Cognitive ability and functional status

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Significant confusion exists in the literature about functional status. Despite its importance, little attention has focused on developing and substantiating frameworks that detail the underpinnings of functional status, which has resulted in lack of agreement about its definition and dimensions. The purpose of this literature review was to examine the development of functional status and to describe the inclusion of its cognitive dimension. Cognition is one key dimension of functional status. One must ‘know how’ to perform to be successful in an activity. While cognitive capacity is generally considered in relation to functional status, the nature of the cognitive dimension is poorly described and poorly understood. Three databases were selected for review: Citations in Nursing and Allied Health (CINAHL), Psychology Literature (PsychLit), and the Medical data base known as MedLine. Key word searches identified thousands of sources. This analysis includes an extensive sampling of these sources from the 1960s through to 1998. The sources sorted into four primary categories and demonstrate a growing recognition of the cognitive dimension of functional status in the literature. Despite this recognition, the lack of conceptual clarity of both the term functional status and its cognitive dimension limits communication among disciplines and limits comparisons of functional status outcomes across studies. Functional status models are needed that include cognition as a core dimension. Population specific descriptions of the cognitive dimension should be guided by knowledge in the neurosciences.

Keywords: functional status, functional ability, cognitive status, cognitive ability, function, cognition, concept analysis

INTRODUCTION
There is confusion in the literature about the definition and meaning of functional status. In general, functional status has been defined through measurement with the items and domains of function in a chosen instrument, defining the features of the concept. Functional status has been used to describe motor function, ability to perform activities of daily living (ADL) and the ability to perform instrumental activities of daily living (IADL). The term functional status is often used interchangeably with the term functional ability.

There are differences in functional status and functional ability. Functional status is the actual performance of an activity and the level or degree of performance. Functional ability is the capacity to perform a given function or activity. An individual may not use all available capacity in the actual performance of a function or activity, and functional status may be limited by a person’s capacity to perform (Leidy 1994). However, while there are important differences between these two concepts, a distinction is often not made in the literature. Instead, in the literature, one finds a series of ideas and measurement methods that
represent an individual author’s unique perspective of functional status for a particular population.

Keith (1994) notes that functional status measures were first devised to measure performance for the determination of disability. Currently, functional status and functional ability have become important outcome measures for community living. The outcomes focus in United States of America (USA) health care necessitates identifying outcomes that are of critical importance, such as self-care and instrumental abilities, which are often included in functional status measures. The elderly, disabled, handicapped, technology-dependent and chronic mentally ill are growing in number and have a variety of functional deficits, many of which are poorly understood. This increase has led to attempts to define functional status by population and to identify those ‘functions’ which are most often associated with successful or unsuccessful outcomes.

Despite change from a disability focus to an outcome focus in the functional status literature, little attention has been given to theoretical frameworks to study functional status (Keith 1994). This lack of focus has probably contributed to the diverse use of the term and disagreement regarding the definition of functional status, its dimensions, and their proposed relationships. Instead, ‘functional status’ becomes a ‘catch all’ outcome measure for health, wellness and disability. This lack of conceptual clarity is a significant problem for all disciplines interested in functional status and functional ability. Communication within and among disciplines becomes difficult and information retrieval becomes nearly impossible.

In this literature review, the identification of cognition as an important variable related to functional status was a primary focus. Functional status sources are organized into four primary categories: functional status as behavioural, cognitive function as a separate construct from functional status, cognitive function assumed via the method chosen to measure functional status and finally, cognitive function as one domain of overall functional status. A distinction will not be made between functional status and functional ability, nor will an argument for differences in these terms be put forth. Instead, the use of the term and the emergence of cognition as a core dimension of functional status and functional ability will be described.

**FUNCTIONAL STATUS AS BEHAVIOURAL**

As described by Keith (1994) and previously noted, functional status as a concept grew out of the early literature on disability determination. The focus on ability or disability in action, movement and performance of activities set the stage for functional status as an outcome to be based on performance as well. While the number of sources which address functional status as strictly behavioural and performance-based is relatively small, given the extensive body of literature on the topic, it is apparent across several clinical disciplines, including nursing, medicine and physical therapy.


