CHAPTER 6

RESULTS

In this chapter the results of the empirical study are reported and explained. Firstly, the descriptive statistics are provided for the caregivers and the Alzheimer's patients. Secondly, an item analysis of the Behaviour Rating Scale for Dementia is given, followed by the qualitative descriptions of some noncognitive correlates, and the descriptive statistics for the scale scores. Thirdly, the concordance statistics are given for the interrater reliabilities using intraclass correlations. Lastly, the relationship between dimensions of premorbid temperament and noncognitive symptoms are elucidated using canonical analysis.

6.1 Characteristics of the sample

The ARDA support group network and neurologists in all the provinces of South Africa were utilised as a contact base over a two and a half-year period. The use of the latter was feasible because of the researcher's membership and involvement with ARDA activities, and the former was accessible because of the researcher's familiarity with neurologists through involvement in pharmacological geriatric trials. This method was used because of a lack of a general registry for Alzheimer's patients and the 'research fatigue' that Alzheimer's patients visiting dementia clinics, which are affiliated to institutions, may have experienced. During this time, the researcher initiated contact with 141 caregivers of Alzheimer's patients. After careful screening, 63 caregivers fulfilled the eligibility criteria for the study. The exclusion of other possible candidates resulted from their reluctance to participate or the stringent criteria outlined in the preceding chapter.

Data was elicited from caregivers pertaining to their own relationship with the patient and other relevant information about the Alzheimer's patient themselves.

6.1.1 Biographical characteristics

This study utilised information from caregivers to determine the premorbid temperament, noncognitive symptoms, and cognitive status of Alzheimer's patients in their care. In the following sections the biographical information for both caregivers and Alzheimer's patients are presented.

6.1.1.1 Caregiver status

For all of the 63 Alzheimer's disease patients a primary caregiver was available to provide information on a patient's premorbid temperament, current noncognitive symptoms, and cognitive status. The primary caregiver in 78% of the cases was a spouse followed by the patient's children in 18% of the cases. In the remaining four percent of the cases, the primary caregiver was a nurse or nurse aide who lived with the patient. Data on the patients' premorbid temperament was also procured from secondary informants. The secondary informants were siblings (28%), children (43%), or friends (29%) who knew the Alzheimer's disease patient before the illness.

6.1.1.2 Alzheimer's patients: Biographical information

Table 6-1 indicates that the mean age of the Alzheimer's disease participants was 74, 4 (5.5). Caregivers provided information for 35 male and 28 female wards members who

were diagnosed with Alzheimer's disease. The mean number of years engaged in education was 12, 7 (3.9).

Table 6-1 Demographic characteristics of Alzheimer's patients

Variables	Mean (SD)
Age	74.4 (5.5)
Education	12.7 (3.9)
Blessed Dementia Scale	6.0 (2.1)

The Blessed Dementia Scale (BDS) elicited information about the severity of the dementia and the functional status of the patient. This information was procured from collateral sources because the patients themselves were unable to answer the questions. High correlations between the Blessed Dementia Scale and Mini Mental Status Exam scores have been reported in the literature (Harwood et al., 2000). This measure is therefore, a reliable reflection of the patient's cognitive state as well.

As illustrated in Table 6-1 the mean score for this sample of Alzheimer's patients on the Blessed Dementia Scale was 6.0 (2.1), thereby suggesting that the sample composed of mainly moderately affected individuals with more discernible neuronal deterioration than a mildly affected group (Blessed et al., 1968; Teri et al, 1988).

In 52% of the cases the caregivers stated that English is the first language of the patient, 44% of the cases stated Afrikaans as a first language, and four percent of the sample can be characterised as foreign language speakers (French, Portuguese, and Dutch). As illustrated in Table 6-2, twenty-seven patients lived in Gauteng (15) and KwaZulu-Natal (12), and the remaining thirty-six were from the Western Cape, North-West, Mpumalanga,

Free State, and the Eastern Cape. All participants, however, were satisfactorily proficient in English and all instruments were administered in English.

