Information

QSI administrators were trained to base their scores on use multiple sources of information. Sources used in completing QSI assessments for this sample ranged from 1 to 5 with an average of 3.7 sources. The following sources were used: record review was used in 98% of the assessments; 97%

included an interview with or observation of the person with a disability, staff were interviewed 94% of the time, family members/guardians were interviewed 21% of the time.

Procedure

The sample was selected from an existing database of QSI assessments throughout Florida. A stratified random sample of 501 assessments was used; the sample was stratified by geographic area so that every geographic area was represented by a minimum of 36 individuals. Because the sample was selected randomly, it is representative of the population of roughly 14,000 QSI assessments that had been completed in Florida at the time of this study. None of the assessments used for the item analysis were included in any other psychometric study in this series.

Data Analyses

The results were analyzed using SPSS version 16.0. It is important to note that raw (not weighted) item scores were used for the majority of these analyses. The only time weighted subscale scores were used was for the subscale intercorrelation analysis. For the most part, then, these analyses examine the psychometric properties and item characteristics of the QSI, not the scoring system. Some items appear on more than one subscale; the item characteristics were computed and are listed for each subscale on which the item appears. When calculating the total alpha for the QSI, these items were included only once. Because the total QSI score and level determination is derived from combining the three subscale scores, item characteristics are reported only for the subscales.

One psychometric assumption is that instruments measure a unitary construct, for example, support needs. When instruments are comprised of several subscales, each subscale measures a unique construct that is closely related to the overall construct. For example, the QSI was developed to measure support needs and is made up of three subscales (Functional, Behavioral, Physical) that measure different types of support needs. We were interested in the relationship or intercorrelation between the subscale scores. Because the subscales of the QSI measure three types of support need, we

expect the **subscale intercorrelations** to be moderately high. We present the correlations between the Functional, Behavioral and Physical subscales. We then present three analyses to evaluate the item characteristics of the QSI: internal consistency, item discrimination, and item convergence. We evaluated each item in terms of its relevance to the subscale to which it belongs.

The first set of item analyses examines the **internal consistency** or homogeneity of each subscale. A scale is internally consistent to the extent that its items are highly correlated with one another. The Cronbach's alpha for each subscale is listed in the following tables (Cronbach, 1951). High internal consistency indicates that all of the items on the scale are measuring the same fundamental construct. Cronbach's alpha scores above .85 are considered acceptable (Aiken, 1997, p.90). Reliability of an instrument is necessary for the instrument to be valid, or measure what it is intended to measure. If an instrument is not reliable, it cannot be valid (Aiken, 1997; DeVellis, 2003).

The second set of item analyses presents the **item discrimination** for each subscale. Item discrimination measures the extent to which the item is able to discriminate those with high subscale scores from those with low scores. It is valuable to evaluate each item relative to other items on the subscale. Item discrimination is measured by the corrected item-total correlation. Higher correlations are desirable (DeVellis, 2003). Item discrimination levels of .2 or higher are considered acceptable (Anastasi & Urbina, 1997 as cited in Thompson et al, 2004).

Finally, the third set of item analyses speaks to **item convergence** as measured by the Cronbach's alpha if item deleted. This analysis measures item convergence as it indicates whether the inclusion of the item increases or decreases the internal consistence of the subscale. For each item, we expect the alpha if item deleted to be lower than the overall subscale alpha, because a higher value would indicate that the inclusion of the item actually decreases the internal consistency of the subscale.

Similar instruments used for comparison

The psychometric properties of the QSI can be compared to other published needs assessment instruments in use with individuals with developmental disabilities. The most widely recognized instrument is the Supports Intensity Scale, which was developed by the Association for Intellectual and Developmental Disabilities, and has been adopted by many states and regional entities as a tool for support planning and budget allocation. Another instrument that is widely recognized was also chosen as a comparison. The Inventory for Client and Agency Planning (ICAP; Bruininks, Hill, Weatherman, & Woodcock, 1986) was developed in Minnesota in the 1980's and continues to be used by a number of states, with various add-ons, for resource allocation purposes (Bruininks et al., 1986; Wikoff, 1989).

