Observed Affect in Nursing Home Residents With Alzheimer’s Disease

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A method for assessing affect states among older people with Alzheimer’s disease was developed for use in a study designed to evaluate a special care unit for such residents of a nursing home. The 6-item Philadelphia Geriatric Center Affect Rating Scale was designed for the use of research and other staff in assessing positive affect (pleasure, interest, contentment) and negative affect (sadness, worry, anxiety, and anger) by direct observation of facial expression, body movement, and other cues that do not depend on self-report, among 253 demented and 43 nondemented residents. Each affect scale was highly reliable, expressed in estimated portions of a 10-minute observation period when the affect expression occurred. Validity estimates were affirmative in showing discriminant correlations between the positive states and various independent measures of social and other outwardly engaged behavior and between negative states and other measures of depression, anger, anxiety, and withdrawal. Limited support for the two-factor dimensionality of the affect ratings was obtained, although positive and negative affect were correlated, rather than independent. Some hope is offered that the preferences and aversions of Alzheimer patients may be better understood by observations of their emotional behaviors and that such methods may lead to a better ability to judge institutional quality.

ONE’S MOST immediate impression of a person with Alzheimer’s disease (AD) or a similar disorder is likely to be conveyed by the massive inroads on overall competence made by the brain damage resulting from these conditions. Personality, everyday needs, interests, emotional attachments, and all else related to the positive goals of ordinary human existence become leveled and dwarfed by the psychopathology. However, closer contact with AD patients reveals significant individual differences in residual functions and preferences. Research interest in quality of life (QOL) for AD patients, and especially the concern expressed in the reforms embedded in the Omnibus Reconciliation Act of 1987, recognize to some degree the need to restore the breadth of our conceptions of AD patients as individuals.

This research investigated manifestations of affect in nursing home residents suffering from Alzheimer’s disease. Affect is an important aspect of personality and deserves study in its own right. Affect is also a potentially important avenue toward understanding the likes and dislikes of a class of patients who are limited in their ability to introspect and report on their internal states. If affect states can be discerned in patients with dementing illness, this information may guide us in designing programs, treatments, and environmental features to enhance their quality of life. This report describes the qualities of an instrument designed to measure observed affect expression in Alzheimer patients. The reliability with which trained observers made such ratings was tested.

The affect measure was used to determine whether the extent to which apparent affect expressions were observed in residents with dementing illness was different from the extent to which they were observed in nondemented residents. Because such illnesses have massive effects on other aspects of the person, it is possible that even if affective function persists, its frequency could be affected by the dementia. Although such analyses have not been performed for dementia, research suggests that brain pathology might decrease positive and increase negative affect (Tucker & Williamson, 1984).

Building on earlier research, the interrelationships of the positive and negative affect terms were determined in order to test the consistency of the two-factor structure of affect as posited by Watson and Tellegen (1985) and others. That is, positive affects should be related to one another but not to negative affects; the negative affects, in turn, would display an analogous pattern. Such a structure should result in separate independent positive and negative affect factors.

The validities of the affect ratings were tested by determining their relationships to independently measured aspects of the residents that might be thought to have a logical association with affect, such as personality ratings, clinical ratings by staff members, and, in one specific hypothesized instance, cognitive performance.

Comprehending Emotion

The background for the present study was research in the general psychology of emotion. Two facets of emotion are the ability to recognize and comprehend emotion in others (decoding) and the experience and display of emotion (encoding). Little research has explored these issues in Alzheimer’s disease and related conditions. One relevant study was that of Albert, Cohen, and Koff (1991), who studied the ability of AD patients to decode emotion from the facial expressions of others. They found that AD patients were indeed less accurate than cognitively intact patients. However, once the effect of cognitive functioning was accounted for statistically, they concluded that the deficit was explainable in terms of the cognitive deficit rather than by any residual noncognitive deficit in emotion processing. Zandi,
Cooper, and Garrison (1992) presented demented and nondemented subjects with tasks of naming emotions expressed in photographs, matching emotion terms with photographs, and producing facial expressions of emotions from verbal emotion names. AD subjects had deficits in all tasks, confirming the contribution of cognitive deficit to emotion decoding. They also concluded that the decoding problem was associated with impaired memory search processes because impaired subjects performed better in matching words to pictured emotions than in the free naming task. They also found that encoding emotion from verbal labels was less well performed in dementia patients than in normal persons. In the case of deeply demented people, on the other hand, experimental exposure to presumably positive and negative situations evoked only basic reactions to the stimulation, rather than the differentiated responses characteristic of the primary emotions (Asplund, Norberg, Adolfsson, & Messina, 1987; Malatesta, Fiore, & Messina, 1987; Malatesta, Izard, Culver, & Nicolich, 1987) and Levinson, Carstensen, Friesen, and Ekman (1991) have successfully applied such methods to the study of emotion in normal elders.

Expressing Emotion

One limitation in exploring the experience of emotion in demented people is their diminished ability to articulate their feelings verbally. This is especially true as dementia progresses in its severity; staff and family need increasingly to base their “reading” of the patient’s emotions on nonverbal communications. Persons with dementia may express their emotions through facial expressions, body movements, posture, gestures, and nonword vocalizations (Bartol, 1979; Mace, 1989). Caregivers are left with the task of attempting to assess the subjective state of the patient via direct observation. Assessment of emotion through the direct observation of facial expression has received a great deal of attention in nondemented populations, especially in the work of Ekman, Friesen, and Tompkins (1971) and Izard (1977). These investigators have developed elaborate rating systems to identify emotional states such as happiness, fear, anger, disgust, contempt, interest, sadness, and surprise by observing the musculature of specific regions of the face (Ekman & Friesen, 1978). Malatesta and colleagues (Malatesta, Fiore, & Messina, 1987; Malatesta, Izard, Culver, & Nicolich, 1987) and Levinson, Carstensen, Friesen, and Ekman (1991) have successfully applied such methods to the study of emotion in normal elders.

Recent research has begun to examine expressions of emotion in people with dementing illness. In a clinically oriented study, Hurley, Volicer, Hanrahan, Houde, and Volicer (1992) developed a scale assessing expressions of discomfort in AD patients, rated by an observer. This scale is limited to negative emotional states as indicated by sad and fearful facial expressions, by language, and negative vocalizations. Initial work with this scale indicated promising reliability and validity.