In 60% of the cases, a neurologist provided the first diagnosis, followed by a general practitioner (19%), a psychiatrist (13%), and neuropsychologist (8%). For all participants considered eligible for the study, a second confirmatory diagnosis of Alzheimer's disease was available. The results showed that 32% of the Alzheimer's patients (32%) had some family member (grandparents, parents, siblings, aunts, or uncles) with a diagnosis of Alzheimer's disease. Twenty-six (41%) had no family member diagnosed with Alzheimer's disease and in the case of 17 (27%) patients, caregivers had insufficient knowledge about the ancestry of the patient.

Table 6-2 Patient profiles

Variables	**%**
Language	
English	52%
Afrikaans	44%
Other	4%
Area (Provinces)	
Gauteng	24%
KwaZulu-Natal	19%
Mpumalanga	14%
North West	13%
Western Cape	13%
Eastern Cape	12%
Free State	5%
First Diagnosis	
Neurologist	60%

General Practitioner	19%
Psychiatrist	13%
Neuropsychologist	8%

Family history of disease	
Present	32%
Absent	41%
Unknown	27%

6.2 Neuropsychiatric and neurobehavioural correlates

To address the research question about the nature and frequency of symptoms displayed, caregiver ratings of symptoms that occurred in the past month were collated, and these are presented in the graphs below. At least one noncognitive symptom was present in all Alzheimer's disease patients, with specific behaviours showing greater frequencies of endorsement. On average 15 items were rated present per individual. The noncognitive profile of over 50% of the sample included six and more items, thus indicating that noncognitive symptoms are common in this sample of Alzheimer's patients.

The following sections contain a graphical item-by-item analysis, a summary of descriptions of specific behaviours, and the descriptive statistics for the Behaviour Rating Scale scores.

6.2.1 Endorsement of specific disturbances

Items relating to self-misidentification, belief that one's spouse is an impostor, one's spouse is unfaithful, one's spouse is plotting abandonment, exaggerated complaints about health, attempts to leave home, expressions of guilt and blame, suicidal ideation, and

weight changes were rated as present in less than a third of the sample. In the majority of the sample, items that were unrated included disturbances pertaining to sexual behaviour, purposeful wandering, and a belief that one's house is not one's home.

Figures 6-1, 6-2, and 6-3 show the frequency of items endorsed by subjects according to a triadic categorisation namely disturbances of thought and perception, mood and neurovegetative disturbances, and behavioural dysregulation.

The number of participants manifesting with psychotic and misidentification symptoms ranged from 5% (auditory hallucinations) to 23% (feeling threatened and suspiciousness).

