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A Critical Review of Research on Cognitive Function/Impairment in Older Adults

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Abstract

Research on aspects of cognitive function and impairment in older adults is critically reviewed with the aim of evaluation and synthesis. The body of research on cognitive aging, mostly atheoretical, has not been placed within the larger context of cognitive sciences. Methodological concerns and lack of a unifying framework inhibit integration of previous studies and the development of a cohesive body of knowledge. Therefore, one paradigm of adult cognition, information processing, is recommended to further advance nursing theory and research.

COGNITIVE IMPAIRMENT (CI), a broad construct used to refer various problems in cognition, is associated with disorders that commonly occur with aging. Studies of the prevalence of CI in individuals living at home (Folstein, Anthony, Parhad, Duffy, & Gruenberg, 1985; Levy, 1985; Schoenberg, Anderson, & Haerer, 1985; Weissman, et al., 1985) and in institutions (Christie & Train, 1984; Fields, MacKenzie, Charlson, & Sax, 1986) suggest that CI increases with age and prevalence is highest in individuals 85 years and older.

Individuals with CI suffer major adverse consequences from illness. Cognitively impaired hospitalized adults require more nursing care, incur greater costs, and have longer hospitalizations than other patients; they are particularly susceptible to respiratory complications and subsequent mortality (Shamash, O'Connell, Lowy, & Katona, 1992). Based on 1983 data, reducing the average length of stay for each confused hospitalized elderly patient by 1 day, through early detection, would save between \$1 and \$2 billion yearly (Levkoff, Besdine, & Welte, 1986). Individuals with CI also require more expensive custodial and institutional care after being discharged (Christie & Train, 1984). The annual per capita cost for home and institutional care for CI patients was \$1,850 more than the cost of the same care for cognitively intact persons. Analysis of costs for these individuals before and after nursing home admission indicates that the annual cost for patients with CI is \$11,700 in the community and \$22,300 in a nursing home. Also, these individuals use nursing homes at twice the rate of nonimpaired individuals. Finally, Coughlin and Korbin (1989) report that the mean annual per capita cost for home and institutional care is \$1,850 more for CI patients than other patients.

Reviews often emphasize aspects of adult cognitive function from a phenomenological and medical model perspective, such as confusion (Boss, 1982; Foreman, 1984, 1986; Lipowski, 1983, 1987; Levkoff, et al., 1986; Platzer, 1989); Alzheimer's disease (Karlinsky, 1986; Oliver & Holland, 1986); dementia, (Consensus Conference, 1987; Cooper & Bickel, 1984; Council of Scientific Affairs, 1986); and disorientation (Castlebury & Seither, 1982). However, Duffy, Hepburn, Christensen, and Brugge-Wiser (1989); Rund and Landro (1989); Roy (1988); and Jorm (1986) have described possibilities for research and theory development within the cognitive impairment domain. This article reviews the state of the research in the domain of cognitive function and impairment and presents information processing (IP) as a model for ongoing research and theory development for investigation of cognitive function in older adults.

AN ORGANIZING FRAMEWORK

Comprehensive cognitive assessment may include examination of attention span, concentration, intelligence, judgment, learning ability, memory, orientation, perception, problem solving, psychomotor ability, reaction time, and social intactness (Kane & Kane, 1981; McDougall, 1990). Although there are many theories of adult cognition such as the dialectic, genetic-epistemological (Piagetian), IP, psychoanalytic, postformal, and psychometric (Hultsch, 1977), many of the domains used to determine cognitive function are derived from IP theory—for example, attention span, concentration, memory, perception, and reaction time. Some of the cognitive function categories identified by Kane and Kane in their comprehensive review (1981) also fit within the IP paradigm; however, many do not.

Information processing is not a single coherent theory, but rather a general perspective in which the focus is on the examination of processes responsible for a given type of behavior (Rybash, Hoyer, & Roodin, 1986). Concepts borrowed from the field of computer science and developments in the information theory of communication were influential in the early years, and an enduring characteristic of this approach is an emphasis on the analysis of intervening processes. In the hopes of discovering fundamental explanatory mechanisms by analyzing complex behavior in detail, IP theory has explanation as its outcome (Salthouse, 1985). The key feature of IP is not the computer metaphor, but rather an emphasis on analyzing the cognitive processes thought to be responsible for the behavior under investigation. The IP model guides investigations of developmental differences in the rate and efficiency of encoding, storing, and retrieving information. Most notably, research has been conducted on such cognitive concepts as attention and automaticity, expectancy and preparation, and selectivity.

RESEARCH TO DATE

Nursing research to date on cognitive function has taken a holistic approach rather than focusing on discrete content areas (Roy, 1988). Seminal research identified the following predictors of postoperative confusion in patients recovering from other illnesses: ability to follow instructions, behavior, orientation, memory, and patients' perception of their own mental status (Williams, et al., 1979; Williams, Ward, & Campbell, 1988). Other nursing studies have investigated changes in mental status after hospitalization and relocation to a

nursing home (Engle, 1985; Roslaniec & Fitzpatrick, 1979). Because CI is a multivariate construct, numerous factors, particularly person-environment interactions, must be studied simultaneously to obtain useful data. Taking this approach, Roberts and Lincon (1988) examined the relationships among cognitive disturbance, neural structure, physiological alterations, sensory deficits, activity limitations, mental health, drugs, and environmental deficits in hospitalized and institutionalized elders (n = 172). Neural function was the only variable to be significantly associated with greater cognitive disturbance.

Belief Systems

Research on attitudes and beliefs of the elderly and their caregivers, including family members and health care providers, toward the elderly, offers some insight into the complexity of patients. Wolanin (1977) studied nurses' and physicians' labeling of older patients as "confused." Each made different attributions to the residents in Wolanin's study. Nurses classified the residents as socially inaccessible, whereas physicians classified them as cognitively inaccessible. Cilberto, Levin, and Arluke (1981) studied nurses' (n = 186) clinical decision-making processes that permit the systematic labeling of patients as senile. When compared with a younger person with identical neuropsychiatric symptoms, the older patient will be the one given the diagnosis of organic brain syndrome with a concomitant poor prognosis for recovery, and the treatment will be more of a palliative rather than interventive nature.

Various other conceptualizations have been suggested to explain attitudes and beliefs about CI: aging labels (Rodin & Langer, 1980); attribution errors (Witkin, 1982; Blanchard-Fields, 1986); cognitive de-differentiation (Durand, Roff, & Klemmack, 1981); cultural meaning systems (Hasselkus, 1988); informal learning processes (Hasselkus & Ray, 1988); knowledge deficit (Robb, 1979; Chandler, Rachal, & Kazelskis, 1986; Williams, Lusk, & Kline, 1986; Galbraith & Suttie, 1987); and the therapeutic relationship (Haug & Ory, 1987).