The Two-Dimensional View of Affect

A model of emotion that locates most specific affects within a two-dimensional space is utilized in the research report here. Although there are clear methodological conditions under which the independence of the two factors is limited, and unresolved conceptual issues regarding their independence, most research findings converge on these dimensions as at least partially independent of one another (Russell, 1980). The names of these dimensions depend on both the affect terms used to rate emotion and on the statistical approach to factor specification. The major alternative models specify these basic dimensions as either an activation dimension and a bipolar pleasantness vs unpleasantness dimension (Russell, 1980, using an unrotated factor solution), or two bipolar dimensions of positive affect and negative affect in a rotated solution (Watson & Tellegen, 1985). The two-dimensional structure was replicated among people of several ages and across older people of several types, including very high-functioning community residents, nursing home residents, and depressed elders (Lawton, Kleban, Rajagopal, Dean, & Parmelee, 1992). The latter research was based, of course, on self-reported affect ratings and included only a few mildly impaired subjects with dementing illness. A need is thus seen to determine whether the relationships among the affects as measured in dementia are consistent with the two-factor structure, using direct observation rather than self-ratings.

The dual-channel hypothesis that relates positive and negative affects differentially to their antecedents, was suggested in Bradburn’s original research (1969) and in Lawton’s (1983) research with the aged. The dual-channel designation originated in research showing that positive affect, but not negative affect, was related cross-sectionally to engagement in external events, such as socializing and engaging in recreational activities (Lawton, 1994). Conversely, negative affect, but not positive affect, tended to be related to inner phenomena. External engagement is behavior, cognition, or affect whose object lies outside the person; it is distinguished from internal engagement, where the origin of the person’s attention is some internal object, such as a memory, a thought, or some internal stimulus such as a physical symptom.

As in the case of the two-factor model of affect, the dual-channel model is relative, rather than absolute. Event-affect congruence was demonstrated by Lawton, DeVoe, and Parmelee (1995) in the stronger relationships between positively valent events and positive affect, on the one hand, and between negatively valent events and negative affect, on the other, than those between the positive and negative members. The cross-relationships were not always zero, however. In fact, Lewinsohn, Biglan, and Zeiss (1976) demonstrated that positive experiences could be used therapeutically to reduce depression. It should also be noted that ratings of depression do not fall clearly into the negative affect factor as defined, for example, by Watson and Tellegen (1985) but into an area between negative affect and low positive affect (or deactivation). Given these limitations on the absoluteness of the dual-channel structure, there is reason to hypothesize relative, but not total, congruence between the valences of antecedent events and affective consequences.

Hypotheses

1. Affect states in dementing illness may be judged reliably by trained observers.
2. Although affects will be evidenced in dementing illness, the frequency of positive emotions will be less and the
frequency of negative emotions greater than in people without dementia.

3. Among a small set of affect states, positive states will be associated with other positive states but not with negative affects; negative affect states will be associated with other negative affects but not with positive affects. As a set, they will form two separate factors, as predicted by the two-factor model of affect.

4. The validity of observed affect states will be established by a correlational pattern whereby the positive affects will be related to "positive" personality traits and engagement in external activities; anger, sadness, and anxiety affect states will be related to other indicators of these characteristics, and interest (which is hypothesized to have a stronger cognitive component than the other affect states) will be positively related to cognitive function.

5. One facet of the dual-channel model of the antecedents of positive affect will be supported if participation in externally engaging activities is associated with positive affects but not negative affects.

**METHOD**

The data were gathered during the preintervention baseline assessment period of an evaluation of a special care unit (SCU) for nursing home residents with dementing illness. Two 52-bed designated SCUs housed 104 of the 550 residents in a large nonprofit nursing home, while 5 other diverse units also housed some demented residents, who were recruited for a "scattered" comparison group.

**Subjects**

*Residents with dementing illness.* — There were 79 residents assessed in one SCU and 77 in another, representing all residents who resided on the two SCUs long enough to complete the measures to be described (an additional 14 subjects began the repeated affect measures to be described later, but died or were transferred before completing them). The baseline assessments extended over a period of 28 months, during which time new residents of the two units were added to the original pool of 104 subjects as original residents died or were transferred. In the scatter units, 97 residents with dementing illness were completed (with a loss of 7 who did not complete other baseline assessments). All potential subjects were judged minimally capable of comprehending the consent information. Therefore, all subjects were approached personally (as specified by the local IRB) for consent; all but one gave such consent. Family members were informed of the research but not requested to provide consent.

The two physically identical SCUs were chosen because all subjects assigned there suffered from moderately severe cognitive impairment. Clinical diagnoses for both the SCUs and scattered units were made by full-time medical staff and consulting staff psychiatrists and clinical psychologists at formal staff conferences, based on both psychological testing and clinical interview. Definitive diagnoses according to ADRDA-NINDS criteria (McKhan et al., 1984) were not available. However, their mean Global Deterioration Scale rating (GDS; Reisberg, Ferris, deLeon, & Crook, 1982) by medical staff was 5.27 (SD = 1.11, range = 2–7) and their mean Mattis Dementia Rating Scale (Mattis, 1976) score was 78.68 (SD = 30.63, range = 24–138). Although there was considerable variability, the greater proportion of subjects were in the moderately severe range of cognitive impairment. Their mean age was 87.82 (SD = 5.83, range = 70–104). Their physical health was rated by physician assistants using the Cumulative Illness Rating Scales (CIRS; Linn, Linn, & Gurel, 1968), which requires 5-point ratings of each of 14 body systems. The mean overall score was 26.9 (SD = 6.4, range = 12–60); the mean of 1.92 per body system represents an overall "mild" burden of illness, but this was contributed to disproportionately by the pathologies of the neurological system. Activities of daily living (ADLs) as rated by nursing staff on the Minimum Data Set (MDS, Morris et al., 1990) indicated that the following percentages of residents were not fully independent on the basic ADLs: Dressing 79%; personal hygiene 68%; toilet use 62%; locomotion 44%; bed mobility 26%; eating 26%.