Results

QSI Overall

The correlations between the three QSI subscales were examined. Moderate correlations between subscales suggest that they are measuring different aspects of the same basic construct, for example support needs. A strong correlation was found between the Functional and Physical subscales ($r=.63$). The Behavioral subscale of the QSI had negligible correlations with the Functional ($r=-.04$) and Physical ($r=.13$) subscales. The fact that the Behavioral subscale was so weakly correlated to the other subscales indicates that this subscale measures something quite different and care should be exercised when combining the scores to create a composite or total score. If the behavioral subscale measures something distinctly different from the other subscales, it may not be appropriate to combine it with items from other subscales in creating a composite score as is done with the Physical Status subscale. The Physical Status subscale is comprised of 5 Behavioral items in addition to 18 other items measuring functional status, physiological status, safety, and frequency of health services.

The internal consistency for the QSI scale is based on 36 questions. The Cronbach's alpha for this scale was .84, which is slightly lower than the accepted minimum alpha of .85 (Aiken, 1997).

Functional Status

The Functional Status subscale is comprised of 11 items and yielded an internal consistency coefficient of .88. Table 1 presents the item characteristics for the Functional Status subscale. **Item characteristics that are of concern are highlighted in bold font in the table.** As shown in Table 1, one item (Q15 Hearing) had very low item discrimination (.12). Two items, Q14 Vision and Q15 Hearing, decreased the consistency of the subscale as evidenced by the Cronbach's alpha if item deleted being higher than the subscale alpha of .88. The strongest items on this subscale appear to be Q20 Hygiene, Q21 Dressing, and Q24 Ability to Evacuate.

Table 1. Functional Status item analyses

Functional Status			
Functional Status Internal Consistency coefficient (Cronbach's alpha) = .88			
Item #	Item Description	Item Discrimination (corrected item-total correlation)	Item Convergence (Cronbach's alpha if deleted)
14	Vision	.23	.89
15	Hearing	.12	.89
16	Eating	.68	.86
17	Ambulation	.65	.86
18	Transfers	.63	.86
19	Toileting	.68	.86
20	Hygiene	.77	.85
21	Dressing	.78	.85
22	Communications	.56	.87
23	Self-Protection	.44	.87
24	Ability to Evacuate (place of residence)	.76	.85

Behavior Intervention and Support Status

The Behavioral Intervention and Support Status subscale is comprised of 6 items that yielded an internal consistency coefficient of .79, which is lower than the accepted minimum of .85 (Aiken, 1997). It appears that each item on this subscale is relevant and contributes to the scale. No item showed item discrimination indices of less than .2 or increased alpha upon deletion.

Table 2. Item Characteristics for Behavior Intervention and Support Status

Behavior Intervention and Support Status			
Behavior Intervention internal consistency coefficient (Cronbach's alpha) = .79			
Item #	Item Description	Item Discrimination (corrected item-total correlation)	Item Convergence (Cronbach's alpha if deleted)
25	Hurtful to Self/ Self Injurious Behavior	.49	.77
26	Aggressive/Hurtful to Others	.60	.75
27	Destructive to Property	.65	.73
28	Inappropriate Sexual Behavior	.47	.78
29	Running Away	.55	.76
30	Other Behaviors that May Result In Separation from Others	.52	.77

Physical Status Support

Physical Support Status is comprised of 23 items, four of which also appear on the Functional Status subscale. The internal consistency coefficient (Cronbach's alpha) for the physical support subscale was .79, which is lower than the accepted minimum of .85 (Aiken, 1997). Item characteristics for this subscale are presented in Table 3. **Weak items are highlighted in bold font**; these include items with discrimination indices smaller than .20 and items with low item convergence as evidenced by increased alpha upon deletion. Four such items may warrant a closer look: Q33 Injury from aggression, Q34 Mechanical restraints, Q36 Skin breakdown, and Q42 Nutrition. The strongest items appear to be Q16 Eating, Q48 Emergency room visits, and Q49 Hospital admissions.

