A Comparison of Cognitive Function in Community-Dwelling and Institutionalized Old People of Normal Intelligence

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ABSTRACT Two carefully matched groups of normal old people living in institutions or in the community were administered a neuropsychological cognitive test battery. In general, the institutionalized group performed worse than the community group. Discriminant function analysis identified a subgroup of high-functioning institutionalized subjects whose performance more closely resembled that of the community group than the remainder of the institutionalized group. Differences between the various groups were not due to differences in IQ, age, health, or other controlled variables. The critical tests that differentiated the groups were sensitive to impaired function in frontal and medial-temporal lobe brain regions. The results suggest a complex interaction involving effects of age and environmental factors on brain function and cognition.

RÉSUMÉ Des groupes soigneusement pairés de gens agés normaux institutionnalisés au vivant dans la communauté ont passé une batterie de tests cognitifs neuropsychologiques. En général, les institutionnalisés démontraient une plus mauvaise performance que le groupe vivant en communauté. Une analyse discriminante des fonctions a identifié un sous-groupe de sujets institutionnalisés fonctionnant à un haut niveau et dont la performance ressemblait plus à celle des sujets vivant en communauté qu’aux autres membres du groupe institutionnalisé. Les différences entre ces divers groupes n’étaient pas dues aux différences de Q.I., d’âge, de santé ou autres variables contrôlées. Les tests critiques qui différenciaient les groupes étaient sensibles aux fonctions touchées lors de lésions des lobes frontaux et medio-temporaux du cerveau. Les résultats suggèrent une interaction complexe impliquant les effets de l’âge et les facteurs environnementaux sur les fonctions cérébrales et la cognition.

The elderly enter institutions for a variety of reasons. Some are institutionalized because they are cognitively impaired or have psychiatric problems, and these may be the majority. However, there are a substantial number of old people who are, to all appearances, cognitively intact but who enter institutions for reasons that are ostensibly unrelated to their mental status. These reasons include social isolation, physical handicaps, economic considerations, and general apprehension about their ability to cope. While the latter group has been extensively studied, research has focussed for the most part on the psychosocial and health-related aspects of adjustment.

The present research was supported by grants from the Medical Research Council and the Social Sciences and Humanities Research Council of Canada awarded jointly to both authors. This study was conducted with the full co-operation of staff at the following residences for the aged: The Wexford, Rotary-Laughlin, Central Park Lodge, Belmont House, Union Villa, and Fellowship Towers. The authors are extremely grateful for their help. The authors also thank Gary Reker for help with the statistical analysis and Doris Pereschuk for her able technical support. Finally, a special thanks to Regina Minde without whose unique contribution the present research could not have been conducted.

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to institutional life (see Kahana, 1982; Kasl & Rosenfield, 1980). In contrast, few studies have been conducted for the express purpose of assessing the cognitive ability of these individuals. It is important to document cognitive function more fully because cognition is multifaceted and some deficits may not be apparent upon initial examination. The need for such a study is underscored by our own research. Our findings suggest that dysfunction in some domains may be widespread in the institutionalized population, affecting even those believed to be cognitively intact (see Winocur, 1982, for a review).

In a series of investigations on the neuropsychological basis of memory disorders in the elderly, we have compared the performance of old people living in the community with those living in nursing homes or homes for the aged. The institutionalized subjects were carefully chosen to be free of clinically diagnosed cognitive or psychiatric problems and were judged to be functioning normally by the nursing staff. In addition, all participating subjects were intellectually intact as determined by their WAIS IQ. Special care was taken to match the institutionalized and community elderly as closely as possible in terms of IQ, age, health, education, and socioeconomic status. Despite these precautions, the institutionalized elderly were consistently impaired on various experimental tests of learning and memory. At times, their performance resembled that of neurological patients with severe memory disorders caused by damage to the medial-temporal or frontal regions of the brain (Moscovitch & Winocur, 1983; Winocur & Moscovitch, 1983; Winocur, Moscovitch, & Witherspoon, 1987).