Nurse researchers have also explored beliefs about and attitudes toward clinical practice with cognitively impaired patients. Armstrong-Esther Brown (1986) for example, found that nurses had significantly less psychosocial interaction with confused patients than with other patients; interestingly, Ryden (1985) found that the staff's assessment of mental status was related to the level of autonomy given to nursing home residents. Strump and Evans (1988) explored the views of CI patients who were physically restrained and found that patients believed the restraints were unnecessary; rarely did anyone cite a need for being restrained.

Attitudes and perceptions of family caregivers toward mentally impaired elderly relatives have been investigated by Greene, Smith, Gardiner, and Timbury (1982), Chenoweth and Spencer (1986), and Deimling and Bass (1986). All investigators found that behavioral manifestations and accompanying mood disturbances were more upsetting to the relatives than was the dementia itself. After reviewing many studies, Morris, Morris, and Britton (1988) concluded that caregivers' attributional style to the dementia sufferer may determine their own sense of control and emotional health. In other words, if the caregiver attributes the behavior of the dementia sufferer to something other than dementia, this may lead the caregiver to feeling guilty and blaming the victim. Phillips, Rempusheski, and Morrison (1989) developed a scale measuring beliefs about caregiving to identify caregivers at risk for

delivering poor-quality care. In long-term care facilities, Bowers (1988) determined that relatives attributed responsibility of care to nursing staff but monitoring and evaluating quality of care to family members.

Functional Ability

Functional ability was examined in two studies of Alzheimer's disease (AD) patients using standardized instruments and plotted as a function of time in years from the estimated onset of dementia (Vitaliano, Russo, Breen, Vitiello, & Prinz, 1986; Volicer, et al., 1987). The disappearance of a function or appearance of a symptom was orderly in terms of years from initial diagnosis: no longer dresses self (4.8), ceases to sleep at night (6.2), becomes rigid in passive movements (7.0), unable to feed self (7.8), cannot walk by self (7.8), develops contractures (9.3), becomes mute (10.0), and loses eye contact (12.0). Scores on the Mini-Mental State examination (MMSE) were abnormal in all patients, and by 9 years after estimated onset, most patients were not testable. However, no association between mobility (ability to transfer) and most measures of the degree of dementia have been determined (MacLennan, Ballinger, McHarg, & Ogston, 1987).

People with AD who live at home show moderate reduction in cognitive function and physical activities of daily living (e.g., feeding, dressing, and grooming); however, they are more dependent in their instrumental activities of daily living (e.g., telephone usage, shopping ability, and food preparation) (Fisk & Pannill, 1987). The ability to eat and self-feed is crucial in AD patients because they are particularly susceptible to protein calorie malnutrition and lower intakes of protein, ascorbic acid, nicotinic acid, and thiamine (Sandman, Adolfsson, Nygren, Hallmans, & Windblad, 1987; Thomas, Chung-A-On, Dickerson, Tidmarsh, & Shaw, 1986). Two studies of the institutionalized elderly over a 2-year period support the need for monitoring an individual's weight (Dwyer, et al., 1987; Johnson, 1985).

Demonstrated functional ability is a patient's capacity to perform the activities of daily living (ADL) and consists of ability to bathe, control behavior, control bladder/bowel functioning and toilet self, communicate needs, dress self, eat/feed self, be mobile, and transfer self (Rameizl, 1983). Cognitive status has not been linked closely enough to functional ability except in the research of occupational therapists. However, research on functional ability instruments has begun in nursing.

Doyle, Dunn, Thadani, and Lenihan (1986) investigated the effectiveness of two screening instruments in determining patients' functional ability and mental status, with AD patients (N = 25) on an Alzheimer's unit. The instruments were the CADET (Rameizl, 1983), representing self-care abilities usually performed independently, (communication, ambulation, daily activities, eliminating, and transfer) and the FROMAJE, representing seven aspects of mental status: function, reason, orientation, memory, arithmetic, judgment, and emotional status. The CADET was useful in assessing abilities and deficits. The FROMAJE needs further study to determine if it is the best screening instrument for determining the mental status of AD patients. Limitations of the study were the small sample and the one-time administration of the screening instruments.

Hogan, Smith, and Jameson (1986) evaluated interrater reliability of a functional assessment tool with patients CN = 290) in a VA hospital. The instrument was based on the data in the Long-Term Care Minimum Data Set. Different reliability measures yielded different evaluations of the reliability of the instrument. Absolute agreement rates combined with Kendall's tau-b were most useful in deciding on the reliability of instrument items.

Intelligence

McCurren and Ganong (1984) examined the reliability, validity, and utility of the Inventory of Piaget's Developmental Tasks (IPDT) for residents of nursing homes and retirement centers. The IPDT converts selected Piagetian concrete and formal operational tasks into a paper and pencil test. McCurren and Gangong's findings suggest that in its present form, the IPDT is too time consuming to be an efficient and clinically useful measure of cognitive functioning. The instrument is able to distinguish between abstract and concrete thinking but only has application for individual teaching.

Language

The assessment of language patterning as an indicator of higher order cortical function is useful in diagnosing dementia. In a seminal nursing investigation Bartol (1979) used case examples to outline guidelines for communicating with patients experiencing dementia. The guidelines include recommendations for verbal and nonverbal behaviors and are a beginning typology that may lead to categories of interventions. Emery and Emery (1983) explored the synthetic mental activity of language use in a population of elderly (N = 60) with senile dementia of the Alzheimer type. Language patterning in this study involved the categorical ranks of phonology, morphology, syntax, and semantics. A three-group experimental design was used, controlling for age and race. The researchers found a direct relationship between linguistic deficits and linguistic complexity, with a concomitant inverse relation between linguistic deterioration and sequence of language development. The study concluded that senile dementia seems to be a process of dedifferentiation that results in a cognitive retrogression.

Skelton-Robinson and Jones (1984), in a study of 20 patients with dementia, found a significant relationship ($r = .84$) between the degree of senile dementia and naming difficulties. According to the researchers, a simple naming test can be useful for evaluating patients with dementia because psychological testing assumes normal language competence on the part of the respondent. Confounding factors in psychological testing of AD patients are decreased intellectual ability, attention span, and cooperation during testing. Hier, Hagenlocker, and Shindler (1985) in another study of three groups of subjects found the dementia subjects used fewer total words, unique words, prepositional phrases, and subordinate clauses, and more incomplete sentence fragments. Other research with AD patients acknowledges the importance of semantic context in recognizing words and filling in missing words in sentences (Nebes, Boller, & Holland, 1986). According to the researchers, weak semantic associations are preserved in mild and moderately demented patients. In a longitudinal case study over 12.5 years, Holland, McBurney, Moossy, and Reinmuth (1985) observed language degeneration in a patient eventually diagnosed with

Pick's disease. The investigators recommend using the longitudinal case study as a methodology for dementia research.