Weaver & Narasavage (1992) used the Health Assessment Questionnaire (HAQ) to measure arthritis patients’ function. The HAQ (Fries et al. 1980) measures changes in clinical symptoms, pain and mobility. Beurskens et al. (1995) used activities of daily living as a marker in individuals with lower back pain and Skelton & McLaughlin (1996) evaluated improving functional ability in old age through exercise. Functional ability was measured through reaching, walking, lifting, stair climbing, balance and flexibility. Steffen & Mollinger (1995) used the Barthel Index of Function in a study on knee flexion contractures. The Barthel Index (Mahoney & Barthel 1965) is a measure of physical disability and uses basic ADLs to indicate functional status. These illustrations demonstrate the lack of clarity in concept.

Several sources in the ‘function as behavioural’ category include psychological variables in relation to functional status. While cognitive ability is not addressed in these studies, the recognition that functional status may depend on other factors, particularly psychological factors, is significant (Silberfarb et al. 1980, Weinberger et al. 1986, Roach & Van Dillen 1988, Farquhar et al. 1993, Jirovec & Maxwell 1993).

Jette & Cleary (1987) used the Functional Status Questionnaire (FSQ) in ambulatory services. The FSQ assesses physical, psychological (nervousness, downheartedness) and social functions (ability to work the usual number of hours, social visiting patterns and isolation). These authors note that the FSQ should be used only for mentally competent clients. Therefore, while their tool has no cognitive component per se, they recognize that underlying mental competence is an important factor in performance.
The Short Form 36 (SF-36) Health Survey (Ware & Sherbourne 1992) is a recent example of a functional status survey which addresses psychological but not cognitive aspects of health. Psychological variables generally include mood, affect and anxiety. Cognitive variables may have been assumed within the psychological domain in these studies as thoughts and perceptions.

Lack of attention to the cognitive aspects of function may in some cases be related to sample-specific considerations, and in others related to the nature of the research question. Sample-specific issues may include the assumption of cognitive capacity as intact and therefore not an issue in the assessment of function. Research questions focusing on selected aspects of function or comparing the effect of an intervention on function may not include cognitive function as a variable. However, these omissions lead to confusion regarding the nature of functional status.

**COGNITIVE FUNCTION AS A SEPARATE CONSTRUCT FROM FUNCTIONAL STATUS**


In many nursing studies, ADLs continue to be used as indicators of functional ability (Morris et al. 1992, Kujawinski et al. 1993, Scanland & Emershaw 1993, Grabbe et al. 1995, Hamilton & Lyon 1995). Many studies in nursing which separate cognitive abilities from functional abilities use the Katz ADL scale (Katz & Lyerly 1963) to measure a person’s ability to perform five self-care activities: bathing, dressing, eating, walking and toileting.

Nursing does contribute to the trend to connect cognition to functional status. Scanland & Emershaw (1993) and Hamilton & Lyon (1995) both studied the relationship of an intervention to cognitive and functional outcomes. While these authors did not evaluate the effect of the relationship between the two outcome variables, they recognized that both variables might respond to an intervention. Wanich et al. (1992) describe an intervention in an elderly population, noting the importance of cognition to functional status in all subjects. Sisson’s (1995) study notes a strong positive relationship between the two, with cognition explaining 69% of the variance in functional status.

The evaluation of cognitive status in this set of studies suggests the significance of cognition in research that is primarily evaluating functional status, even as defined through ADLs. This suggested relationship is important from a conceptual perspective because it may represent the first in a series of necessary steps that will ultimately identify specific relationships between cognitive and functional variables. However, the problem of measurement remains prominent.

The deciding factor regarding the relationship of these variables may be the complexity of the instruments or methods of measurement. Further, while cognitive ability may be related to functional status, only significant deficits such as those evident in dementia or other neurobehavioural conditions will be likely to impair routine activities of daily living. Routine activities of daily living are generally performed so frequently that they remain automatic. Other problems that must be considered with this type of approach are related to sample selection (intact cognition), and research questions that do not reflect cognitive ability.

At this point, however, a critical element is the movement towards the inclusion of cognition as a variable which might affect performance. This integrative approach, either through the assumption of cognitive intactness or through the use of measures that include a cognitive component, has become the standard.