*Residents without dementia.* — A comparison group of subjects was selected from which to assess the rough frequency of the several emotion expressions among nondemented residents. Five care units that housed relatively intact residents were selected for this purpose. Researchers attended the monthly residents council meeting in each area to describe the research; written descriptions of the proposed research were passed out to residents individually and posted in the care areas. The names of residents who attended the meeting were presented to the unit care coordinators, who then designated those judged to be cognitively unimpaired. The resulting 43 residents thus represented a particularly active, alert, and well-functioning group of nursing home residents. None had a diagnosis of any of the dementing illnesses. It should be noted that the intent was to test gross differences in frequencies of observable affect states. No attempt was made to sample either residents or situations systematically or to estimate prevalence in an epidemiological sense.

**Measuring Instruments: Core Measures**

The data used for this report included core measures of daily competence made by service-giving staff, families of residents, and research assistants. These measures were chosen for analysis in the present report to explore the nomological net of affect among demented nursing home residents, including assessment of the validity of the affect measures. Although all the core measures have been shown to possess acceptable psychometric characteristics, most represent clinical ratings, often performed by nonprofessional staff. These limitations need to be kept in mind in interpreting the results.

*Depression* was measured in two ways. Day-shift nursing assistants rated residents on the 8-item Depression factor of the Multidimensional Observation Scale for Elderly Subjects (MOSES; Helmes, Csapo, & Short, 1987). Nurses used the Raskin Depression Rating (Guy, 1976), which requests ratings on verbal reporting, depressed behavior, and secondary symptoms of depression.
Agitation was indexed broadly by the Cohen-Mansfield Agitation Inventory (CMAI; Cohen-Mansfield, Marx, & Rosenthal, 1989), a 29-item inventory that inquires into the prevalence of pathological and disruptive behaviors. For these analyses, one subscale, Physical Aggression, was used as a criterion for the ARS Anger rating. The total CMAI score, minus the Physical Aggression items, to be referred to as agitation, was used as a behavioral indicator of anxiety. Anger was also assessed by nursing assistants on the MOSES 6-item irritability factor (Helmes et al., 1987).

External engagement was originally conceptualized in two ways, involvement with other people and involvement with activities. In order to represent the concepts, nursing assistants rated residents on the 8-item Withdrawal factor of the MOSES (Helmes et al., 1987), which contains items in both the social and the activity realms. They also provided ratings on a Behavior Rating Scale, 4-point scales of planned activity, friendliness with other residents, and sociability with staff. Another view of external engagement was obtained from activity therapists, who rated the latter three engagement items plus rating frequency of participation in 11 types of planned activities. The activity and sociability items were combined separately for nursing assistants and activity therapists for principal components analysis. Nursing assistants’ ratings on the 8 MOSES Withdrawal items and 3 Behavior Rating Scale items were subjected to a principal components factor analysis. For activity therapists, 11 activity participation and 3 Behavior Rating Scale items were factor analyzed. For both of these analyses, a single first component accounted for most of the variance. The social and activities items were thus combined into different summed “sociability” composite scores for activity staff (14 items) and nursing assistants (11 items).

Personality. — The closest family member of record was telephoned by the social worker and asked to complete a personality inventory and to make a set of affect ratings. The Adult Personality Rating Scale (APRS), a 44-item inventory constructed for an earlier research project on dementing illness (Kleban, Brody, & Lawton, 1971) was used to measure personality. The family member was asked to rate their institutionalized relatives appear at the present time. An orthogonal principal components analysis of the 94 responding relatives’ ratings resulted in 4 factors (accounting for 78% of the total variance). The factors were named Extraversion, Hostility, Task Assertiveness, and Neuroticism. Because the “neurotic” dimension was represented by only three items, it is not included in the present analyses. Summed composite scores were created for these three dimensions. Results based on these factors are performed only for the subset of 146 residents whose families provided valid personality factor ratings.

The Dependent Variables: Affect Rating Scale (ARS)

The affect measure was developed by using 6 of the 10 adjectives from the Philadelphia Geriatric Center Positive and Negative Affect Rating Scales (Lawton et al., 1992). The number of affects used in this study was reduced from 10 to 6 in order to lessen the burden on the observer. The terms represented three positive states (pleasure, interest, contentment) and three negative affects (sadness, anxiety, and anger). The rating form (Table 1) provides brief illustrations of cues by which each emotion expression may be identified by an observer, and a 5-point rating to be made following a 10-minute observation. The rating form begins with the general instruction, “Over this 10-minute observation period, rate the extent or duration of each affect state. The indications are named for illustrative purposes. You may use other indicators but if you do, please write them into the defining block.’’ The scales are the research observers’ estimates of the amounts of time during the 10-minute interval in which each affect state was exhibited: Never, <16 sec, 16–59 sec, 1–5, and >5 min, plus “can’t tell’’ durations. The 5-point rating scales may be thought of as ordinal ratings anchored roughly to time rather than cumulative real times denoted by on-off segments.

The same adjectives shown in Table 1 were used by activity therapists and family members, but the instructions requested them to rate the frequency of each affect state over the past 2 weeks: 1 = never, 2 = once per week, 3 = 2–6 times per week, 4 = 1–2 times per day, 5 = 3+ times per day. Thus, in addition to using a totally different rating scale, these raters had considerably larger samples of time over which to accumulate their observations. The 2-week time span also afforded a period of time during which aggregated states might begin to approximate traits (Epstein, 1983).

Procedure

The core measures were performed over a period of about 4 weeks for each resident. Nursing assistants were trained