Heyman, et al. (1987), in a 5-year longitudinal study of AD patients (N = 92), found language ability, scores on screening test, and clinical dementia ratings to be predictors of subsequent institutional care and death. Thompson (1987), in a review of language in dementia, concluded that language is increasingly compromised in all stages of the disease beginning with problem solving, advancing to subtle linguist support of thought processes, and terminating in widespread disruption of the dynamic and executive processes of communication. Huff, et al. (1987) found the most frequent deficits among AD patients to be in lexical-semantic language abilities and recent memory.

Learning Ability

Health care learning ability was investigated by Kim (1986) to determine if elderly nursing home residents performed better when provided with fast-paced, slow-paced or self-paced response conditions. The self-paced condition was superior to the two experimenter-paced conditions. Wright (1985) hypothesized that use of a mode of teaching with specific auditory, kinesthetic, and visual cognitive channels would help the patients interact with their external environment. The sample consisted of 20- to 70-year old patients undergoing elective surgery in an intensive care unit. Participants were assessed to determine their strongest cognitive channel but cognitive function was not assessed. Only the method of presentation varied: tape recording for auditory learning; typed instruction for visual learning; and personal instruction for kinesthetic learning. Those individuals that were taught strategies matched to their cognitive channels exhibited a greater number of correct performances in breathing, coughing, exercising, and turning.

Memory

The major paradigms used in studying memory are associative, information processing, contextual, and metamemory. The associative and IP paradigms have guided basic laboratory research without consideration for ecological validity. In the contextual approach, learning and memory are regarded as dynamic properties; events or items have meaning only within the context experienced by the individual. Taking this approach, researchers use methods that are ecologically valid; for example, prose recall is favored over verbatim memory, and everyday memory including knowledge of memory, or metamemory, is considered more beneficial than laboratory measures of memory performance (Dixon, 1989).

Closely related to memory is the construct metamemory that has two conceptual underpinnings, clinical and developmental. The developmental emphasis is information about the memory system, that is, a person's perceptions, beliefs, and knowledge about the functioning and development of memory mechanisms and contents. The clinical perspective emphasizes memory problems and failures, such as frequency of forgetting in specific domains, and includes mnemonic strategy usage (McDougall, 1993). McDougall (1994) investigated the influence of depression, health status, and self-efficacy on metamemory in three age groups of community-residing older adults (N = 169) attending continuing education classes. The 65- to 74-year-old age group had significantly higher scores on

strategy and the 75 + age group had higher scores on anxiety. Depression did not predict metamemory correlates; although health status, medications, and number of chronic conditions were important predictors. However, self-efficacy was a strong predictor of metamemory correlates.

Orientation

Many nurse clinicians use the patient's orientation to time, place, and person as a quick evaluator of cognitive function; however, recent investigations determined orientation items to be inaccurate indicators of degree and severity of CI (Palmateer & McCartney, 1985). Clients who underwent the Cognitive Capacity Screening Examination (CCSE) were oriented during its administration but had deficits in other areas of cognitive functioning, that is, abstraction, concentration, and memory. Differences in level of orientation and nonorientation responses were observed after conducting mental status examinations on patients with and without dementia (Klein, et al., 1985). Level-of-orientation evaluation consisted of ability to identify day of week, month, year, city, and hospital. Results showed that screening examinations were unacceptably insensitive. The two nonorientation items examined were serial 7s and recall of three items, which demonstrated high sensitivity and low specificity.

Perception

Perception generally refers to the processes involved in acquisition and interpretation of information from a person's environment (Salthouse, 1987). Assessment is usually accomplished through observation of an individual's capacity to accurately reproduce a design drawn by the examiner, and to do this with a reasonable degree of coordination and speed. Nurses have investigated temporal experience in cognitively intact elderly and determined that those in nursing homes have an orientation to the past. Investigators of perception in CI patients have included drawing ability (Moore & Wyke, 1984); the association of color of nurses' uniforms with the amount of patient night-time disturbance (Steffes & Thralow, 1985); hearing impairment (Uhlmann, Larson, & Koepsell, 1986); perceptual interference (Coyne, Liss, & Geckler, 1984); visual affect recognition (Brosogole, Kurucz, Plahovinsak, Spratte, & Haveliala, 1983); visual field limitations (Steffes & Thralow, 1987); attention-focusing (Rosswurm, 1990), and visual matching tasks (Rosswurm, 1989).

Perceptual deficits in AD patients go beyond those associated with normal aging, and visual field losses are significantly greater with AD than with other dementias. Also, after 1 year, outpatients diagnosed with senile dementia of the Alzheimer type and with hearing impairments, had nearly twice the cognitive decline as other patients. Cognitively impaired patients' perceptions of people entering their rooms may affect the nursing care they receive. For example, after nursing rounds, on the nights when brown uniforms were substituted for white uniforms, Steffes and Thralow (1985) found that patients experienced increased somnolence. Overall, AD patients are more sensitive to facial stimuli than to postural representations (Brosogole, Kurucz, Plahovinsak, Spratte, & Haveliala, 1983). When CI patients were verbally prompted to point to either the happy, sad, or angry facial and bodily expressions, more errors were made to the angry expressions than to the sad and happy

faces. Also of note was that significantly more errors were produced with facial expressions than with postural representations. Drawing tests in clinical practice may provide a method for discriminating levels of performance when standardized psychometric tests are no longer useful. Dementia patients' spontaneous drawings of a house and a cube were found to be impoverished compared with those of controls.

Psychomotor Ability

McDougall (1990) defined psychomotor behaviors as the effects of cerebral or psychic activity that lead to purposeful or goal-directed behaviors. Teri, Larson, and Reifler (1988) examined the psychomotor behaviors in patients with CI. The observed behaviors were agitation, incontinence, poor personal hygiene, and wandering. Other problems such as falls, hallucinations and/or suspicions, and restlessness were considered to be idiosyncratic. The results indicated that the number of behavioral problems significantly increased with increased CI, even though the types of problems varied with the severity of the impairment; however, behavioral problems are not related to the patient's age. Important areas for assessment include reflex elicitation, specifically primitive reflexes (Koller, 1984); sleep patterns (Hoch, Reynolds, & Houck, 1988), sundown syndrome (SS) (Evans, 1987); wandering (Monsour & Robb, 1982; Dawson & Reid, 1987; Algase, 1992); and other atypical presentations of CI (Mayeaux, Stern, & Spanton, 1985; Shuttleworth, 1984; Hauser, Morris, Heston, & Anderson, 1986; Ditter & Mirra, 1987).