**COGNITIVE FUNCTION ASSUMED THROUGH INSTRUMENTAL ACTIVITIES**

In the middle to late 1980s, as providers became more focused on shorter hospital stays and outcomes which reflected an individual’s ability to be at home, measures began to emerge addressing usual daily activities other than simply self-care. Functional status became a descriptor for instrumental activities of daily living (IADLs) such as shopping, cooking and cleaning. In addition, functional status was used to describe broad functioning in major aspects of living such as the social,
occupational and psychological. Many studies that focus on functional status and functional ability, while not measuring cognitive capacity per se, assume cognition by virtue of the activities chosen to evaluate functional status or functional ability.

As early as 1982, Pfeffer et al. recognized that ADLs did not adequately describe functional ability and therefore used an alternative method to evaluate functional ability, the Functional Activities Questionnaire (FAQ). The FAQ rates individuals in 10 activities such as writing cheques, paying bills or playing a game; these activities assume a large degree of cognitive ability. Lowenstein et al. (1989) used a similar instrument (Direct Assessment of Functional Status) to evaluate functional status in individuals with Alzheimer's disease.

The Older Americans Resources and Services Multidimensional Functional Assessment (OARS) (Duke University 1978) is another well-known method of evaluating functional status which assumes cognitive capability through the ability to perform IADLs. The Duke UNC Health Profile (DUHP) and the subsequent 10-item DUHP both have social and emotional dimensions (Blake & Vandiver 1986) which assume cognitive ability. Questions such as ‘Do you get your work done as carefully and accurately as usual?’ clearly indicate an underlying capacity to attend and concentrate.

The Sickness Impact Profile (SIP) is another well-known measure used to assess functional status (Bergner et al. 1976). While cognitive capacity is not assessed directly, it can be assumed through household activities, social and recreational activities, and the psychosocial area of evaluation.


While nurses followed the trend to use functional status measures with IADLs as indicators of function, Conn et al. (1995) noted potential difficulty. These authors measured functional status using the Biggs Elderly Self Care Assessment Tool (BESCAT)(Biggs 1990). Items addressing breathing, intake, elimination, rest, social interaction, and the promotion of normalcy, are included. While the BESCAT was developed to evaluate critical daily activities and functions, the authors of this study noted that many of the items addressed both cognitive and physical function capabilities. In other words, the individual’s cognitive ability may not be overtly considered, but it naturally underlies many functional skills.

The utilization of IADLs as indicators of functional status demonstrates the broad scope and complexity of activities necessary for community function. While the assumption of an intact cognitive capacity may be appropriate in considering the functional status of individuals in certain populations, it may not be appropriate in others. For example, while using this type of measure to evaluate the elderly, mentally ill, post-trauma or post-head injury individual will indicate whether or not the task or activity can be accomplished, cognitive, motor or psychological factors that support or impede the performance of the activity will remain largely unknown. Serious methodological issues arise regarding the use of IADL measures in particular populations where cognitive problems may be present.

**COGNITION AS A DIMENSION OF FUNCTIONAL STATUS**

Recognition in the early 1980s of the complexity of functional status and the role of cognition did not lead to agreement on how to address the cognitive component. A handful of theoretical approaches to functional status have appeared in the literature along with multiple works that attempt to delineate the role of cognition in performance through measurement. A significant number of essays appeared in the geriatric literature, including many pieces focused on dementia. Comprehensive assessment of multiple domains of function became an important consideration in functional status evaluation in two predominant ways. First, acknowledging the multidimensional nature of functional status, another wave of instruments was developed, identifying several dimensions of function, including a cognitive one. Second, many authors struggled with specific dimensions of function and their interactions in an effort to better understand the complex dimensions underlying functional status.

Granick (1983) presented an argument for incorporating a psychological assessment into the functional assessment of elderly individuals. He proposes that memory, learning and problem solving be specifically incorporated. Granick’s (1983) work suggests important conceptual issues regarding the assumption that ‘knowing what to do’ must underlie the use of measures which focus on IADLs.
Granick’s (1983) work set the stage for efforts to incorporate cognitive ability into functional assessment. Further, this conceptual analysis probably influenced several disciplines.