<table>
<thead>
<tr>
<th>Table 1. Philadelphia Geriatric Center Affect Rating Scale</th>
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<tbody>
<tr>
<td><strong>Pleasure</strong></td>
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<tr>
<td>Signs: Smile, laugh, stroking, touching with “approach”</td>
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<tr>
<td>manner, nodding, singing, arm or hand outreach, open-arm</td>
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<tr>
<td>gesture, eye crinkled</td>
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<tr>
<td><strong>Anger</strong></td>
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<tr>
<td>Signs: Clench teeth, grimace, shout, curse, berate, push,</td>
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<tr>
<td>physical aggression or implied aggression, like fist shaking,</td>
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<tr>
<td>pursed lips, eyes narrowed, knits brows/lowested</td>
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<tr>
<td><strong>Anxiety/Fear</strong></td>
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<tr>
<td>Signs: Furrowed brow, motoric restlessness, repeated or</td>
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<tr>
<td>agitated motions, facial expression of fear or worry, sigh,</td>
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<tr>
<td>withdraw from other, tremor, tight facial muscles, calls</td>
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<tr>
<td>repetitively, hand wringing, leg jiggling, eyes wide</td>
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<tr>
<td><strong>Sadness</strong></td>
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<td>Signs: Cry, tears, moan, mouth turned down at corners,</td>
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<tr>
<td>eyes/head down turned and face expressionless, wiping eyes,</td>
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<tr>
<td>horse-shoe on forehead</td>
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<tr>
<td><strong>Interest</strong></td>
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<td>Signs: Eyes follow object, intent fixation on object or</td>
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<tr>
<td>person, visual scanning, facial, motoric or verbal feedback to other, eye contact maintained, body or vocal response to music, wide angle subtended by gaze, turn body or move toward person or object</td>
</tr>
<tr>
<td><strong>Contentment</strong> (less intense than pleasure)**</td>
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<tr>
<td>Signs: Comfortable posture, sitting or lying down, smooth</td>
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<tr>
<td>facial muscles, lack of tension in limbs, neck, slow movements</td>
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</table>
individually to make the depression, engagement, and agitation ratings by rating trial cases. Research assistants interviewed the nursing assistants individually about the resident in order to obtain these ratings. Physicians and physician assistants received two formal training sessions conducted by a senior psychiatrist consultant on the GDS and by local staff for the CIRS. Research assistants were trained intensively by senior clinical psychology staff to administer the Mattis Scale. Activity therapists were trained by research staff to make the engagement ratings.

The ARS ratings on demented residents were made by research assistants in association with direct observations of ongoing behavior entered into a hand-held event recorder. After each period of observation, the affect ratings were also entered into the programmed event recorder. The data were gathered by research assistants, who underwent a period of training in the use of the ARS. Training began with a didactic session during which senior staff discussed the meaning of emotion and the several manners in which emotion is manifested. This session also included an introduction to the science of facial expressions as indicators of emotion (Ekman et al., 1971). The training video tapes for the Facial Action Coding system (FACS; Ekman & Friesen, 1978) were used to illustrate some of the concepts behind this process. It should be noted that the FACS itself was not used as the formal basis for the ARS ratings, but was introduced to sensitizize the researchers to the use of facial expressions. A manual was produced that elaborated on the indicators displayed in Table 1. It should be noted that verbal expressions, voice, and all body motoric behaviors could be used as indicators. The training period proceeded over one month. Researchers discussed their experiences after they had spent several hours simply observing residents informally and making their own ratings, in the presence of one of the authors (K.V.), who was available on the spot for discussion. At that point, each researcher was assigned a series of observations with a senior staff member or another research assistant. An average of 35 to 40 such independent two-person ratings were performed, followed by discussion by the pair. Two cycles of formal comparisons of agreement rates were completed during the month, using results in corrective feedback. At the end of the month and before the main data were gathered, reliability was tested formally (see below). (The behavioral observations, called Behavior Streams, were gathered in 10-minute segments; these data are not reported in this article.) After each period of observation, the affect ratings were entered into the programmed event recorder. After training and informal training ratings but prior to the gathering of the ARS data to be described, pairs of research assistants observed the same subject on 243 occasions.

A total of 16 10-minute Streams were collected over a 4-week period for each resident, sampling equally morning (10–12 noon), afternoon (1–3 p.m. and 3–5 p.m.), and early evening (7–8 p.m.) segments. A total of 224 subjects had the full complement of 16 Streams; an additional 20, who had fewer than 8 because of deaths or transfers before completion of the Streams, were not included among the 253 dementia subjects reported on here. There were 29 subjects who had 8–15 Streams; each of these residents' average affect ratings was calculated for the reduced number of Streams and used as data, resulting in an N of 253.

For the observations, the research assistants positioned themselves to be as unobtrusive as possible while still maintaining a full view of the resident's face. As is usual with naturalistic observation, despite the researchers' frequently being in full view of the resident, reactivity to the observer was minimal by the time pilot work was completed and actual data collection had begun. Virtually all observations were done within the confines of the subject's residential unit, but the observer followed the resident wherever she went. Toilets, bathrooms, treatment rooms, and closed bedroom doors were, however, off limits for observation.

The intact residents are quite mobile throughout the nursing home, and thus ARS observations confined to their residential care unit would not be representative of their day. Therefore, the observers sought intact subjects in the residential care unit, the central "mall" of the nursing home, the main dining room (not during meals but at off-meal hours), and in the waiting area of the nursing home medical clinic. A quota, rather than a representative time-sampled group, of affect ratings was sought for nondemented residents. Thus, a total of 143 ARS observations were obtained from the 43 intact residents (a quota sample of 4 per resident was sought, but achieved about half the time) to compare normal with demented residents in terms of the frequency with which the affect states were observed.

Results

Table 2 shows the descriptive statistics for the measures used in this report. Measures were available for most subjects on most measures. Only 239 were able to give scorables on the Mattis, however. The APRS questionnaires were returned by 146 family members. As can be seen, the internal consistencies of most of the multi-item measures were acceptable.

The results are presented so as to address each of the research questions. First, can emotion in dementia patients be reliably observed? Second, do residents with and without dementing illness differ in their frequency of display of affect states? Third, a test of the consistency of the results with the two-factor conception of affect was conducted. Fourth, is there evidence of validity in observers' ratings of the affect states of impaired elders? Fifth, the dual-channel view of affect was tested by determining whether people who are more involved in engaging activities and social behavior exhibit more positive affects.

The Reliability of the Affect Rating Scale

Table 3 shows the reliabilities, frequencies, and mean duration ratings. The first column of Table 3 shows the kappas for 243 two-observer ratings of each affect state for AD residents. These kappas are very high (.76 to .89) and display few differences in reliability among the six states. Table 3 also shows the frequencies of occurrence of each affect in directly observed behavior for the residents with dementia. The second column indicates the mean percentage of all 16 occasions in which each resident exhibited one or more instances of each affect, i.e., the frequencies. The next two columns show the mean affect ratings and their standard
deviations. It can be seen that the “hot” affects — anger, sadness, pleasure, and anxiety/fear — were relatively infrequent, while contentment (68%) and interest (87%) were observed during the majority of the behavior streams.