Reflex elicitation is a routine part of a neurological exam and is used to determine psychomotor ability, degree of CI, and dementia. Assessment of reflexes in neurological patients is a quick indicator of cognitive functioning. The primitive reflexes routinely tested for are corneomandibular, gegenhalten, glabellar, hand grasp, palmomental, snout, and suck. The presence of these primitive reflexes indicates severe cerebral degeneration, particularly of the frontal lobes, and is closely associated with dementia. However, recent investigations indicate that primitive reflexes may occur in the elderly as a concomitant of normal senescence and increase with age (Koller, 1984). Primitive reflexes occur in normal elderly, in adults with signs of brain disease, in demented patients, and in patients with psychiatric disease. They are not correlated with cerebral atrophy or cognitive function and therefore have little clinical value in evaluation of the elderly.

SS resembles delirium, and nurses often describe it as the agitation, restlessness, confusion, and wandering behavior of older adults that occurs when the sun goes down. Risk factors that have been identified for SS in the elderly include: physiological factors (dehydration, mental impairment, frequent night awakening for nursing care, dementia, urine odor) and psychosocial factors (in room less than 1 month, recent admission to facility, higher evening levels of confusion) (Evans, 1987). Risk factors for wandering include: cognitive deficits, agitation/aggression, and hyperactivity (Dawson & Reid, 1987). Wandering is not always a negative psychomotor activity that should be halted.

Current research emphasizes the identification and measurement of productive behaviors in individuals with AD. Baum, Edwards, and Morrow-Howell (1993) developed the Functional Behavior Profile as part of a caregiver assessment battery that measures three factors: task performance, problem solving, and social interaction. By assisting the caregiver to

emphasize the presence of productive behaviors, this assessment battery represents a paradigm shift in the beliefs about the capabilities of AD patients.

Social Intactness

Socialization is a process of an individual's integration into society and the learning of socially acceptable behavior. For an adult, socialization includes a narrow range of skills and attitudes such as occupational skills that are necessary to perform social roles. Social intactness is usually determined by assessing the quality and quantity of an individual's social support network and the appropriateness of social interactions (McDougall, 1990). Inappropriate behaviors such as abuse and violence are usually associated with CI, and they let nurses know whether a patient will be able to conform to the routines and rules of the environment. Early researchers (Dominick, 1968; Kleban, Lawton, Brody, & Moss, 1976) conducted behavioral observations and identified the needs of mentally impaired elderly in institutional settings. Those patients who remained stable in functioning tended to be more outgoing and reactive to their social needs. Noise-making has recently received attention in long-term care facilities (Ryan, Tainsh, Kolodony, Lendrum, & Fisher, 1988). After assessing 1,036 residents, a typology of noise-making behaviors was developed, and researchers found that approximately 30% of the residents in the investigated facilities exhibited these behaviors. Disruptive behavior is also being considered as an eligibility criterion to determine long-term care benefits (Spector, 1991).

Agitation has been proposed as the term to describe inappropriate behaviors, e.g., verbal, vocal, or motor activity that is not explained by needs or by confusion per se (Cohen-Mansfield, 1986a; Taft, 1989). Disturbing behaviors of agitated nursing home residents include physically aggressive behaviors such as biting, spitting, hitting, or throwing objects; verbally aggressive behaviors such as cursing and verbal threats; and nonaggressive behaviors such as pacing, dressing or disrobing inappropriately, and constant requests for attention (Cohen-Mansfield, 1986b). A conceptual model that focuses on progressively lowered stress threshold (Hall & Buckwalter, 1987) may promote further development in the study of agitation. The model hypothesizes that normative or baseline behavior and maximum function can best be achieved by supporting losses rather than testing them. Further research is recommended to explore the antecedents, consequences, and manifestations of social intactness and the management of disruptive behaviors.

DIRECTIONS FOR RESEARCH

Theoretical

Cognitive theorists have cautioned against using the computer metaphor, that is, IP as the major paradigm to guide research in the cognitive sciences (Normal, 1980; Teskes and Pea, 1981; and Salthouse, 1985). Therefore, a model that would account for complexity is needed to accurately represent the cognitive function construct. Cognitive functioning is a complex construct and many variables must be included in research designs for ecological validity and practice applicability. These variables include: activity limitations, belief systems, consciousness, development, drugs, emotional/mental status, environment, experience, interaction, language, memory, motivation, neural structure, perception, performance,

personality, physiological response, sensory deficits, skill, strategy selection, task, and thought (Cavanaugh, Kramer, Sinnott, Camp, & Markley, 1985; Foreman, 1989; Norman, 1980; Roberts & Lincon, 1988). Nevertheless, information processing is a useful paradigm for examining discrete mental operations and organizing current research on CI and the dementias, and it can help to guide future research (Jorm, 1986; Roy, 1988; Rosswurm, 1989).

Methodologies

A longitudinal design is the most appropriate methodology for studies of older adults because it makes it possible to account or control for cohort effects; however, there are no such designs available. Cross-sectional analysis does not always accurately reflect the phenomena studied, and decrements may be in part a function of design error in studies that do not have sufficient information to exclude from analysis those subjects with potentially causal diseases. Individual differences are large, indicating that group means may not accurately reflect the average functioning of the individual. All nursing studies, but one, on CI have been at the descriptive level identifying the phenomena.

Case studies are also useful when a limited sample of patients is available. However, in the reviewed nursing research on CI, only one case study was identified (Johnson, 1985). Meta-analysis can be adapted to case studies to achieve a larger data base.