Moinpour et al. (1988 p. 24) proposed one of the earliest comprehensive definitions of functional status in nursing. These authors defined functional status measurement as ‘any systematic attempt to measure the level at which a person is functioning in any variety of areas, such as physical health, quality of self-maintenance, quality of role activity, intellectual status, social activity, attitude toward the world and toward self, and emotional status’. Here, the inclusion of cognitive and intellectual functioning is clear.

Also in nursing, Leidy (1994) noted the confusion in the literature regarding the term ‘functional status’. She constructed a framework of functional status with four dimensions: capacity, performance, reserve and capacity utilization. Cognitive ability is included in the dimension of ‘capacity’ along with psychological, physical, social and spiritual capacities. Leidy (1994) explained that a person’s capacity cannot be directly translated into performance, yet an individual’s level of performance is constrained by his or her capacity. This is a useful proposition when beginning to consider the relationship between underlying capacities and the actual ability to perform a task.

Allen (1985), an occupational therapist, believed that impairment in cognition led to impairment at the social and interpersonal level. Based on this notion, Allen (1985) developed a craft-based assessment which evaluates the individual’s cognitive function. The evaluation is based on the individual’s ability to follow directions and solve problems presented in the activity.

Fisher (1990), also an occupational therapist, hypothesized that motor and process skills are required for IADL performance. Motor skills are the observed actions; process skills are the observed operations that are used to logically organize and adapt actions to effective, efficient and timely completion of a specific IADL task (Fisher 1993). The Assessment of Motor and Process Skills (AMPS) (Fisher 1992) was developed to evaluate individuals in the performance of IADL activities that were familiar to them. Individuals would be asked to prepare the table for lunch or wrap a parcel for mailing. Individuals would subsequently be rated on a scale of 1–4 on 16 separate motor activities (aligns, reaches, coordinates) and 20 separate process activities (chooses, attends, organizes). Fisher (1993) believed this method of evaluation to be superior to traditional ones as it allowed for the evaluation of both motor and cognitive skills across any activity or task. This kind of functional status assessment represents a unique contribution to the literature and, while it has yet to break into measurement paradigms of other disciplines, Fisher and colleagues provide a scholarly description of the motor and process components of functional status.

These authors (Allen 1985, Fisher 1992, 1993) are not anticipating a global measurement of function but an evaluation of particular skills as both cognitive and performance, a perspective which will yield detailed information regarding functional status. Most other functional status literature went the way of global measurement, evaluating broad skills from a ‘multidimensional’ perspective.

In all disciplines, researchers who originally viewed function in terms of mobility and activities of daily living seemed to move forward with the idea of including cognitive ability as a dimension of functional status quite readily. Wilkerson et al. (1992) noted that functional status assessment tools were becoming more global, including cognitive, social and psychological aspects of functioning. These authors identified the Functional Independence Measure (FIM), the Level of Rehabilitation Scale (LORS), and the Patient Evaluation and Conference System (PECS) as three of the most prominent assessments. To date the FIM has received the most attention in the literature and is described here as an example of a comprehensive global assessment of functional status. The FIM is an 18-item assessment instrument that measures patients’ capacities in activities of daily living (eating, dressing, bathing, toileting), continence and cognitive functions such as communication and problem solving (Hamilton et al. 1994, Williams et al. 1997). Analytical tests of the instrument support the construct as having two primary dimensions, motor and cognitive (Granger et al. 1993). The development of this particular functional assessment instrument brought forward the major components of overall function, cognitive ability and instrumental ability.


A few of these studies did look specifically at the role of cognitive impairment on outcome and independent living in the elderly population (Diamond et al. 1996, MacNeil & Lichtenberg 1997). Cartwright et al. (1996) used the FIM to...
evaluate improvement in functional status of cognitively impaired elders. They found that despite the level of cognitive impairment on admission, all areas of functional status improved with rehabilitation, including cognition. Diamond et al. (1996) found that individuals with serious cognitive impairment were less likely to be functionally independent, while those with mild or even moderate impairment were able to manage independently. Similar findings by MacNeill & Lichtenberg (1997) emphasized the importance of cognition on independent functioning. Yu et al. (1993) found a strong relationship between cognitive measures and functional abilities (ADL Index) among institutionalized elderly women.