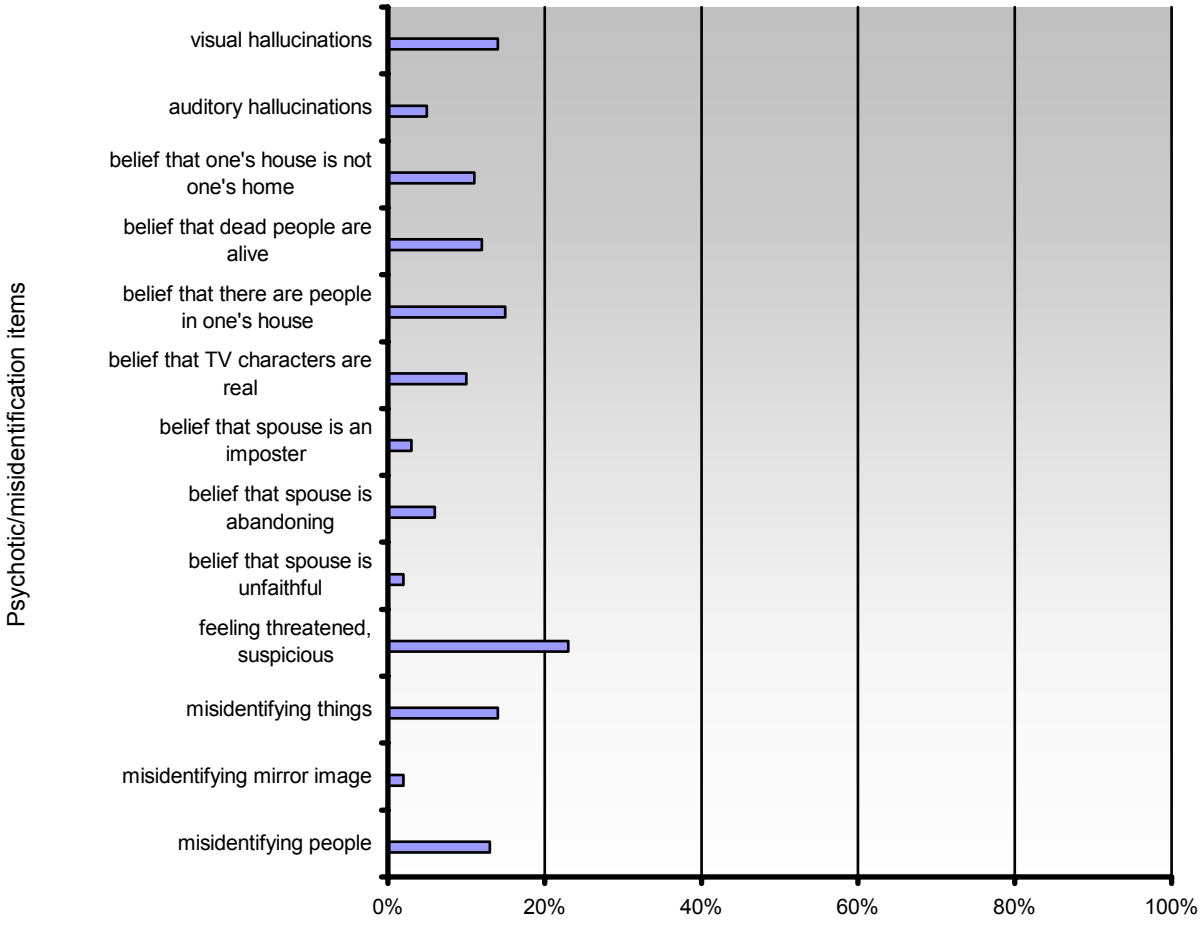

Figure 6-1 Disturbances of thought and perception

Misidentification items had the lowest endorsement compared to all scaled items. The most common reported visual hallucination pertained to children, who the subject saw in a room.