These surprising results prompted the present study which had several objectives. First, we wanted to determine whether those institutionalized elderly who appear to be of normal intelligence and are judged to be functioning at a high level would be as impaired on standard tests of learning and memory as on the experimental tests used. Second, we wished to extend our previous research, which was concerned primarily with memory, to cover a broader range of cognitive functions. Finally, in line with our neuropsychological approach, the present study included several tests that are known to assess cognitive impairments associated with dysfunction in specific regions of the cortex. These areas, which include the medial-temporal lobe, prefrontal cortex, and parietal association cortex, were selected because they are believed to deteriorate early in normal and pathological aging (Albert & Kaplan, 1980; Barnes, 1983; Bondareff, 1977; Brody, 1976; Kemper, 1984).

**Method**

Subjects: For this experiment, senior citizens between the ages of 70 and 85 years were recruited from amongst populations living in their own homes within the community or in various institutions designed for seniors past retirement age. All resided within the Toronto area. Each volunteer was interviewed privately and administered a health status questionnaire. Prospective subjects were briefed in general terms about the purpose and nature of the study and encouraged to participate if they felt they could complete the testing programme. With their permission and that of consulting physicians, where appropriate, additional information concerning health status was obtained from medical records and, in the case of institutionalized subjects, from institutional staff. Individuals were considered only if they were free of known psychological, neurological, and serious physical disorders involving heart, lung, liver, or kidney function. Individuals taking antidepressants or other medication known to influence cognitive function were excluded. Those who met these criteria were administered...
the Vocabulary, Block Design, and Digit Span tests of the WAIS as a measure of intelligence, and only those whose scores were at least normal were considered further. Another consideration was the volunteer's functional status, as only those people with a range of interests and an active social life that extended beyond their immediate environment were included in the final sample.

Community group. The community group consisted of 30 subjects with a mean age of 77 years ($SD = 4.7$, range 70–88). Their mean pro-rated IQ was 118.3 ($SD = 11.5$, range 102–150), and they had a mean of 12.2 years of formal education ($SD = 3.3$, range 7–20). Community subjects lived in a variety of settings that included detached houses and townhouses, but the majority lived in standard one- or two-bedroom apartments. Most lived alone, although some shared accommodation with a spouse or friend.

Institutionalized group. These subjects were drawn from institutions that had in common a central dining room that provided at least one main meal a day, a health care staff, a social programme, and an activity programme that was supervised by institutional staff. The people who constituted our sample invariably required very little attention from staff and were amongst the healthiest and most active residents in their respective institutions. The reasons our subjects typically gave for entering institutions were death of a spouse, family moving away, anxiety over being able to manage, and financial concerns. There was no indication from the individuals themselves or from their records that they were institutionalized because of poor physical or mental health.

The institutionalized group was made up of 44 subjects with a mean age of 78.2 ($SD = 4.7$, range 71–89). They had a mean WAIS score of 110.7 ($SD = 13.6$, range 92–150) and a mean of 12.8 years ($SD = 2.9$, range 8–20) of formal education. Although some subjects had lived in more than one institution, only those who had spent at least the preceding 2 years in the present institution were considered.

Of the original subjects who met our inclusion criteria and began testing, 11 (7 community, 4 institutionalized) did not complete the entire battery. The reasons given related to illness, conflicting appointments, or unwillingness to continue. There were no distinguishing features about these individuals, and their data were excluded to enable a constant number of measures across all tests.

Procedure: All meetings were arranged by appointment. Subjects in the community group were tested in their homes. Subjects in the institutionalized group were tested in their rooms or, in some cases where it was necessary to gain privacy, in another room in the institution. At the first test session, subjects signed a consent form that guaranteed confidentiality and the individual's right to withdraw at any time. Testing took about 6 hours and was spread over 3–4 sessions lasting about 1.5 hours each. After testing, debriefing sessions were held and all subjects were invited to attend. Each subject who completed testing was paid $15.00.