Affect in Demented and Nondemented Residents

Table 3 also shows the comparison between the mean affect scores (i.e., estimated durations of each affect) of demented and nondemented residents. Pleasure, interest, and contentment were greater in cumulated duration among nondemented residents, while anxiety was less. Anger was never observed among nondemented residents. Means were compared with a multivariate analysis of variance (omitting anger because it lacked variance). The overall group difference was highly significant ($F = 24.68, df = 5,192, p < .001$). The univariate tests showed significant differences between the two groups on four of the five affect states, only sadness displaying no difference in mean rating.

The Two-Factor Structure of Affect

The present results would be consistent with the two-dimensional model of affect if the three positive states were related to one another but not to the negative states, and the three negative states to one another but not to the positive states.

In the left-hand portion of Table 4 are shown the correlations among the AD residents’ affects, using each subject’s 16-day mean as the variate ($N = 243$). The 3 positive affects formed a clear cluster (intercorrelations of .41, .43, and .56). Pleasure was minimally correlated with anxiety and anger but slightly negatively correlated with sadness (−.22). Anxiety and sadness were clearly related (r = .49), but anger was unrelated to sadness and only slightly (r = .23) to anxiety. Anxiety and sadness were strongly negatively related to contentment (−.48 and −.46). Of special note was the pattern of correlations involving interest. Although clearly a member of the “positive triad,” interest was also positively correlated with both anxiety and anger. Interest thus appeared to have displayed components of both positive mood tone and psychological activation, albeit negative activation.

Although there are good reasons for examining each of the affect ratings separately, the most definitive test of the applicability of the two-factor model to these particular affect states as exhibited in AD would come from a confirmatory factor analysis allowing the positive factor to be correlated with the negative factor. This hypothesis was tested through use of the Analysis of Moment Structures (AMOS; Arbuckle, 1994), a maximum-likelihood program that allows raw data to be entered directly rather than as multiple matrices. This solution could not be attained, how-
ever, because of a singular matrix on the negative affect factor. The reason for this result became apparent when the ratings were subsequently analyzed by the principal component method with Varimax rotation. The right-hand portion of Table 4 shows such exploratory factor loadings. The singularity was introduced by the fact that anxiety accounts for by far the greatest amount of variance in negative affect; anger and depression are clearly members of this factor, but their low prevalence and general covariation with anxiety anger and depression are clearly members of this factor, but their low prevalence and general covariation with anxiety mean that the latent variable would be almost completely accounted for by anxiety.

An alternative accounting for the structure of the affect ratings is provided by the first principal (unrotated) component, whose loadings are shown in the rightmost column of Table 4. This clearly bipolar factor did not include anger at all, but indicated the poles as but defined by Contentment (−.91 loading) vs Sadness (−.67 loading). There is thus some support for both a single- and dual-factor affect structure.

A Validity of the Affect Rating Scale

The discriminant and convergent validities of the ARS were determined by calculating each AD resident’s mean rating across 16 occasions for each affect and using the resulting 6 mean affect scores to correlate with the variety of other indicators of the resident’s current status. These bivariate analyses were performed because some hypotheses were advanced regarding relationships between specific affect states and selected criterion measures. In other cases, composites may be the best source of validity correlates. Therefore, separate composites based on the exploratory factor analyses were composed to represent Positive Affect (pleasure, interest, contentment). Anxiety and Depression (omitting Anger because of its relative independence from other states), and Total Affect (the 3 positive affects plus reverse-coded anxiety and depression, a high score representing positive total affect). For easier comprehension, the correlations will be presented separately for staff and family ratings of negative characteristics (Table 5) and positive characteristics (Table 6). For convenience, the family APRS factor of hostility is grouped with negative characteristics in Table 5, and extraversion and task assertiveness with the positive characteristics in Table 6. A series of hypotheses (detailed below) were made regarding the expected pattern of significant and nonsignificant relationships. Tables 5 and 6 show the disconfirmed hypotheses, whether the hypothesis called significant or a zero relationship, by values enclosed in parentheses. That is, parenthetical significant correlations are those that were not predicted, and parenthetical nonsignificant correlations are those that had been predicted to be significant. The large number of bivariate correlations computed ensures that many would be anticipated on the basis of chance. Therefore one might well provide Bonferroni ad-

Table 4. Correlations Among Affect Rating Scale Items and Rotated Two-Factor Loadings

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<th>3</th>
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<th>6</th>
<th>Factor I</th>
<th>Factor II</th>
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<tbody>
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<td>1. Pleasure</td>
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<td>.71</td>
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<td>2. Interest</td>
<td>41*</td>
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<td>.86</td>
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<td>.92</td>
</tr>
<tr>
<td>3. Contentment</td>
<td>43*</td>
<td>56*</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.78</td>
<td>.78</td>
<td>.91</td>
</tr>
<tr>
<td>4. Anxiety</td>
<td>.06</td>
<td>28*</td>
<td>.48*</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.00</td>
<td>.00</td>
<td>-.55</td>
</tr>
<tr>
<td>5. Anger</td>
<td>00</td>
<td>20*</td>
<td>02</td>
<td>23*</td>
<td>—</td>
<td>—</td>
<td>.27</td>
<td>.27</td>
<td>.02</td>
</tr>
<tr>
<td>6. Sadness</td>
<td>-22*</td>
<td>-02</td>
<td>-46*</td>
<td>49*</td>
<td>02</td>
<td>—</td>
<td>-.30</td>
<td>.71</td>
<td>-.67</td>
</tr>
</tbody>
</table>

Notes: N = 243. Decimals omitted. PC = Principal component.
*p < .001.