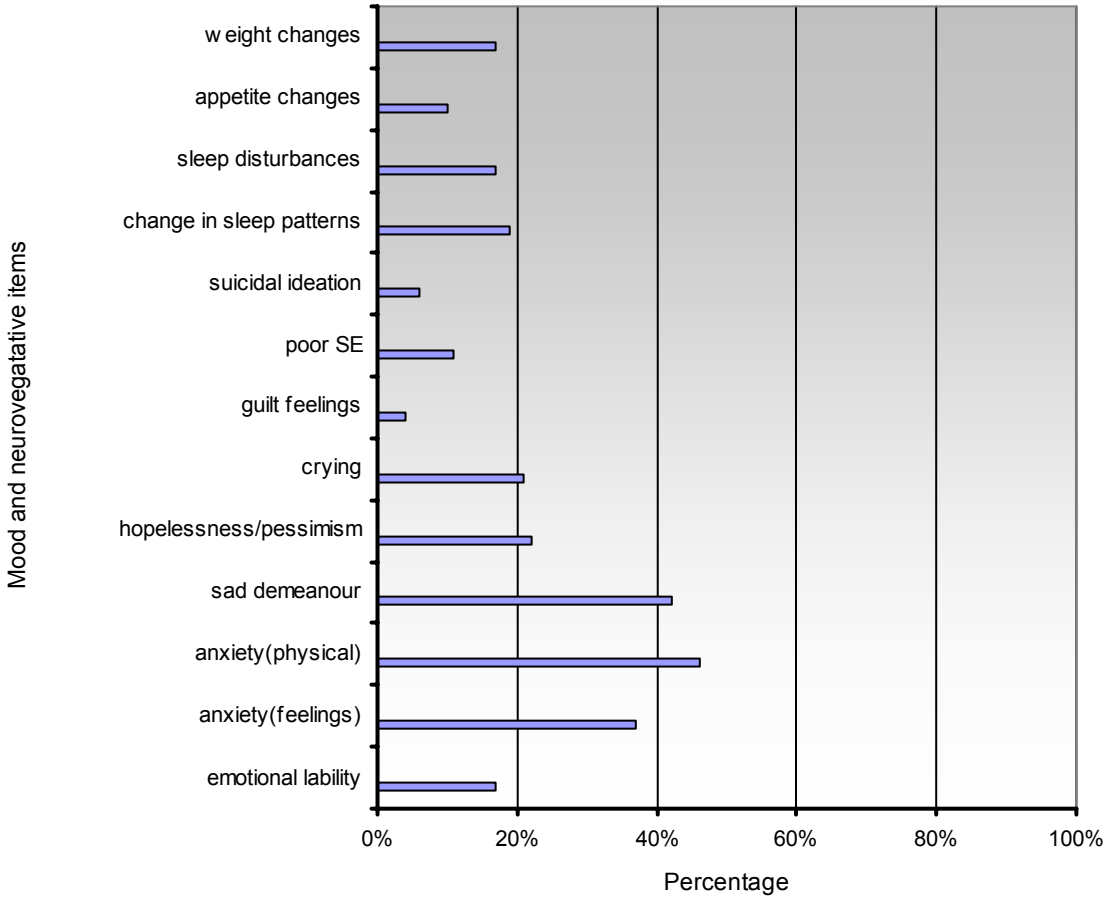

Figure 6-2 mood and neurovegetative disturbances

Mood related symptoms occurred in over 20 % of the sample, with characteristics of sadness and overt anxiousness occurring in approximately 50% of the Alzheimer's disease patients. One can hypothesise that mood related symptoms such as anxiety and depression may occur early in the disease process and diminishes over time because of the decline in cognition and thus, insight or awareness into their condition. This may account for the high occurrence reported in this group of moderately affected patients.

The neurovegetative changes occurred in less than a fifth of the sample with sleep alterations more frequent (19%) than weight (17%) or appetite changes (10%).