Test Battery: All the following tests were administered to each subject in an order that varied between subjects. The tests assessed different cognitive abilities that, to varying degrees, could be identified with specific brain regions. Some of the tests are commercially available and used widely in clinical settings, while others were designed for use with elderly and clinical populations in our neuropsychological research programme (Moscovitch, 1982; Winocur, 1982).

Wechsler Memory Scale (WMS). This is a standardized test that is used extensively to assess verbal memory ability. The test yields a general index of memory function in the form of a quotient and is very sensitive to memory impairment for whatever reason.

Rey-Osterreith Complex Figure Test. In this test, subjects copied a complex line design and were asked 20 minutes later to reproduce the design from memory. Standardized scoring procedures provided a measure of recall (R) in the form of a savings score. Deficits in copying (C) are associated with parietal lobe and frontal lobe damage, whereas deficits on later reproduction are associated with right temporal lobe damage (Taylor, 1969).

Paired-associates. This test consists of 12 pairs of familiar words (e.g., grass-pencil) of low associative strength. After studying the word pairs in a single trial, subjects received three trials in which the first word of each pair was presented with instructions to give the
word that goes with it. The correct word was provided after each response. Paired-associate (P-A) learning, as measured by the number of correct responses, is used extensively to identify organically based memory problems of cortical (Taylor, 1969) and subcortical (Winocur, Oxbury, Roberts, Agnett, & Davis, 1984) origin.

Immediate and delayed recall. For these tests, six lists of 10 familiar words were constructed: three for the immediate test and three for the delayed recall test. One list was presented at a time at spaced intervals, usually between other tests during each session. Each list was shown once for study, followed immediately or after a filled 60-s delay by a test of free recall in which the subject was instructed to provide as many words as possible in any order from the preceding list. Data are presented in terms of the total number of words recalled. Old people and neurological patients with memory disorders are typically more impaired on delayed tests than on immediate tests of free recall (Craik, 1977; Warrington & Weiskrantz, 1968).

Word and face recognition. In these tests devised by Warrington (1984), subjects studied 50 faces or words and then later were required to choose between the familiar stimuli and 50 distractors. The performance measure was the number of correctly identified target stimuli. Recognition memory deficits have been observed in amnesic patients with medial temporal lobe (Milner, 1972) or diencephalic (Winocur et al., 1984) damage.

Negative transfer. This test involves two lists of categorically similar paired-associates consisting of a common stimulus word and different response words for each corresponding pair (e.g., List 1: battle-soldier; List 2: battle-army). Subjects were given three study trials on List 1 in which each pair of words was presented together. Following the third trial, a recall test was administered in which only the stimulus words were presented and subjects were asked to supply the appropriate response words. After a filled 20-min interval, List 2 was presented in the form of a single study trial followed immediately by test trials in which the stimulus words were presented and subjects had to provide the List 2 response words. Testing was terminated by an errorless trial or after three trials. This test has been used extensively with clinical and elderly populations (Winocur & Moscovitch, 1983; Winocur & Weiskrantz, 1976). Difficulty in learning the second list, as measured by the number of errors, is a sign of increased susceptibility to interference from List 1 learning and is associated with left temporal lobe damage (Moscovitch & Winocur, manuscript in preparation).

Word fluency. This test requires subjects to generate words beginning with the letters S, A, F, with 1 minute allowed for each letter. The words were spoken by the subject and recorded by the experimenter. The measure of interest is the total number of words generated in 3 min. This test is sensitive to dorsolateral frontal lobe damage and is commonly used to evaluate word-finding ability in clinical populations (Milner, 1964) and the elderly (Rosen, 1980).

Design fluency. In this test, subjects were required to generate as many different nonsense drawings as possible in a 5-min period. Frontal lobe damage, particularly in the orbital region, reliably causes deficits on this task (Jones-Gotman & Milner, 1977).