Instrumentation

Of particular interest to nurse researchers is accurate measurement of the phenomena or manifestations of CI. To make accurate clinical evaluations and programmatic decisions, assessment of functional ability is the most useful measurement for clinicians, particularly in long-term care settings. Alzheimer's disease is heterogeneous, and four groups of patients have been identified: (a) benign, little or no progression; (b) myoclonic, after younger onset, severe intellectual decline and frequent mutism; (c) extrapyramidal, severe intellectual and functional decline and psychotic symptoms; and (d) typical, a gradual progression of intellectual and functional decline, but without other distinguishing features (Mayeaux, et al., 1985). Patients with myoclonus or extrapyramidal signs have greater intellectual decline and functional impairment in daily activities. These findings, as well as extrapyramidal signs, especially rigidity, have been supported by several studies (Ditter & Mirra, 1987; Hauser, et al., 1986). The research of Whall, Engle, Edwards, Bobel, & Haberland, 1983; Whall, Engle, Floyd, & Ager, 1985; Whall, et al., 1989 on Tardive Dyskinesia has provided a knowledge structure to begin classification of AD patients that is promising (Booth, Bradley, & Whall, 1988; Christman, Tabor, Whall, & Booth, 1991; Whall, Gillis, Yankou, Booth, & Beel-Bates, 1992). A taxonomy based on cognitive levels and task analysis may be useful for assessing functional abilities in patients with AD (Allen & Allen, 1987). The Global Deterioration Scale is designed to delineate all the stages throughout the entire course of primary degenerative dementia (Reisberg, Ferris, DeLeon, & Crook, 1982).

In summary, after reviewing numerous multidisciplinary research studies it was concluded that the information processing theory is the most useful theoretical model to assist with the organization and development of knowledge for nursing within the cognitive domain.

Instrument development is necessary to predict and measure a cognitively impaired person's functional ability. The most common behaviors exhibited by CI patients that are of concern to nurse clinicians are aggression and wandering. Research could also focus on functional ability, using a taxonomy based on symptom clusters (benign, extrapyramidal, myoclonic, or typical), the patient's ability to perform ADLs (bathing, dressing, feeding, etc), and the patient's sensory abilities (communication, hearing, perceiving, smelling, tasting, and seeing). Some of these categories have already been studied within the cognitive functioning domain, for example, intelligence, learning ability, memory, orientation, problem solving, and reaction time. These abilities also fit into existing nursing diagnostic categories. Continued testing of existing instruments on specific populations is needed at this time.

REFERENCES

- Algase DL (1992). Cognitive discriminants of wandering among nursing home residents. *Nursing Research* 41(2), 78–81. [PubMed: 1549523]
- Allen CK, & Allen RE (1987). Cognitive disabilities: Measuring the social consequences of mental disorders. *Journal of Clinical Psychiatry*, 48(5), 185–190. [PubMed: 3571172]
- Anstrong-Esther Brown CA (1986). The influence of elderly patients' mental impairment on nurse-patient interaction. *Journal of Advanced Nursing*, 11, 379–387. [PubMed: 3638312]
- Bartol MA (1979). Nonverbal communication in patients with Alzheimer's disease. *Journal of Gerontological Nursing*, 5(4), 21–31.
- Baum Edwards, & Morrow-Howell (1993). Identification and measurement of productive behaviors in senile dementia of the alzheimer type. *Gerontologist*, 33(3), 403–408. [PubMed: 8325529]
- Blanchard-Fields F (1988). Attributional processes in adult development. *Educational Gerontology*, 12, 291–300.
- Booth D, Bradley W, & Whall A (1988). Description of early and late functional changes in persons with Alzheimer's disease. *Journal of Nursing Science and Practice*, 1(3), 9–16.
- Boss BJ (1982). Acute mood and behavior disturbances of neurological origin: Acute confusional states. *Journal of Neurosurgical Nursing*, 14(2), 61–68. [PubMed: 6922145]
- Bowers BJ (1988). Family perceptions of care in a nursing home. *Gerontologist*, 28(3), 361–368. [PubMed: 3396917]
- Brosigole L, Kurucz J, Plahovinsak TJ, Spratte C, & Haveliala YA (1983). Facial and postural-affect recognition in senile elderly persons. *International Journal of Neuroscience*, 22, 37–46. [PubMed: 6668132]
- Castelberry K, & Seither F (1982). Disorientation. In Norris CM (Ed.) *Concept clarification in nursing* (pp. 309–323). Rockville, MD: Aspen Systems Corporation.
- Cavanaugh JC, Kramer DA, Sinnott JD, Camp CJ, & Markley RP (1985). On missing links and such: Interfaces between cognitive research and everyday problem-solving. *Human Development* 28, 146–168.
- Chandler JT, Rachal JR, & Kazelskis R (1986). Attitudes of long-term care nursing personnel toward the elderly. *Gerontologist*, 26(5), 551–555. [PubMed: 3095193]
- Chenoweth B, & Spencer B (1986). Dementia: The experience of family caregivers. *Gerontologist*, 26(3), 267–272. [PubMed: 3721234]
- Chrisman M, Tabar D, Whall A, & Booth D (1991). Agitated behavior in the cognitively impaired elderly: Observational issues. *Journal of Gerontological Nursing*, 17(12), 9–13.
- Christie AB, & Train JD (1984). Change in the pattern of care for the demented. *British Journal of Psychiatry*, 144, 9–15. [PubMed: 6692081]
- Cilberto DJ, Levin J, & Arluke A (1981). Nurses' diagnostic stereotyping of the elderly. *Research on Aging*, 3(3), 299–310.
- Cohen-Mansfield J (1986a). Agitated behaviors in the elderly I. A conceptual review. *Journal of the American Geriatrics Society*, 34(10), 711–721. [PubMed: 3531296]