A number of studies attempted to describe and understand in a more detailed manner, the complex relationship between cognition and other dimensions of functional status. Winograd & Fisk (1983) studied the relationship between cognitive status, psychological status and behaviour. These authors pointed out the importance of identifying changes in behaviour with corresponding changes in cognitive status. A similar study (Fitz & Teri 1994) examined the role of depression in people with dementia and its relationship to cognition and behaviour. Klapow et al. (1997) compared the functional status of schizophrenic individuals with a non-schizophrenic control group. There were significant differences between the two groups in overall functional status, but the cognitive sub-score was the best predictor of functional status. Here we begin to appreciate the significant effect cognitive ability has on activity performance.

Other instruments illustrate the relationship of cognition to performance. The Structured Assessment of Independent Living Skills (SAILS) (Mahurin et al. 1991) includes IADL activities such as writing a cheque, but also includes items which deal with language expression and language comprehension. Arronson & Vroonland (1993) used the Arronson Shopping List Subset in an elderly population to evaluate competence and learning through functional skills. Royall et al. (1993) noted that executive processes orchestrate goal-directed behaviours such as IADLs. These authors developed an instrument to capture the executive functions in nursing home patients through specific behavioural sequelae.

In nursing, many sources also cited the importance of a comprehensive assessment when evaluating functional ability, including mental status or cognitive ability (Boyd 1988, Dalton 1989, Kolanowski 1996). Kolanowski (1996) details the use of appropriate neuropsychological measures to aid in the evaluation of functional status.

The cited studies are significant. Thinking about the direct relationship of cognition and specific behaviours is articulated clearly. With these detailed descriptions, we can begin to consider each behavioural function in a dimensional perspective. These studies add depth to the literature and begin to demonstrate that the concept of functional status can have meaning across populations once the contribution of the cognitive component is clarified.

CONCLUSIONS

This analysis of functional status has provided a description of the term as it has evolved. Enough evidence is present to indicate that functional status has both cognitive and instrumental components. The ability to perform instrumental activities of daily living must include ‘knowing what to do’ as these activities require choosing, attending, and problem solving.

The focus on outcomes in health care has led some researchers away from a conceptual focus on functional status. The literature reflects functional status being defined through the method chosen to evaluate outcomes. These multiple methods of functional status evaluation and therefore definitions contribute to the problem of delineating the concept. Failure to carefully articulate the concept has impeded movement towards developing consensus within and across disciplines as to what underlies an individual’s ability to perform those activities and skills that are necessary in every day life.

What is needed first is a re-focus identifying the primary components of functional status from a theoretical perspective. This must include at a minimum, the conceptualization of functional status as having cognitive, behavioural and psychological dimensions. Each of these dimensions can then be specified to identify any number of specific components. For example, the psychological dimension might include components such as mood, affect and motivation. Next, client populations must be analysed regarding their particular functional problems or limitations. This will elucidate those dimensions and components which have more or less meaning for that population. Comparisons of functional status within specific populations and across studies will then be possible.

Finally, the cognitive dimension must be more carefully delineated. This is particularly critical in populations where cognitive deficits underlie the functional ones. Components such as attention, concentration, memory and problem solving each contribute to the ‘knowing what to do’. Knowledge related to the type of cognitive impairment will allow for the development and implementation of interventions directed at explicit cognitive problems. For example, assisting an individual with poor short-term memory in the construction of a grocery list will be very effective while the individual with an inability to think flexibly and solve problems may need help planning how to get to the grocery store. Both problems (memory and problem solving) lead to the same functional deficit (inability to get groceries), yet the same intervention would not be effective in both situations. This situation illustrates
similar functional outcomes across individuals and populations may have substantially different meaning.

In summary, as the health care community continues to focus on broad outcomes, practitioners must have frameworks for identifying the critical elements necessary to plan care for people in a community. In the future, life-expanding technology will increase the numbers of chronically ill, disabled and elderly individuals in nearly all countries. This increase anticipates the need for effective and comprehensive methods of functional status evaluation.

References