Wisconsin Card Sorting Test (WCST). This widely used test of set-formation and attentional-shift requires subjects to sort cards containing multidimensional drawings into different categories. The WCST yields performance measures, and the measure reported here is the number of card sorting errors. The test is sensitive to dysfunction of the frontal lobe and, in particular, the left dorsolateral region (Milner, 1964).

Posner Line Test. For this test, subjects were shown a line with a dot on it and then asked to reproduce the dot in the same way on another line. This is a test of immediate nonverbal memory, and the measure of performance is the displacement (in cm) of the reproduced dot from the original. This test is sensitive to the effects of right temporal lobe damage (Milner, 1974).

Brown-Peterson Test. Subjects studied three words and then engaged in a distraction task for intervals between 0 and 18 s. Following the distraction, they were asked to recall the preceding words. This test assesses forgetting rate for verbal short-term memory. Deficits on this task have been observed in patients with damage to the dorso-medial thalamus (Squire & Slater, 1978; Winocur et al., 1984).

Spatial Orientation Stick Test. In this test, subjects were presented with sticks in various patterns and instructed to copy them in the same patterns or in their mirror reversals. This
TABLE 1
Test Scores for Institutionalized and Community Subjects

<table>
<thead>
<tr>
<th>Test</th>
<th>Institutionalized (n = 44)</th>
<th>Community (n = 30)</th>
<th>High Functioning Institutionalized Subgroup (n = 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean  SD</td>
<td>Mean  SD</td>
<td>Mean  SD</td>
</tr>
<tr>
<td>WAIS</td>
<td>110.7 13.6</td>
<td>118.3 11.5</td>
<td>115.9 16.9</td>
</tr>
<tr>
<td>WMS</td>
<td>112.3 13.6</td>
<td>122.7 11.3</td>
<td>119.3 13.6</td>
</tr>
<tr>
<td>Brown-Peterson</td>
<td>22.3 4.3</td>
<td>23.1 5.3</td>
<td>23.0 4.1</td>
</tr>
<tr>
<td>Posner Line</td>
<td>350.2 95.2</td>
<td>214.6 28.6</td>
<td>266.1 80.8</td>
</tr>
<tr>
<td>Immediate Recall</td>
<td>29.1 3.5</td>
<td>31.7 3.7</td>
<td>30.9 3.3</td>
</tr>
<tr>
<td>Delayed Recall</td>
<td>20.2 4.7</td>
<td>27.0 3.6</td>
<td>25.4 2.4</td>
</tr>
<tr>
<td>Rey-Osterreith (C)</td>
<td>25.0 3.4</td>
<td>27.9 4.1</td>
<td>27.2 3.0</td>
</tr>
<tr>
<td>Rey-Osterreith (R)</td>
<td>38.6 12.5</td>
<td>60.2 10.6</td>
<td>47.4 12.7</td>
</tr>
<tr>
<td>Word Recognition</td>
<td>34.6 6.5</td>
<td>39.4 3.8</td>
<td>36.7 6.6</td>
</tr>
<tr>
<td>Face Recognition</td>
<td>35.3 4.4</td>
<td>38.4 3.9</td>
<td>37.1 4.6</td>
</tr>
<tr>
<td>Remote Memory</td>
<td>26.1 3.8</td>
<td>27.4 4.2</td>
<td>27.4 2.2</td>
</tr>
<tr>
<td>Word Fluency</td>
<td>25.9 6.4</td>
<td>36.3 5.5</td>
<td>31.4 6.5</td>
</tr>
<tr>
<td>Design Fluency</td>
<td>20.0 6.0</td>
<td>28.2 2.7</td>
<td>25.3 4.2</td>
</tr>
<tr>
<td>Stick Test</td>
<td>5.2 1.4</td>
<td>6.3 1.4</td>
<td>5.8 1.2</td>
</tr>
<tr>
<td>Wisconsin Card</td>
<td>51.6 11.2</td>
<td>30.5 6.3</td>
<td>38.8 4.4</td>
</tr>
<tr>
<td>Negative Transfer</td>
<td>28.9 8.9</td>
<td>15.3 5.4</td>
<td>21.8 5.8</td>
</tr>
<tr>
<td>Paired-Associate</td>
<td>52.2 9.9</td>
<td>37.3 6.6</td>
<td>44.9 8.0</td>
</tr>
</tbody>
</table>