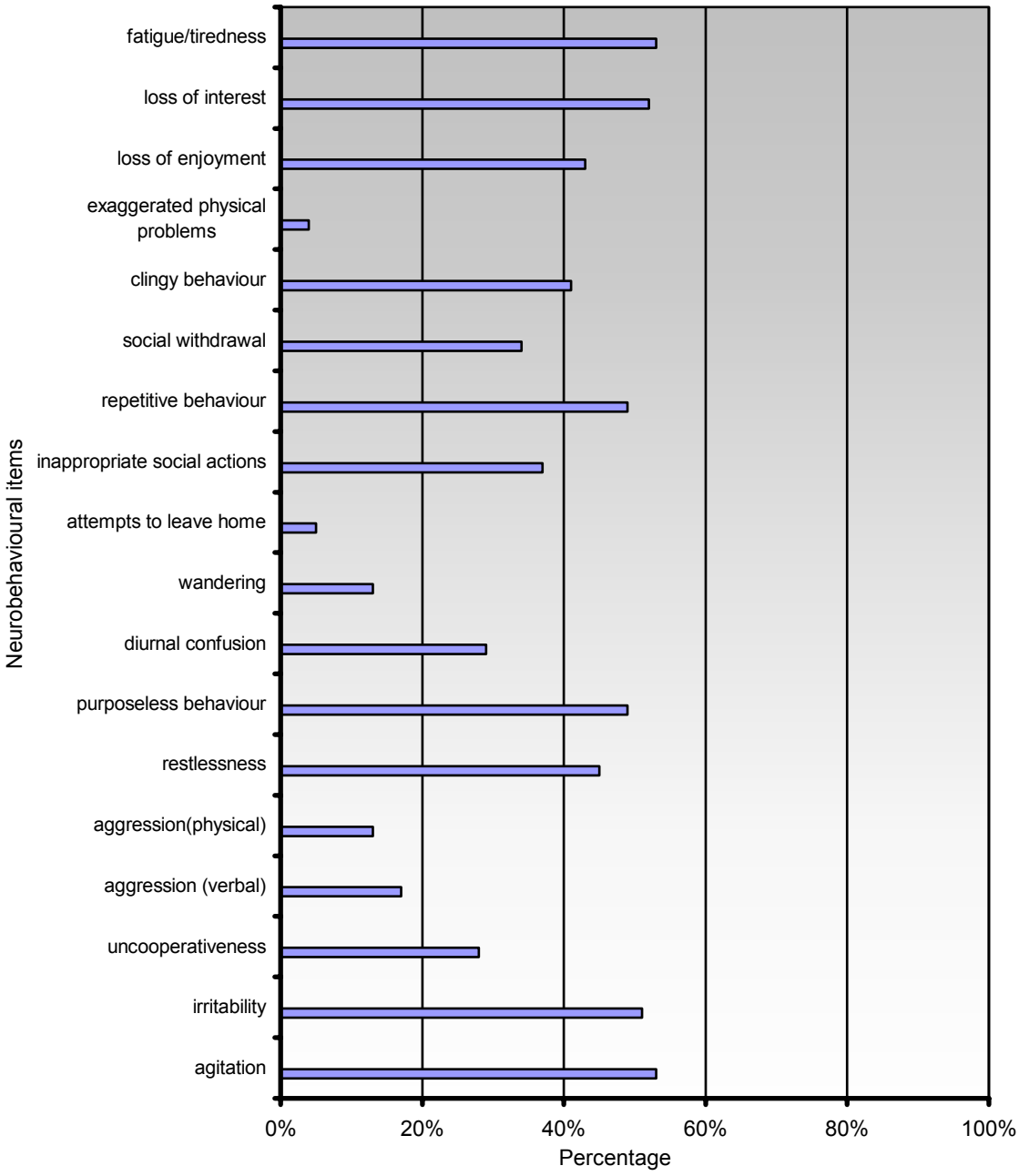

Figure 6-3 Behavioural dysregulation

In the group of Alzheimer's disease patients, caregivers observed a spectrum of dysregulatory behaviour. A change in energy and initiative components of the person's behaviour was reported in 53% and 52% of the sample, respectively. However, this ebb of

inertia was interspersed with moments of excessive kinaesthetic flow, which occurred when usually docile patients engaged in purposeless wandering and repetitive behaviours that perseverated over a period. It would seem therefore, that the behavioural disturbances display a pattern of temporal and energetic juxtaposition.

Levels of irritation and agitation were reported in over half of the sample and this appears to contribute to the challenging behaviours caregivers have to deal with, when patients act out in aggressive and uncooperative styles.

In sum, there was a wide spectrum of noncognitive symptoms in the patients' profile. Furthermore, the frequencies of endorsement varied across items. The conclusion from this data supports the idea that noncognitive variables are common in the disease profiles of moderately impaired Alzheimer's disease patients, but there is a relative heterogeneity in the symptom presentation, with symptoms classified under the rubric of neurobehaviours (behavioural dysregulation) being more common that those classified as neuropsychiatric (mood and psychotic symptoms).

6.2.2 Description of specific behaviours

The open-ended item 46 yielded new information for only seven subjects. All other responses provided for item 46 were amenable to recoding and rating under existing items. Three subjects displayed phobias for snakes and continuously shut all doors and windows that were open. Two would repeatedly talk to themselves and one subject complained of a rancid odour that permeated his home. Outlined below are three brief vignettes of individual idiosyncrasies in presentation profile.

Vignette 1: A 66 year-old participant (Mrs A) watched rugby obsessively so that she could see Joost van der Westhuizen. Her recognition of him was intact even though she could not remember most of her family members. Her interest in rugby prior to the dementia was at best marginal. One of her prized possessions was a scrapbook in which she pasted pictures of him that she found in magazines and newspapers. If she misplaced this book, which occurred often, Mrs A would sulk for hours and then proceed to sit in front of the television in the hope of seeing him again.

Vignette 2: A 70 year-old participant (Mrs B) recognised Marike de Klerk on television during the time of her murder. Mrs B believed that the deceased was a childhood friend who had grown up with her. She was adamant that her family go to the home of the deceased and pay their respects. Mrs B continuously reminisced about de Klerk and was on occasion seen having a conversation with de Klerk, as if she were present. During the next few months, Mrs B would sporadically talk about her friend de Klerk and mention that she was feeling sad, but could not relate this sadness to de Klerk's death.