Table 5. Correlations Between Behavior Stream Affect Ratings and Staff and Relative Ratings of Negative Characteristics

<table>
<thead>
<tr>
<th>Behavior Stream Affect</th>
<th>ARS</th>
<th>Activity Therapists</th>
<th>MOSES Depression</th>
<th>MOSSES Raskin</th>
<th>CMAI Agitation</th>
<th>CMAI Physical</th>
<th>MOSES Irritability</th>
<th>APRS Hostility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anger</td>
<td>32*</td>
<td>25*</td>
<td>00</td>
<td>-03</td>
<td>00</td>
<td>24*</td>
<td>37*</td>
<td>24*</td>
</tr>
<tr>
<td>Anxiety</td>
<td>31*</td>
<td>31*</td>
<td>20*</td>
<td>(13)</td>
<td>32</td>
<td>16</td>
<td>16</td>
<td>07</td>
</tr>
<tr>
<td>Sadness</td>
<td>37*</td>
<td>32*</td>
<td>25*</td>
<td>32*</td>
<td>(17)</td>
<td>02</td>
<td>-02</td>
<td>-03</td>
</tr>
<tr>
<td>Pleasure</td>
<td>NA</td>
<td>NA</td>
<td>(-29)*</td>
<td>(-23)*</td>
<td>-13</td>
<td>-07</td>
<td>-10</td>
<td>-05</td>
</tr>
<tr>
<td>Interest</td>
<td>NA</td>
<td>NA</td>
<td>00</td>
<td>-05</td>
<td>01</td>
<td>07</td>
<td>08</td>
<td>04</td>
</tr>
<tr>
<td>Contentment</td>
<td>NA</td>
<td>NA</td>
<td>-16</td>
<td>(-20)*</td>
<td>-14</td>
<td>01</td>
<td>00</td>
<td>01</td>
</tr>
<tr>
<td>Positive Affect</td>
<td>-13</td>
<td>-19</td>
<td>(-20)*</td>
<td>(-23)*</td>
<td>-13</td>
<td>-07</td>
<td>-10</td>
<td>-05</td>
</tr>
<tr>
<td>Anxiety/Depression</td>
<td>25*</td>
<td>23*</td>
<td>30*</td>
<td>12</td>
<td>12</td>
<td>04</td>
<td>04</td>
<td>04</td>
</tr>
<tr>
<td>Affect total</td>
<td>-22*</td>
<td>-25*</td>
<td>-27*</td>
<td>06</td>
<td>07</td>
<td>00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: ARS = Affect Rating Scale; MOSES = Multidimensional Observation Scale for Elderly Subjects; CMAI = Cohen-Mansfield Agitation Inventory; APRS = Adult Personality Rating Scale. Decimals omitted. Cell entries in parentheses indicate divergent correlations (significant unpredicted or nonsignificant predicted correlations). n = 237 except for APRS, where n = 145.
*p < .001.
adjustments to redefine traditional significance levels. For this first exploratory descriptive study, however, showing the most complete picture, one that shows all values significant at the p < .001 level, seems appropriate. The overall pattern of confirmations and disconfirmations will also be analyzed.

Negative characteristics. — Among all possible correlations between ARS ratings of anger, anxiety, and sadness, and the ratings by staff and relatives, the following selective hypotheses were made:

a. Negative-affect ARS ratings from directly observed behavior should be significantly correlated with past-2-week ratings of the same three affects by Activity Therapists (AT) and Relatives (Rel).

b. ARS Anger should be correlated with CMAI Aggression, MOSES Irritability, and Family APRS Hostility.

c. ARS Anxiety should be related to MOSES and Raskin Depression and CMAI Agitation.

d. Sadness should be related to MOSES and Raskin Depression and CMAI Agitation.

e. The negative composite (anxiety and depression) as well as the overall affect score, should be related to MOSES and Raskin Depression and CMAI Agitation.

f. All other pairwise correlations were implicitly hypothesized to be nonsignificant, particularly those involving the positive affects (pleasure, interest, and contentment). There is, of course, some ambiguity in the constructs that might be expected to correlate with one another. For example, knowledge of how affects have correlated in other research might predict that the various measures of depression or anxiety and anger might be related as they often are in life. Anger was seen as different enough from depression and anxiety, however, to warrant the hypothesis of no correlation. On the other hand, anxiety and depression, having been perennially difficult to separate in self-report measures, were expected to be correlated with one another in the observational mode. All other bivariate correlations were hypothesized to be zero.

Results from the above hypotheses may be summarized, first, by noting the significant, though moderate-sized correlations between observed ARS negative affects and ratings of the same emotions by activity therapists and relatives (first two columns of Table 5). Thirteen of the 15 hypothesized significant relationships (including those involving the Anxiety-Depression composite and the Affect total) indicated in Table 5 were confirmed. Anxiety was not significantly related to Raskin Depression, while Sadness was not correlated with CMAI Agitation. None of the 15 zero-hypothesized relationships involving the negative affects was significant. All 24 correlations between the 3 positive affects (plus the PA composite) and the negative characteristics were hypothesized to be zero. Four were, in fact, significant, 3 of them converging on the clear conclusion that residents in whom 2 of the positive affects (Pleasure and Contentment) were less frequently observed were considered more depressed by staff. Those less contented were also considered more agitated by nursing assistants.

Positive characteristics. — Among these correlations, it was expected that:

(a) observers' ratings of the 3 positive affects should be related to the 2-week frequency ratings of the same affects by activity therapists and relatives.

(b) Each of the positive affects should be related to all 4 positive characteristics (Sociability ratings by activity therapist and nursing assistants and Extraversion and Task Assertiveness ratings by relatives).

(c) One affect state, interest, should be related to cognitive function as estimated by Mattis scores.

(d) None of the 3 negative affects should be related to any of the 2 measures of sociability or the 2 positive personality traits.

The validity coefficients between observers and activity staff ratings were significant for Pleasure and Interest but not Contentment; observed interest and contentment were not significantly related to relatives' 2-week ratings of these states, but Pleasure as observed and as rated by family members was significantly related.

As shown in Table 6, 9 of the 13 hypothesized concurrent correlations were confirmed. Observer-rated interest was
unrelated to family APRS ratings of Extraversion and Task Assertiveness. Neither Pleasure nor Contentment was significantly correlated with Task Assertiveness. Of the correlations hypothesized not to differ from zero, 18 of the 20 did not. The only unhypothesized correlation showed that residents rated as more extraverted by family members were less often observed to be anxious and showed lower scores on the Anxiety-Depression composite.

The Dual-Channel Hypothesis

The correlations relevant to the dual-channel hypothesis are included among those shown in Table 6. All 3 positive affect terms were associated with both measures of external engagement (Sociability), while all of the relationships between negative affect and Sociability were zero.

Discussion

The discussion will examine the implications of the findings with respect to each of the sets of hypotheses and then consider some larger issues of quality of life and quality of institutional care.