Table 3. Item Characteristics for Physical Status Support

Physical Status Support			
Physical Support Status internal consistency coefficient (Cronbach's alpha) = .79			
Item #	Item Description	Item Discrimination (corrected item-total correlation)	Item Convergence (Cronbach's alpha if deleted)
16	Eating	.52	.78
17	Ambulation	.55	.78
18	Transfers	.53	.78
19	Toileting	.44	.78
32	Injury to the person caused by Self-Injurious Behavior	.27	.79
33	Injury to the person caused by Aggression toward others or property	.07	.80
34	Use of Mechanical Restraints or Protective Equipment for maladaptive Behavior	.14	.79
35	Use of Emergency Chemical Restraint	.26	.79
36	Use of Psychotropic Medications	.06	.81
37	Gastrointestinal Conditions (includes vomiting, reflux, heartburn, or ulcer)	.32	.79
38	Seizures	.37	.79
39	Anti-Epileptic Medication use	.29	.79
40	Skin Breakdown	.30	.79
41	Bowel Function	.39	.78
42	Nutrition	.17	.80
43	Treatment (physician prescribed)	.31	.79
44	Assistance in meeting Chronic Healthcare Needs	.30	.79
45	Individual's Injuries	.38	.79
46	Falls	.41	.78
47	Physician Visits/Nursing Services	.38	.79
48	Emergency Room Visits	.53	.77
49	Hospital Admission	.53	.78
50	Days missed- illness	.36	.79

Comparison to similar instruments

The psychometric properties of the QSI were compared to those of similar instruments, the Supports Intensity Scale (SIS) and the Inventory for Client and Agency Planning (ICAP), when comparable information was available. Subscale intercorrelations on the SIS were found to range from .46 to .87 (Thompson et al., 2004). Comparable intercorrelations on the QSI ranged from -.04 to .63. As previously reported, internal consistency on the QSI was found to be .84. Internal consistency was reported for the ICAP at .86 (Wikoff, 1989) and for the SIS at .99 (Thompson et al., 2004). The ICAP maladaptive behavior subscale alpha was found to be .86 (Sturme, 2001) and the SIS exceptional behavioral support need subscale alpha was found to be .86 (Buntinx, 2008) as compared to the QSI behavior scale of .79.

Table 4. Psychometric Comparison of QSI, SIS, and ICAP

	QSI	SIS	ICAP
Subscale intercorrelations	-.04-.63	.46-.87	Not available
Internal Consistency	.84	.99	.86
Internal Consistency- Behavior scale	.79	.86	.86
Internal Consistency- Physical scale	.79	.74	Not available

Conclusions

The Questionnaire for Situational Information (QSI) was developed for use in the needs assessment process for the purpose of planning supports and possibly in budget allocation. This study examined the QSI item analyses in terms of the subscale intercorrelations, the internal consistency of the three subscales and of the QSI as a whole, item discrimination, and item convergence.

The QSI is comprised of three subscales: Functional Status, Behavior Intervention and Support, and Physical Status. The correlation between the Functional and Physical Support subscales was moderate. The negligible correlations between the Behavioral subscale and the other two subscales raise questions about the appropriateness of combining Behavioral items with items from the other subscales in creating a composite score as is done with the Physical Status subscale. If the behavioral subscale measures something distinctly different from the other subscales, it may not be appropriate to add items from the Behavioral to items from the other subscales in calculating a total support needs score. The question of how best to use information from the QSI Behavioral items would be informed by a factor analysis of the QSI. The factor analysis will group QSI items together in subscales empirically, according to the correlations between items. The factor solution would yield a subscale structure that may differ from the current Functional, Physical, and Behavioral subscale structure.