Note. See description of individual tests in Method section for explanation of scores.

test assesses the capacity to perform extrapersonal rotations and is particularly sensitive to right parietal lobe damage (Butters & Barton, 1970).

Remote memory. This tests the ability to identify faces of well-known personalities who were famous during time periods between 1930 and 1980. On tests of remote memory, the aged typically show poorer memory for recent decades, a pattern that is also seen in many amnesic patients, particularly those with hippocampal damage (Moscovitch, 1982).

Results

Table 1 provides the means and standard deviations of all cognitive test scores administered to the community and institutionalized subjects. All cognitive scores were transformed to standard scores with a mean of 0 and a standard deviation of 1. The standard scores were positively keyed so that, for each test, the more positive the standard score, the higher the level of performance. A general index of cognitive function (CI) was computed for each subject by taking the arithmetic average of the standard scores. The CI provided a convenient and useful summary of the overall level of performance on the specialized cognitive tests. WAIS-IQ and WMS scores were not included in the CI. All computations were conducted using the SPSS-X computer program system (SPSS Inc., 1983).

As can be seen from Table 1, scores for the community group were generally higher than those of the institutionalized group. The corresponding mean CIs were 8.2 (SD = 3.9) for the community group and -9.0 (SD = 3.0) for the institutionalized group. ANOVA performed on the CIs confirmed a significant group effect, F(1, 71) = 11.11, p < .01. Separate analyses revealed significant group differences on all individual test scores (ps < .05) except the Brown-Peterson, remote memory,
and immediate recall tests. Although all potential subjects were screened for WAIS-IQ and only those who scored at least in the normal range were selected, ANOVA showed that group scores on IQ were significantly different, $F(1, 72) = 6.41, p < .01$. Since differences in general intelligence could account for differences on tests of specific functions, an analysis of covariance was performed on the data with transformed WAIS scores as covariates. This analysis did not yield a significant covariate effect, $F(16, 56) = 1.79, p > .05$, indicating that group differences on the various cognitive tests as indicated by ANOVA were not significantly affected by WAIS. In line with the results of the specialized tests, which included several memory tests, a significant group difference was also obtained on the WMS, $F(1, 72) = 11.86, p < .001$.

Although there were clear differences between institutionalized and community groups on the overall CI and on most of the individual test scores, further examination of the data suggested that scores for the two groups may be distributed differently. Whereas the scores for the community group appeared normally distributed, there appeared to be more variability and the possibility of skewness in the scores of the institutionalized group. Accordingly, a frequency distribution analysis was performed on the total raw scores to examine the characteristics of the distributions for both samples. For this purpose, the raw data were converted where necessary such that higher scores on all subtests reflected poorer performance.

The distribution for the community group was a normal curve ($M = 802.7, SD = 41.6$) with no significant deviation in terms of kurtosis ($-.027$) or skewness ($-.413$). The distribution for the institutionalized group was also a normal curve ($M = 855.7, SD = 79.9$) but with more variability than the distribution for the community group, as reflected by the fourfold increase in variance. There was also increased kurtosis ($-.839$) in the institutionalized group’s distribution and a tendency towards a positive skew (.298). The distribution of the institutionalized group indicates an accumulation of scores towards the high end of the CI continuum and a degree of overlap between highly functioning institutionalized subjects and the community group.