- Cohen-Mansfield J (1986b). Agitated behaviors in the elderly II. Preliminary results in the cognitively deteriorated. *Journal of the American Geriatrics Society*, 34(10), 722–727. [PubMed: 3760436]
- Consensus Conference (1987). Differential diagnosis of dementing diseases. *JAMA*, 258(23), 3411–3416. [PubMed: 3316725]
- Cooper B, & Bickel H (1984). Population screening and the early detection of dementing disorders in old age: A review. *Psychological Medicine*, 14, 81–95. [PubMed: 6709794]
- Coughlin TA, & Korbin L (1989). Health care costs of older persons with cognitive impairments. *Gerontologist*, 29(9), 173–182. [PubMed: 2502480]
- Council on Scientific Affairs (1986). Dementia. *JAMA*, 256(16), 2234–2238. [PubMed: 3093698]
- Coyne AC, Liss L, & Geckler C (1984). The relationship between cognitive status and visual information processing. *Journal of Gerontology*, 39(6), 711–717. [PubMed: 6491183]
- Dawson P, & Reid DW (1987). Behavioral dimensions of patients at risk of wandering. *Gerontologist*, 27(1), 104–107. [PubMed: 3557136]
- Deimling GT, & Bass S (1986). Symptoms of mental impairment among elderly adults and their effects on family caregivers. *Journal of Gerontology*, 41(6), 778–784. [PubMed: 3772056]
- Ditter SM, & Mirra SS (1987). Neuropathologic and clinical features of Parkinson's disease in Alzheimer's disease patients. *Neurology*, 37, 754–760. [PubMed: 3033544]
- Dixon RA (1989). Questionnaire research on metamemory and aging: Issues of structure and function. In Poon LW, Rubin DC, & Wilson BA (Eds.). *Everyday Cognition in Adulthood and Late Life* (pp. 394–415). New York: Cambridge.
- Dominick JR (1968). Nursing care factors in psychotic depressive reactions in elderly patients. *Perspectives in Psychiatric Care*, 6(1), 28–32. [PubMed: 5184557]
- Doyle GC, Dunn SI, Thadani I, & Lenihan P (1986). Investigating tools to aid in restorative care for Alzheimer patients. *Journal of Gerontological Nursing*, 12(9), 19–24.
- Duffy LM, Hepburn K, Christensen R, & Brugge-Wiser P (1989). A research agenda in care for patients with Alzheimer's disease. *Image*, 21(4), 254–257.
- Durand RM, Roff LL, & Klemmack DL (1981). Cognitive differentiation and the perception of older persons. *Research of Aging*, 3(3), 333–344.
- Dwyer JT, Coleman KA, Krall E, Yang GA, Scanlan M, Galper L, Winthrop E, & Sullivan P (1987). Changes in relative weight among institutionalized elderly adults. *Journal of Gerontology*, 42(3), 246–251. [PubMed: 3571859]
- Emery OB, & Emery PE (1983). Language in senile dementia of the Alzheimer type. *Psychiatric Journal of the University of Ottawa*, 8(4), 169–178. [PubMed: 6366848]
- Engle V (1985). Mental status and functional health 4 days following relocation to a nursing home. *Research of Nursing and Health*, 8, 355–361.
- Evans LK (1987). Sundown syndrome in institutionalized elderly. *Journal of the American Geriatrics Society*, 35(2), 101–108. [PubMed: 3805551]
- Fields SD, MacKenzie CR, Charlson ME, & Sax FL (1986). Cognitive impairment: Can it predict the course of hospitalized patients? *Journal of the American Geriatrics Society*, 34(8), 579–585. [PubMed: 3088089]
- Fisk AA, & Pannill FC (1987). Assessment and care of the community-dwelling Alzheimer's disease patient. *Journal of the American Geriatrics Society*, 35(4), 307–311. [PubMed: 3559018]
- Fitzpatrick JJ, & Donovan MJ (1978). Temporal experience and motor behavior among the aging. *Research in Nursing and Health*, 1(2), 60–68. [PubMed: 248833]
- Folstein M, Anthony JC, Parhad I, Duffy B, & Gruenberg EM (1985). The meaning of cognitive impairment in the elderly. *Journal of the American Geriatrics Society*, 33(4), 228–235. [PubMed: 3989183]
- Foreman MD (1984). Acute confusional states in the elderly: An algorithm. *Dimensions of Critical Care Nursing*, 3(4), 207–215. [PubMed: 6563997]
- Foreman MD (1986). Acute confusional states in hospitalized elderly: A research dilemma. *Nursing Research*, 35(1), 34–38. [PubMed: 3632845]
- Foreman MD (1987). Reliability and validity of mental status questionnaires in elderly hospitalized patients. *Nursing Research*, 36(4), 216–220. [PubMed: 3299279]

- Foreman MD (1989). Confusion in the hospitalized elderly: Incidence, onset and associated factors. *Research in Nursing and Health*, 12, 21–29. [PubMed: 2922488]
- Galbraith MW, & Suttie SM (1987). Attitudes of nursing students toward the elderly. *Educational Gerontology*, 13, 213–223.
- Greene JG, Smith R, Gardiner M, & Timbury GC (1982). Measuring behavioral disturbance in the elderly demented patients in the community and its effects on relatives: A factor analytic study. *Age and Ageing*, 11, 121–126. [PubMed: 7102472]
- Hall GR, & Buckwalter KC (1987). Progressively lowered threshold: A conceptual model for care of adults with Alzheimer's disease. *Archives of Psychiatric Nursing*, 1(6), 399–406. [PubMed: 3426250]
- Hasselkas BR (1988). Meaning in family caregiving: Perspectives on caregiver/professional relationships. *Gerontologist*, 28(5), 686–691. [PubMed: 3229655]
- Hasselkas BR, & Ray RO (1988). Informal learning in family caregiving: A worm's eye view. *Adult Education Quarterly*, 39(1), 31–40.
- Haug MR, & Ory MG (1987). Issues in elderly patient-provider interactions. *Research on Aging*, 9(1), 3–44. [PubMed: 3589142]
- Hauser WA, Morris ML, Heston LL, & Anderson VE (1986). Seizures and myoclonus in patients with Alzheimer's disease. *Neurology*, 36, 1226–1230. [PubMed: 3092131]
- Heyman A, Wilkinson WE, Hurwitz BJ, Helms MJ, Haynes CS, Utley CM, & Gwyther LP (1987). Early-onset Alzheimer's disease: Clinical predictors of institutionalization and death. *Neurology*, 37, 980–984. [PubMed: 3587649]
- Hier DB, Hagenlocker K, & Shindler AG (1985). Language disintegration in dementia: Effects of etiology and severity. *Brain and Language*, 25, 117–133. [PubMed: 2411334]
- Hoch CC, Reynolds CF, & Houck PR (1988). Sleep patterns in Alzheimer, depressed, and healthy elderly. *Western Journal of Nursing Research*, 10(3), 239–256. [PubMed: 3176447]
- Hogan AJ, Smith DW, & Jameson J (1986). Functional assessment of nursing home patients: Reliability and relevance. *Evaluation and the Health Professions*, 9(3), 339–360. [PubMed: 10301442]
- Holland AL, McBumey DH, Moosy J, & Reinmuth OM (1985). The dissolution of language in Pick's disease with neurofibrillary tangles: A case study. *Brain and Language*, 24, 36–58. [PubMed: 3971135]
- Huff FJ, Becker JT, Belle SH, Nebes RD, Holland AL, & Boller F (1987). Cognitive deficits and clinical diagnosis of Alzheimer's disease. *Neurology*, 37, 1119–1124. [PubMed: 3601078]
- Hultsch DF (1977). Changing perspectives on basic research in adult learning and memory. *Educational Gerontology*, 2, 367–382.
- Johnson J (1985). Nutrition as a factor of mortality in senile dementia of the Alzheimer type. *Psychiatric Annals*, 15(5), 323, 327, 330.
- Jorm AF (1985). Subtypes of Alzheimer's dementia: A conceptual analysis and critical review. *Psychological Medicine*, 15, 543–553. [PubMed: 3901058]
- Jorm AF (1986). Controlled and automatic information processing in senile dementia: A review. *Psychological Medicine*, 16, 77–88. [PubMed: 3961049]
- Kane RA, & Kane RL (1981). *Assessing the elderly: A practical guide to measurement* Lexington, MA, Lexington Books.
- Karlinsky H (1986). Alzheimer's disease in Down's syndrome: A review. *Journal of the American Geriatrics Society*, 34(10), 728–734. [PubMed: 2944942]
- Kim KK (1986). Response time and health care learning of elderly patients. *Research in Nursing and Health*, 9, 233–239. [PubMed: 3639538]
- Kleban MH, Lawton MP, Brody EM, & Moss M (1976). Behavioral observations of mentally impaired aged: Those who decline and those who do not. *Journal of Gerontology*, 31(3), 333–339. [PubMed: 1270770]
- Klein LE, Roca RP, McArthur J, Vogelsang G, Klein GB, Kirby BA, & Folstein M (1985). Diagnosing dementia: Univariate and multi-variate analyses of the mental status examination. *Journal of the American Geriatrics Society*, 33(7), 483–488. [PubMed: 4008847]