The Reliability of Affect Ratings in Dementia

These data attest to the persistence of observable emotion among demented nursing home residents. The two-observer reliability of the scales was excellent, which reinforces the conclusion regarding the sheer presence of affect in dementia. One may still wonder what the ratings measure. Although observers estimated the time during which each state was present, are they really approximations of the time during which each emotion was registered? Because strict on-off clockings on real time were not made for each state, the ARS may well represent more global perceptions of complex cue clusters than cumulated time during which affects were observed. Even if true, this pattern of results still affirms the ability of the ratings to denote the occurrence of specific emotions. Further research clearly is required on the microbehavioral dynamics of emotion in this subject group and context, research where antecedents and contextual conditions could be more precisely determined and small behavioral units linked to concurrent emotions. Although emotion was not their focus, the nursing home research of Baltes and colleagues (e.g., Baltes & Zerbe, 1976), is a good example of the possibility of relating a microbehavioral antecedent to a microbehavioral consequence.

Affect State Frequencies in Demented and Nondemented Residents

Within the dementia group, it is clear that all 6 emotions were present to some degree or another. The prevalences and mean time intervals shown in Table 2 show that interest and contentment were most often observed. Although contentment and interest appear in most affect lists (e.g., Diener & Emmons, 1984; Watson & Tellegen, 1985), they appear to be less intense and intrinsically more extended in time than the other three; thus we suggest the terms “cold” for these two states, as compared to the other “hot” emotions. Qualitatively the raters expressed much uncertainty about identifying contentment. Sometimes they used it as a residual category, on occasions when there was no evidence for negative feeling, or for the presence of hot emotions, or inappropriate or totally detached behavior. Despite this perceived ambiguity, the psychometric performance of the contentment item was not poorer than that of the other four affects, except in the failure of activity therapists and family raters to agree with research assistants.

The observed differences between affect state frequencies of the affects in demented and nondemented residents represent only a preliminary view. The recruitment of nondemented subjects was not random and the contexts in which the behaviors of the two groups were observed were not totally matched. This first view does, however, suggest that the positive emotions were somewhat less frequent among demented people, and anxiety was more frequent. Anger was rare in the demented group and totally absent in this sample of nondemented people. The absence of a difference in sadness could represent either truly equal frequency or, perhaps, greater difficulty in assessing sadness by observation. In any case, more research is needed to determine true differential prevalence rates.

The Two-Dimensional Model of Affect

Because of the singularity of the matrix, confirmatory factor analytic methods could not be used to test the differential goodness of fit of a one- versus two-factor affect structure. By comparison with most other research on emotion ratings, the present results are unusual in producing a bipolar one-factor exploratory solution. The failure of the single factor to account for anger is a disadvantage. The two-factor solution accounted for all affect states and produced a result much more similar to that of other studies, in demonstrating clear positive affect and negative affect factors, which were also correlated.

One can only speculate about the meaning of the single-factor results. It is possible that the widespread pathology of dementing illness does cause a leveling or simplification of the structure of affect in the direction of a simple good vs bad dimension. It is just as likely that observers impose such simplicity of structure on what they see in AD patients. We are inclined to add the ARS instrument itself to the list of factors leading to simplification. The affect list is short and the indicators and their definitions represent a first effort. Before drawing any conclusion regarding the structure of affect in Alzheimer’s disease, it is obviously necessary to expand the methods used to study affect in residents with dementing illness.

The two-factor solution exemplifies the only partial independence of the two factors. The correlation between them (-.19, p < .01) is accounted for by dual loadings of interest, contentment, and sadness. Interest loaded positively, rather than negatively, on the negative affect factor and was correlated with both anxiety and anger. Earlier research had already identified interest as being minimally related to the negative affects among noncognitively impaired elders (Lawton et al., 1992). A possible explanation for the positive correlation between interest and both anger and anxiety among AD patients may be that a certain amount of physical vigor and attentional capacity is required to show interest, anger, and anxiety. (Note also the positive correlation between interest and cognitive functioning on the Mattis)
These unexpected positive correlations may thus be a function of the continued presence of vigor among moderately impaired residents, compared to the inevitable decline of both physical and affective functions among those with greater cognitive decline. The “cost” of continued vigor may thus lie in the possibility that engagement can bring about negative as well as positive interactions. This hypothesis is worth testing in confirmatory fashion across a larger sample of AD subjects with a broader range of cognitive function, to determine whether this anomaly persists.

Contentment appears to express a relatively global “good” state and Sadness a global “bad” state, each of them showing an understandable negative “crossover” in addition to their expected high loadings on positive affect and negative affect, respectively. Sadness, or depression, is notably absent from the Positive and Negative Affect Scales (PANAS; Watson, Clark, & Tellegen, 1988). These authors achieved a zero correlation between PA and NA by carefully choosing affect terms to represent two dimensions so as to eliminate items like depression, which represent both low activation and negative valence. As was argued in our construction of the Philadelphia Geriatric Center Positive Affect and Negative Affect Scales (Lawton et al., 1992), allowing such bridging affect terms to appear in a scale captures better the reality of the full range of emotions as well as providing a measure of a centrally important feeling state. In conclusion, although we are unable to provide a statistical basis for choosing between a one-factor and a two-factor model of affect states of AD patients measured in this way, the presence of evidence in favor of differential correlates of positive and negative affects (see below) argues in favor of the usefulness of retaining two separate factors.

The Validity of the Affect Rating Scale

Although the summary factor-derived composites express well the overall affect state valence of each person, in some case differential hypotheses were formulated for individual affect states. This section will discuss these bivariate results, then consider whether the composites afford as much information as the individual affect states, and then whether some affect terms are so redundant as to be superfluous. The validity estimates were of modest magnitude, but it is still reassuring that despite the multiple sources of ambiguity inherent in assessing people with dementing illness, the imprecision of assessing emotion, and this study’s frequent reliance on modestly trained nursing-staff raters for criterion ratings, a preponderance of positive concurrent validities emerged. Good agreement with research assistants’ ARS ratings of the negative and positive affects by activity staff was observed, while relatives showed excellent agreement with the ARS on all the negative affects and on Pleasure. Family members clearly had smaller samples of recent behaviors on which to base their ratings. They also had to depend on the written instructions for guidance in making their ratings, compared to the focused training provided for research assistants and activity therapists. Therefore, the fact that family agreed significantly (though to a modest extent) with research assistant observers at all gives hope for the possibility of improving the validity of family members’ rating skills through training.

Among all hypothesized concurrent validity correlations between ARS ratings and the scales completed by staff and families (plus the one between interest and the resident’s test score on the Mattis), 22 of the total of 29 positive predicted relationships (76%) occurred.