Vignette 3: A 69 year old foreign diplomat (Mr C) was obsessed with obtaining news and would walk up to strangers and ask them about some current or remote political, social, or sports event. Before the dementia, he held a high position as a foreign diplomat and mainly spoke a foreign language before the dementia. After the onset, he began speaking in Zulu to all persons, and was hostile towards family and friends but very sociable to strangers.

These vignettes illustrate the peculiarities that begin to manifest and the challenges that these behaviours may present to caregivers. Interestingly, the narratives that the caregivers used to describe the behaviour of patients conjured impressions of specific

profiles of behaviours. For example, obsessive and rigid traits seem to permeate these descriptions and hint at frontal pathway deterioration and a general breakdown of the patient's 'theory of mind'. The following chapter addresses this in more detail.

Twelve questions of the rating scale require descriptions of the manifestations that caregivers observed. Table 6-3a and 6-3b contain examples of these neurobehavioural and neuropsychiatric displays.

Table 6-3a Content of anxiety and sleep disturbances

Noncognitive items	Examples
Anxious/fearful situations	Fear at being abandoned if caregiver is late or out of sight. Fear at being left alone in unfamiliar surroundings. Person could not walk down a little hill without being panic stricken and afraid of falling into a dam. Fear at being left alone with unfamiliar people. Strong aversion to water, having a bath or shower. Anxious about the weather and if the sky was blue with no clouds he would insist on walking around with an open umbrella.
Physical signs of anxiety	Nervous when caregiver is out of sight and screams especially when in a public place. Pacing and babbling. Fearful facial expressions and disruptive behaviour. Panic expressed in excessive movement/talking. When family member is talking to someone, the patient would laugh inappropriately and attempt to push the stranger away or scream at them to leave.

Sleep disturbances	Excessive daytime napping. Getting up at odd hours at night and assuming it is day and opening doors and windows. When awake at night, spends the time cleaning the bathroom and toilet walls.

Table 6-3b Content of psychiatric and behavioural manifestations

Noncognitive Items	Examples
Incidences of wandering	Person found at the end of his street, totally disorientated, and unable to find his way home. Person found wandering many kilometres away from home after boarding a bus to an unspecified location.
Auditory hallucinations	Hears noisy children in the room. Hears people from the past or television characters speaking.
Visual hallucinations	Observes children in rooms and around the house and spends most of the day trying to shoo them away. Converses with deceased people from the past. Believes that television characters are real and having conversations with the patient specifically. The patient responds in a monologue or whispers as if answering questions from these characters. Became agitated and saw tarred footprints on the carpet, as if some entity was walking in the lounge.

6.2.3 Six composite noncognitive measures

As explained in chapter five the Behaviour Rating Scale for Dementia includes aggregated values according to composite subscale scores. The calculation of Cronbach alpha determined the internal consistency of the subscale scores. The coefficients varied between .68 and .83, which indicated acceptable levels of internal consistency (Nunnally & Bernstein, 1994). The skew and kurtosis values for all subscales except the psychiatric subscale were close to the value one but less than the value two. This is acceptable according to the rule of thumb, which punctuates the possible effects and significance of distributions on parameter estimates between these two values (Miles & Shevlin, 2001). The psychiatric subscale has a moderate degree of skewness (1.11), however the skewness values are less than twice the standard error (SE .56). The distribution for this subscale therefore, did not differ significantly from the expectations of normally distributed scores.

The subscales yield six scores and Table 6-4 provides the sample means and standard deviations for each of the Behaviour Rating Scale for Dementia subscales.

Table 6-4 Mean and standard deviations for subscales

Subscale Measures	Mean (SD)
Psychotic Symptoms	6.2 (3.3)
Behavioural Dysregulation	10.7 (2.5)
Vegetative Symptoms	1.3 (1.7)
Depressive Symptoms	9.8 (4.1)
Inertia	1.9 (1.1)
Irritability/Aggression	10.9 (3.7)

Pearson correlation coefficients were used to evaluate the association between noncognitive indices and patient characteristics.