The frequency distribution analysis suggested the presence of a definable subgroup of higher-functioning individuals in the institutionalized group. To assess this suggestion, a discriminant function analysis was performed on all the variables and a significant function emerged, $\chi^2(17) = 92.67, p < .001$. Examination of the structure matrix, retaining variables loading $\geq .3$ on the significant function, revealed that the function was defined by the following tasks: Wisconsin Card Sorting Test, Negative Transfer, Rey-Osterreith (R), Posner Line, Word Fluency, Paired-Associate, Design Fluency, and Delayed Recall.

A frequency distribution of scores on the function showed the expected separation of community and institutionalized groups. All community subjects scored above the midpoint and 30 of the 44 institutionalized subjects scored below the midpoint. Of particular interest were the 14 remaining institutionalized subjects, all of whom scored at or above the midpoint on the obtained function. The mean IQ of this subgroup was 115.9 ($SD = 16.9$), the mean WMS score was 119.3 ($SD = 13.1$), and the mean CI was 1.73 ($SD = 4.3$). The mean age for subjects in the subgroup was 78.2 ($SD = 4.2$), and they had a mean of 13.9 years ($SD = 2.9$) of formal education.
These scores contrasted from those of the institutionalized group as a whole and confirmed our original observation of a definable subgroup of higher functioning institutionalized subjects. These subjects closely resembled the community group in terms of their performance on the key cognitive tasks that defined the significant function (see Table 1).

Finally, a discriminant function analysis was performed based on three groups: all the community subjects and the two institutionalized subgroups identified by the previously described discriminant function analysis. One significant function emerged, \( \chi^2(22) = 166.57, p < .01 \). Examination of the structure matrix, retaining variables loading \( \geq .3 \) on the significant function, revealed that the function was defined by the following tests: Posner Line, Wisconsin Card Sorting, Word Fluency, Design Fluency, Negative Transfer, Rey-Osterreith (R), and Paired-Associate.

A frequency distribution of all groups' scores on this function (Fig. 1) showed that community subjects' scores (Group 1) were above the midpoint on the function and all of the lower-functioning institutionalized subjects (Group 2) were below 0. The scores for the higher-functioning institutionalized subgroup (Group 3) contrasted from those of the low-functioning subgroup. Most (11/14) of Group 3 scores clustered above 0 and were close to the scores of Group 1. The group classification generated by the original discriminant function analysis accurately predicted group membership in 93% of the cases in Group 1 and Group 2. Group 3 membership was correctly predicted in 64% of the cases, with 14% and 22% of the remaining subjects being placed in Groups 1 and 2, respectively.
Discussion

Careful screening procedures ensured that all subjects participating in this study, including those who were institutionalized, were equivalent in terms of health, age, education, and socioeconomic status. We also were careful to include only those subjects whose intelligence, as measured by WAIS IQ, was normal or better. Despite our efforts to match the groups, the average WAIS score of the institutionalized group was slightly, but significantly, lower than that of the community group. As a result, WAIS scores were factored out to determine whether performance differences in specific tests resulted in differences in general intelligence.

To obtain an overall measure of cognitive function, a cognitive index (CI), based on the battery of tests we administered, was computed for each subject. A comparison of institutionalized and community elderly on this index yielded a highly significant difference even when WAIS IQ was factored out, indicating that the observed effects could not be attributed solely to differences in intelligence. Further examination revealed that the groups differed on all tests except the Brown-Peterson, immediate recall, and remote memory tests. These tests typically resist the effects of aging or damage to frontal or medial-temporal lobe structures, which include the hippocampus.

Discriminant function analysis revealed that of the 15 specialized cognitive tests, 8 contributed to the observed differences between the groups. These eight were WCST, Negative Transfer, Rey-Osterreith (R), Posner Line, Word Fluency, Paired-Associate, Design Fluency, and Delayed Recall. All eight tests are sensitive to medial-temporal lobe or frontal lobe damage. That both verbal and nonverbal tests are included in this group indicates that these regions are affected in both hemispheres. In terms of the frontal lobes, deficits on WCST and the fluency tests suggest that both the dorsolateral and orbital regions are compromised in the institutionalized group. Of the remaining seven tests whose contribution to the group differences was small, none was sensitive to frontal lobe damage. Of the five memory tests in this group, it is noteworthy that small but significant differences were found in the word and face recognition tests. While these tests are used to diagnose amnesia (Warrington, 1984), their sensitivity to mild temporal lobe damage has not been established.