- Koller WC (1984). Primitive reflexes in the evaluation of the aging patient. *Clinical Gerontologist*, 3(2), 19–22.
- Levkoff SE, Besdine RW, & Wetle T (1986). Acute confusional states (delirium) in the hospitalized elderly. In Eisdorfer C (Ed.), *Annual Review of Geriatrics and Gerontology* (pp. 1–26). New York: Springer.
- Levy MT (1985). Psychiatric assessment of elderly patients in the home: A survey of 176 cases. *Journal of the American Geriatrics Society*, 33(1), 9–12. [PubMed: 3965554]
- Lipowski ZJ (1983). Transient cognitive disorders (delirium, acute confusional states) in the elderly. *American Journal of Psychiatry*, 140(3), 1426–1436. [PubMed: 6624987]
- Lipowski ZJ (1987). Delirium (acute confusional states). *JAMA* 258(13), 1789–1792. [PubMed: 3625989]
- MacLennan WJ, Ballinger BR, McHarg A, & Ogston SA (1987). Dementia and immobility, Age and Aging, 16(1), 1–9.
- Mayeux R, Stem Y, & Spanton S (1985). Heterogeneity in dementia of the Alzheimer type: Evidence of subgroups. *Neurology*, 35, 453–461. [PubMed: 3982631]
- Mccurren CA, & Ganong LH (1984). Assessing cognitive functioning of the elderly with the 'Inventory of Piaget's Developmental Tasks.' *Journal of Advanced Nursing*, 9, 449–456. [PubMed: 6567648]
- McDougall GJ (1990). A Review of Screening Instruments for Assessing Cognition and Mental Status in Older Adults. *The Nurse Practitioner*, 15(11), 18–28. [PubMed: 2255423]
- McDougall GJ (1993). Older Adults' Metamemory: Coping, depression, and self efficacy. *Applied Nursing Research*, 6(1), 28–30. [PubMed: 8439175]
- McDougall GJ (1994). Predictors of metamemory in older adults. *Nursing Research*, 43(4), 212–218. [PubMed: 8047425]
- Monsour N, & Robb SS (1982). Wandering behavior in old age: A psychosocial study. *Social Work*, 27, 411–416. [PubMed: 10309765]
- Moore V, & Wyke MA (1984). Drawing disability in patients with senile dementia. *Psychological Medicine*, 14, 97–105. [PubMed: 6709795]
- Morris RG, Morris LW, & Britton PG (1988). Factors affecting the emotional well-being of the caregivers of dementia sufferers. *British Journal of Psychiatry*, 153, 147–156. [PubMed: 3076489]
- Nebes RD, Boller F, & Holland A (1986). Use of semantic context by patients with Alzheimer's disease. *Psychology and Aging*, 1(3), 261–269. [PubMed: 3267407]
- Norman DA (1980). Twelve issues for cognitive science. *Cognitive Science*, 4, 1–32.
- Oliver C, & Holland AJ (1986). Down's syndrome and Alzheimer's disease: A review. *Psychological Medicine*, 16, 307–322. [PubMed: 2941815]
- Palmateer LM, & McCartney JR (1985). Do nurses know when patients have cognitive deficits? *Journal of Gerontological Nursing*, 11(2), 6–16.
- Phillips LR, Rempusheski VF, & Morrison E (1986). Developing and testing the beliefs about caregiving scale. *Research in Nursing and Health*, 12, 207–220.
- Platzer H (1989). Post-operative confusion in the elderly-A literature review. *International Journal of Nursing Studies*, 26(4), 369–379. [PubMed: 2693387]
- Rameizl P (1983). "CADET, a self-care assessment tool." *Geriatric Nursing*, 11/12, 377–378. [PubMed: 6557987]
- Reisberg B, Ferris SH, DeLeon MJ, & Crook T (1982). The global deterioration scale for assessment of primary degenerative dementia. *American Journal of Psychiatry*, 139(9), 1136–1139. [PubMed: 7114305]
- Robb SS (1979). Attitudes and intentions of baccalaureate nursing students toward the elderly. *Nursing Research*, 28(1), 43–50. [PubMed: 252706]
- Roberts BL, & Lincon RE (1988). Cognitive disturbance in hospitalized and institutionalized elders. *Research in Nursing and Health*, 11, 309–319.
- Rodin J, & Langer E (1980). Aging labels: The decline of control and the fall of self-esteem. *Journal of Social Issues*, 36(2), 12–29.