Table 6-5 Relationship between noncognitive symptoms and patient characteristics

Noncognitive pathology	BDS	Age	Gender	Education
DEP	.25*	.03	.06	.11
I/A	-.34**	.01	.09	.12
VEG	-.07	.21*	.13	.02
IN	.10	.15	.10	-.08
BD	-.09	.02	-.14	.14
PSY	.13	-.10	.04	.03

$p<0.05$, ** $p<0.01$

DEP-*Depression*, I/A- *Irritability/Aggression scale*, VEG-*Vegetative,* IN-*Inertia*, BD-*Behavioural dysregulation*, PSY-*Psychotic.* BDS- *Blessed Dementia Scale*

As Table 6-5 illustrates, lower levels of cognitive functioning is significantly associated with aggressive actions, and higher levels of cognitive functioning with manifestations of depressive symptoms. Advancing age appears to influence the neurovegetative manifestations of the disease.

6.3 Descriptions of premorbid temperament

In fifty-one cases, Alzheimer's patients had premorbid temperament ratings from a primary caregiver and a secondary informant. Computation of mean differences between the ratings and intraclass correlations determined the interrater reliability. Comparison of means and standard deviations facilitates the alleviation of errors of concordance that may arise when two sets of scores correspondingly increase and decrease in magnitude across observations. Bordens and Abbot (2002) suggest that comparison of two sets of means

acts as a guide for interpreting the high Pearson *r* scores. In other words, if the means are similar and the Pearson r is high then the researcher can conclude with more confidence that the two scores are similar.

Among the specific temperament domains, no significant mean differences were observed between the raters. The intraclass correlations were significant for five of the six domains, with Endurance the temperament domain that was not significant (r = .23, $p<0.05$). The other domains had higher correlations, with Briskness (r = .53, $p<0.05$), Activity (r = .57, $p<0.05$), Emotional Reactivity (r = .49, $p<0.05$), perseverance (r = .42, $p<0.05$), and sensory sensitivity (r = .61, $p<0.05$) showing significance. The basis for rater disagreement on the Endurance domain could be attributable to the introspective nature of the questions on that subscale. Informants had to provide the best estimate of the patient's introspective processes and this could yield discrepancies in answers. However, based on the overall agreement between observers and no significant differences between the means, a combined mean score was used in all subsequent analyses and in instances where only one rater was available (12 cases), the individual rating was used. The concordance between primary and secondary informants may reflect reliable estimates of the patient's premorbid disposition with retrospective bias being a minimal confounder.

6.4 Canonical correlation analysis

To analyse the relationship between two sets of variables, the multivariate technique of the canonical correlation routine was used. The first set of variables, comprising six dependent or criterion variables, included the subscales of the Behaviour Rating Scale for Dementia, and the second set of eight independent or predictor variables derive from the subscales of the Formal Characteristics of Behaviour-Temperament Inventory, Blessed

Dementia Scale (cognitive status), and age scores. Gender and education level were omitted from this analysis based on their low correlations with all of the noncognitive scales. Before the analysis procedure, variable distributions were evaluated for skewness. Although some variables had slightly positive skewed distributions, these were insignificant and logarithmic or square root transformations were unwarranted.

The analysis entailed a series of steps namely, the generation of i) an intercorrelation matrix, ii) canonical variates, iii) squared canonical correlations, iv) canonical coefficients v) within set variance and redundancy for significant variates and, vi) interpretation of relevant dimensions of set one and set two. A discussion of the above-mentioned processes is included in the following paragraphs.

6.4.1 Pearson product-moment correlations

The matrix of intercorrelations between the two sets revealed moderate and high correlations *(r)* among some variables (Table 6-6).

Table 6-6 Correlation Matrix of set 1 and set 2

IV's	DEP	I/A	VEG	IN	BD	PSY
BR	-.03	.07	.14	-.18	.12	.05
PE	.41	-.18	.03	.19	.06	.53
SS	.23	.33	.09	.05	.39	.25
EN	-.03	.10	-.09	.11	-.07	-.16
ER	.17	.62	.07	-.03	.38	.06.
AC	-.10	.04	-.16	-.28	.17	.29
AGE	.03	.01	.21	.15	.02	-.10
COGSTAT	.25	-.34	-.07	.10	-.09	.13

BR-*briskness*, PE-*perseverance,* SS-*sensory sensitivity*, EN-*endurance*, ER-*emotional reactivity*, AC-*activity,* COGSTAT-*cognitive status*.