In addition to performance differences between the institutionalized and community groups on tests sensitive to frontal and medial-temporal lobe damage, the data also revealed greater variability in performance for the institutionalized group. The distribution of scores suggested that among the institutionalized subjects there was a definable subgroup of 14 higher-functioning individuals, an observation confirmed by discriminant function analysis. Indeed, on the critical tests that defined the function that differentiated the groups, the great majority of those in the higher-functioning subgroup resembled community elderly much more than they resembled the remainder of the institutionalized group. The tests on which the discriminant function was based were Posner Line orientation, WCST, Word Fluency, Design Fluency, Negative Transfer, Rey-Osterreith (R), and Paired-Associate. All of these tests are sensitive either to impaired frontal or medial temporal-lobe functions.

Thus, the results confirm our earlier finding that people who are functioning well in institutions and who appear normal nevertheless may have significant cognitive impairment in certain domains (Moscovitch & Winocur, 1983; Winocur & Moscovitch,
1983; Winocur, Moscovitch, & Witherspoon, 1987). The question arises as to whether institutionalization invariably leads to cognitive impairment. The results of the present study suggest that this is not the case. Whereas the majority of institutionalized subjects were impaired, a sizeable proportion performed most like the community-dwelling individuals. The question still remains whether we can attribute the cognitive decline of the impaired group to the effect of institutionalization. The possibility exists that these individuals, though appearing to be normal, were already in a state of decline at the time of admission and that their decline continued on its course or was exacerbated by institutionalization.

On the other hand, evidence from a longitudinal study that we conducted on another set of subjects (Winocur, Moscovitch, & Freedman, 1987) shows that cognitive function can be influenced by the individual’s adjustment to institutional life. We found that performance on many of the same tests as in the present study varied with the individual’s social activity and perceived control of environment. As perceived control or activity either increased or declined over the 10–12 months that the subjects were tested, so did their cognitive performance. To extrapolate from the previous study, we would expect that those individuals who comprised the higher-functioning institutionalized subgroup were also coping well with institutional life.

The present study suggests that there is a complex interaction involving the effects of age and environmental factors on brain function and cognition. It is clear that some functions are highly resilient, such as short-term memory and remote memory, and others are very vulnerable, especially those sensitive to frontal and medial-temporal-lobe damage. As indicated in the introduction, these brain structures have been identified as amongst those that deteriorate early with aging. Being highly vulnerable, they may deteriorate more quickly in an unstimulating, possibly stressful, environment. Alternatively, these brain regions may retain their structural integrity but their level of functioning may be reduced in an unfavourable environment. Our finding that impaired cognitive function is reversible (Winocur, Moscovitch, & Freedman, 1987) supports the latter interpretation.

Our investigations into aging and cognitive function, as well as our observations of the elderly in institutions, underscore the importance of considering cognitive abilities in assessing the individual’s well-being. Whereas the psychological literature on the effects of institutionalization is concerned almost exclusively with social function, our work is the first to indicate that cognitive functions interact in important ways with social and environmental factors. In practical terms, this means that cognitive function can serve as an index of the individual’s psychosocial well-being and may be an early sign of poor adaptation to the institutional environment. In addition, programmes designed to improve the quality of life may lead to better cognitive functioning which, in turn, could lead to greater life satisfaction. While we have established that there is a strong link between cognitive and psychosocial functioning, the mechanism mediating this interaction or even the causal relation between the two is still undetermined. Future research directed at this problem has important practical implications for the care of the elderly, as well as being of theoretical significance for understanding brain/behaviour relationships.
References


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