- Roslaniec A, & Fitzpatrick JJ (1979). Changes in mental status in older adults with 4 days of hospitalization. *Research in Nursing and Health*, 2, 177–187. [PubMed: 260852]
- Rosswurm MA (1989). Assessment of perceptual processing deficits in persons with Alzheimer's disease. *Western Journal of Nursing Research*, 11(4), 458–468. [PubMed: 2781795]
- Rosswurm MA (1990). Attention-focusing program for persons with dementia. *Clinical Gerontologist*, 10(2), 3–16.
- Roy C (1988). Alterations in cognitive processing. In Mitchell PH, Hodges LC, Muwaswes M, & Welleck CA (Eds.). *AANN's Neuroscience Nursing* (pp. 185–211). Norwalk, CT; Appleton & Lange.
- Rund BR, & Landro NI (1989). Information processing: A new model for understanding cognitive disturbances in psychiatric patients. *Acta Psychiatrica Scandanavica*, 81, 305–316.
- Ryan DP, Tainsh SMM, Kolodony V, Lendrum BL, & Fisher RH (1988). Noise-making amongst the elderly in long term care. *Gerontologist*, 28(3), 369–371. [PubMed: 3135247]
- Rybash JM, Hoyer WJ, & Roodin PA (1986). *Adult Cognition and Aging: Developmental Changes in Processing, Knowing and Thinking* New York: Pergamon.
- Ryden MB (1985). Environmental support for autonomy in the institutionalized elderly. *Research in Nursing and Health*, 8, 363–371. [PubMed: 3853249]
- Salthouse TA (1985). *A Theory of Cognitive Aging* New York: North Holland.
- Salthouse TA (1987). Perception. In Maddox GL (Ed.). *Encyclopedia of Aging* (pp. 517–518). New York: Springer.
- Sandman PO, Adolfsson R, Nygren C, Hallmans G, & Winblad B (1987). Nutritional status and dietary intake of institutionalized patients with Alzheimer's disease and multi-infarct dementia. *Journal of the American Geriatric Society*, 35(1), 31–38.
- Schoenberg BS, Anderson DW, & Haerer AF (1985). Prevalence and clinical features in a biracial population. *Archives of Neurology*, 42, 740–743. [PubMed: 4026605]
- Shamash K, O'Connell K, Lowy M, & Katona CLE (1992). Psychiatric morbidity and outcome in elderly patients undergoing emergency hip surgery: A one-year follow-up study. *International Journal of Geriatric Psychiatry*, 7, 505–509.
- Shuttleworth EC (1984). Atypical presentations of dementia of the Alzheimer type. *Journal of American Geriatrics Society*, 32(7), 485–489.
- Skelton-Robinson M, & Jones S (1984). Normal dysphasia and the severity of senile dementia. *British Journal of Psychiatry*, 145, 168–171. [PubMed: 6466914]
- Spector WD (1991). Cognitive impairment and disruptive behaviors among community-based elderly persons: Implications for targeting long-term care. *Gerontologist*, 31(1), 51–59. [PubMed: 1901046]
- Steffes R, & Thralow J (1985). Do uniforms colors help keep patients awake? *Journal of Gerontological Nursing*, 11(7), 6–9.
- Steffes R, & Thralow J (1987). Visual field limitation in the patient with dementia of the Alzheimer's type. *Journal of the American Geriatrics Society*, 35(3), 198–204. [PubMed: 3819258]
- Strumpf NE, & Evans LK (1988). Physical restraint of the hospitalized elderly: Perceptions of patients and nurses. *Nursing Research*, 37(3), 132–137. [PubMed: 3368353]
- Taft LB (1989). Conceptual analysis of agitation in the confused elderly. *Archives of Psychiatric Nursing*, 3(2), 102–107. [PubMed: 2712590]
- Teri L, Larson EB, & Reifler BV (1988). Behavioral disturbances in dementia! of the alzheimer type. *Journal of the American Geriatrics Society*, 36(1), 1–6. [PubMed: 3335725]
- Teske JA, & Pea RD (1981). Metatheoretical issues in cognitive science. *The Journal of Mind and Behavior*, 2(2), 123–178.
- Thomas DE, Chung-A-On KO, Dickerson JWT, Tidmarsh SF, & Shaw DM (1986). Tryptophan and nutritional status of patients with senile dementia. *Psychological Medicine*, 16, 297–305. [PubMed: 3726005]
- Thompson IM (1987). Language in dementia, Part 1: A review. *International Journal of Geriatric Psychiatry*, 2(3), 145–161.

- Uhlmann RF, Larson EB, & Koepsell TD (1986). Hearing impairment and cognitive decline in senile dementia of the Alzheimer's type. *Journal of the American Geriatric Society*, 34(3), 207–210.
- Vitaliano PP, Russo J, Breen AR, Vitiello MV, & Prinz PN (1986). Functional decline in the early stages of Alzheimer's disease. *Psychology and Aging*, 1(1), 41–46. [PubMed: 3267378]
- Volicer L, Seltzer B, Rheame Y, Fabiszewski K, Herz L, Shapiro R, & Innis P (1987). Progression of Alzheimer-type dementia in institutionalized patients: A cross-sectional study. *Journal of Applied Gerontology*, 6(1), 83–94.
- Weissman MM, Myers JK, Tischler GL, Holzer CE, Leaf PJ, Orvaschel H, & Brody JA (1985). Psychiatric disorders (DSM-III) and cognitive impairment among the elderly in a U.S. urban community. *Acta Psychiatrica Scandinavica*, 71, 366–379. [PubMed: 4003102]
- Whall AL, Engle V, Edwards A, Bobel L, & Haberland C (1983). Development of a screening program for Tardive Dyskinesia. *Nursing Research*, 32(3), 151–156. [PubMed: 6133266]
- Whall AL, Engle V, Floyd J, & Ager JW (1985). Monitoring for Tardive Dyskinesia: A community based program. *Public Health Nursing*, 2(3), 168–177. [PubMed: 2997766]
- Whall A, Booth D, Kosinski J, Donbroski D, Zakul-Krupa I, & Weissfeld L (1989). Tardive dyskinetic movements over time. *Applied Nursing Research*, 2(3), 128–134. [PubMed: 2764580]
- Whall A, Gillis G, Yankou D, Booth D, & Beel-Bates C (1992). Disruptive behavior in elderly nursing home residents: A survey of nursing home staff. *Journal of Gerontological Nursing*, 18(10), 13–19.
- Williams MA, Holloway JR, Winn MC, Wolanin MO, Lawler MI, Westwick CR, & Chin MH (1979). Nursing activities and acute confused states. *Nursing Research*, 28(1), 25–35. [PubMed: 252701]
- Williams MA, Ward SE, & Campbell EB (1988). Confusion: Testing versus observation. *Journal of Gerontological Nursing*, 14(1), 25–30.
- Williams RA, Lusk SL, & Kline NW (1986). Knowledge of aging and cognitive styles in baccalaureate nursing students. *Gerontologist*, 26(5), 545–550. [PubMed: 3770505]
- Wilkin SL (1982). Cognitive processes in clinical practice. *Social Work*, 9, 389–395.
- Wolanin MO (1977, 3). Confusion study: Use of grounded theory as methodology. In Batey MV (Ed.), *Communicating Nursing Research Volume 8, Nursing Research Priorities: Choice or Chance*, (pp. 68–75). *Communicating Nursing Research Conference Phoenix, AZ, Western Interstate Commission for Higher Education*.
- Wright JE (1985). Using cognitive channels in patient education. *Dimensions of Critical Care Nursing*, 4(5), 308–313. [PubMed: 3851733]