Internal consistency is a measure of the homogeneity of the items on the scale. The QSI Functional Status subscale had an acceptable internal consistency coefficient. The other two subscales had internal consistency coefficients well below the accepted minimum. The 36 items of the QSI had an internal consistency coefficient that approached the minimum level. Several steps may be taken to improve both the subscale intercorrelations and internal consistency. The first step may be to closely examine the wording of the QSI items to increase homogeneity. For example, some items may refer directly to support needs while others may tap individual characteristics (e.g., Vision). Submitting the QSI data to a factor analysis may also improve the internal consistency of the instrument. Many test developers use factor analysis to help refine the item selection and to assign items to subscales in a way that maximizes the internal consistency and item characteristics of the instrument.

Six items warrant further attention as they seem to detract from their subscale. The following items had either very low (<.20) item discrimination or very poor item convergence as measured by increased Cronbach's alpha if item deleted. These weak items are Q14 Vision, Q15 Hearing, Q33

Injury to the person caused by aggression toward others or property, Q34 Use of mechanical restraints or protective equipment for maladaptive behavior, Q36 Use of Psychotropic medication, and Q42 Nutrition. When deciding how to best address these weaknesses, it will be important to examine the wording of the items. The weak relationship among subscale items could, in part, be due to the combination of support need items and items that measure individual characteristics. As a result, some individuals who may have low needs in most areas could nonetheless have high scores on items such as vision.

In summary, the QSI shows promise as a measure of support needs. The internal consistency scores were low (less than .85) for two of the three QSI subscales and for the total score. The Behavioral subscale was so weakly correlated with the other two subscales that it may not be appropriate to add behavior items to items from other subscales to calculate the Physical Status composite score. These psychometric concerns may be addressed by improving the homogeneity of items and by using an exploratory factor analysis. The purpose of a factor analysis is to summarize the interrelationships among scale items in a concise but accurate manner to better understand and measure the underlying construct (e.g., support needs). The resulting factor solution may suggest a different subscale structure with improved internal consistency. The factor solution may also help address how best to use the behavioral items. The sample used in this study would be appropriate for an exploratory factor analysis.

References

- Aiken, L.R. (1997). *Psychological Testing and Assessment (9th ed)*. Boston: Allyn and Bacon.
- Anastasi, A. (1988). *Psychological testing (6th Ed.)*. New York: Macmillan.
- Anastasi, A. & Urbina, S. (1997). *Psychological testing (Seventh Ed.)*. Upper Saddle River, NJ: Prentice-Hall.
- Bruininks, R. H., Hill, B. K., Weatherman, R. F., & Woodcock R. W. (1986). *Inventory for Client and Agency Planning*. Itasca, IL: Riverside Publishing Company.
- Buntinx, W. (2008). The Dutch Version of the Supports Intensity Scale. In R.L. Schalock, JR. Tompson, and M.J. Tassé (Eds.). *AAIDD White Paper: Psychometric Properties of the Supports Intensity Scale*. Washington, DC: AAIDD.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, 297-334.
- DeVellis, R.F. (2003). *Scale Development: Theory and applications (2nd ed)*. Applied Social Research Methods Series, 26, Thousand Oaks, CA: Sage Publications.
- Garrett, H. E. (1965). *Testing for teachers*. New York: American Book.
- Joint Committee on Standards for Educational and Psychological Testing (1999). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.
- Nunally, J. C. (1978). *Psychometric theory*. New York: McGraw Hill.
- Sturmev. (2001). An exploratory factor analysis of the ICAP maladaptive behavior items. *Journal of Developmental and Physical Disabilities*, 13(2), 137.
- Thompson, J.R., Bryant, B.R., Campbell, E.M., Craig, E.M., Hughes, C.M., Rotholz, D.A., Schalock, R.L., Silverman, W.P., Tassé, M.J., Wehmeyer, M.L. (2004). *Supports intensity scale user manual*. Washington, DC: AAMR.
- Wikoff, R.L. (1989). Review of Inventory for client and agency planning. *The tenth mental measurements yearbook*. Edited by J.C. Conoley & J.J. Kramer. Buros Institute Test Reviews. Rolling Meadows, IL: Riverside Publishing.