The pattern of divergent validity estimates is particularly relevant to the dual-channel conception of affect-behavior relationships, which will be discussed in greater detail later. These indicators of discriminant validity also showed an overall confirmatory pattern (91% of those hypothesized to be zero were not significant). Significant but unhypothesized correlations showed that Pleasure and Contentment did, in fact, occur less frequently among residents rated by staff as more sad and anxious. Intuitively this pattern also seems to be quite expectable; people who are considered sad and anxious surely ought to experience fewer positive states. The analysis of within-ARS correlations and factor structure repeated this picture. The disconfirmation here, however, is part and parcel of the theoretically based expectation that there should be two factors, discussed earlier with the conclusion that two factors of partial independence represent the most useful model. The unhypothesized negative correlations between Extraversion and both ARS Anxiety and the Anxiety-Depression composite also are best understood as another illustration of the limits of independence between negative states and positive personality traits.

These results are also relevant to the question of the appropriate type of aggregation of affect terms to best represent the emotional valence of the dementia resident. First, it is clear that, despite the statistically acceptable bipolar single affect factor, the gains consequent to keeping positive terms separate from negative terms were very well demonstrated. In few cases were the Total Affect Scores correlated more highly with criteria than were the separate PA and NA composites. Less clear is whether the 3-item PA composite and the Anxiety-Depression composite are as useful or more useful than the single affect terms that compose the indices. Interest was, in fact, quite different in its pattern of intercorrelations from those associated with Pleasure and Contentment. One thus can conclude that Anger and Interest should be used as separate affect terms. The sizes of the PA composite and the Anxiety-Depression composite correlations with other measures were never impressively higher than those for the single affects. Therefore there is little reason to prefer the composites.

To summarize the indicators of validity, the overall task was one of asking whether the aggregate time-sampled ratings made by research observers were picking up affect states that were congruent with totally independent, more time-extended estimates of personal characteristics falling more toward the trait portion of the state-trait continuum. In this task, the ARS performed in a pattern that was highly confirmatory, despite built-in limitations in the judgments by clinical staff which were the basis for most criterion measures; even the nonhypothesized relationships were understandable. One thus concludes that it is worthwhile to pursue affect ratings as a way of further comprehending the resident with dementia. It also seems profitable to explore how to use affect ratings as a means for tapping the knowledge of relatives regarding people with dementing illness.
The Dual-Channel Model of Affect and Activity

In Lawton’s original statement of this hypothesis (1983), antecedents of both positive and negative outcomes were used in the data set. The present study was cross-sectional, of course. The selectively positive correlations between positive affect and staff ratings of sociability and the lack of correlations between negative affects and sociability are consistent with the dual-channel view. This research tested only the engagement channel, however, and not the channel that might relate negative affects to other factors. This result is similar to many others in the literature that document the elasticity of positive feelings in response to socially engaging activity. The present results show only a correlation between the two. It remains to be demonstrated whether deliberately programmed interventions that feature the use of leisure-time activities can have such consequences. Nonetheless, the search for enhancement of positive quality of life through engagement seems worthwhile. The present results suggest that negative affective states are less likely to become ameliorated by such engagement. Further tests of such a possibility are clearly warranted, however, in light of the findings noted earlier suggesting that positive experiences can ameliorate depression. The cross-loadings of sadness on the positive and negative factors may be interpreted as support in the ability of sadness, but not anxiety, to be influenced by positive experiences. The other channel of the dual-channel hypothesis, not tested here, would suggest that interventions directed toward the self and other interior phenomena would be more clearly capable of diminishing negative affect than of enhancing positive affect.

Quality of Institutional Life and Quality of Care

An ideal scenario would be to determine what an older AD patient likes and dislikes, what soothes her and what stimulates her, and so on, through skilled observation of the type described here. Observed pleasure should allow one to discern a preference for some valued object; observed negative feelings would suggest aversions. Individualized treatment could then be tailored to the needs of each resident, so that the geographic location of the resident, the sensory and interpersonal stimulus context, the one-to-one care transactions, and the planned and unplanned activities of the treatment environment could converge in a way that would maximize positive emotion and minimize negative emotion.

The present report has moved the state of knowledge one step toward such a goal, in demonstrating the “legibility” of the dementia patient’s outward mien and the gross congruence between some indicators of context and apparent emotion. However, one must be cautious about the claims made for the association between affective indicators and context. A major problem concerns the level of aggregation used in the present report. That is, the person was the unit of analysis and the measure of emotion was the person’s mean across 16-10-minute periods. Thus, what has been demonstrated is that people who smile, gaze with interest, and appear content are also people who participate in activities, show higher levels of activity, and are considered to be extraverts by family members. At this point, then, personality consistency has been demonstrated in several of the traditional components of personality. Not yet tested is the degree to which single individuals’ emotions vary with the environmental, social, or treatment situation. This is the intraindividual level of covariation, an analytic task where interindividual differences are no longer of concern. This is a very complex analytic task, which is now under way in the analysis of other data from this research project.

These results suggest that it is possible to define institutional quality through the use of observed emotion. The present findings suggest that high activity and structured social interaction level are associated with favorable resident affects. It is tempting to suggest that such activity is the answer. What is much more likely is that people vary both in terms of their general sensitivity to context and their valence of responsiveness to external and internal stimulation. The intraindividual level of analysis may well identify people whose day-to-day affect improves as engagement increases; it is also likely that some will become more anxious or angry as stimulation increases, and that still others will be impervious to such influence. Basing intervention on these principles will be the true bottom line of personalized treatment quality. The quality indicator for an individual will be the congruence between contexts and psychological well-being. On an institutional level, the quality indicator may, conceivably, be an index of aggregated stimulation, but only if positive-reacting residents are most prevalent among the total resident population. A probable better indicator would be an audit that can detect (a) the extent to which the institution makes an effort to match context with individual need, and (b) the counted aggregates of positive and negative affect, which we hypothesize will reflect the outcomes of external stimulation whether the person's preference is for high or low levels of stimulation. The use of affect ratings as quality indicators is a future possibility, but considerably more research is needed before counted affects may be used in quality control. Nonetheless, the present results give some hope that direct-care staff, and perhaps even Medicaid surveyors, might add this element to their ability to identify high-quality care.

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