DEP-*Depression*, I/A- *Irritability/Aggression*, VEG-*Vegetative,* IN-*Inertia*, BD-*Behavioural dysregulation*, PSY-*Psychotic.*

Table 6-6 indicates that Irritability/Aggression and Emotional Reactivity were highly correlated with a coefficient of .62. Psychiatric (.53) and depressive symptoms (.41) shared moderate associations with a perseverative temperament. The temperament trait of sensory sensitivity shared positive correlations with behavioural dysregulation and emotional reactivity, with coefficients of .33 and .39, respectively.

6.4.2 Canonical variates and correlations

The canonical analysis yielded six pairs of canonical variates. Table 6-7 shows the correlations of the variates together with the squared canonical correlations and their eigenvalues.

Table 6-7 Canonical correlations

Variate	Canonical correlation (*rċ¡*)	Squared canonical Correlation (*rċ¡* ²) / Eigenvalues
1	.78	.61
2	.69	.48
3	.43	.19
4	.28	.07
5	.19	.04
6	.08	.02

The first pair of canonical variates yielded the maximum correlation and the *rċ¡* was .78, and the second pair showed a canonical correlation of .69. This indicated a strong

association between pairs of canonical variates, because the *r* is interpretable as a Pearson product-moment coefficient. For the first pair of variates, calculations yielded a .78 correlation and an overlapping variance of 61% (eigenvalue of .61). The last pair of variates correlates at .08 and has an overlapping variance of 2% (eigenvalue of .02).

The patterns of association between and within the two sets are important in identifying the linear combinations of variables. Therefore, Bartlett's test of significance allowed for the possibility of a rejection of the null hypothesis, which states that the sets of data are unrelated. When all sets of canonical variates were included, the tests of significance showed that X^2 (48) = 124.58, p<0.001. When the first variate was removed, X^2 was still significant: X^2 (35) = 91.07, p<0.001. With the first and second removed the calculated values for the remaining variates did not attain significance. Although the six dependent and eight independent variables yielded six pairs of variates, the significance tests showed that only the first and second variate pairs were amenable to interpretation.

Two sets of canonical coefficients, one for dependent/criterion variables [Y] and another for independent/predictor variables [X], were calculated and these allowed for the estimation of correlations between variables and canonical variates. Table 6-8 and Table 6-9 are matrices of canonical coefficients for both sets of variables.

Table 6-8 Matrix of canonical coefficients: Noncognitive correlates

BRSD	Y1	Y2	Y3	Y4	Y5	Y6
DEP	-.30	.69	.63	.06	.52	.09
I/A	.87	.24	.25	.11	.21	.11
VEG	.08	-.05	.09	-.33	-.10	-.17
IN	-.02	.13	.11	-.18	-.08	-.36
BD	.66	.43	.25	.14	.26	.20
PSY	.22	-.55	.14	.47	.24	.24

BRSD-*Behaviour Rating Scale for Dementia*

DEP-*Depression*, I/A- *Irritability/Aggression*, VEG-*Vegetative,* IN-*Inertia*, BD-*Behavioural dysregulation*, PSY-*Psychotic.*

Table 6-9 Matrix of canonical coefficients: Premorbid temperament/Cognition/Age

FCB-TI/BDS/Demographic	X1	X2	X3	X4	X5	X6
BR	.30	-.05	.02	.37	.17	.25
PE	.13	.63	.17	.19	.23	.04
SS	.24	.27	.19	.06	.41	.12
EN	-.06	.29	-.1.01	.24	.13	.12
ER	.69	-.31	.37	.26	.19	.14
AC	.25	.38	.12	.1.02	.27	.11
AGE	-.17	.19	.07	.20	.02	-.42
COGSTAT	-.31	.08	.37	.04	.29	.27

FCB-TI- Formal Characteristics of Behaviour-Temperament Inventory

BDS- Blessed Dementia Scale

BR-*briskness*, PE-*perseverance,* SS-*sensory sensitivity*, EN-*endurance*, ER-*emotional reactivity*, AC-*activity,* COGSTAT-*cognitive status*.

The matrices indicate the direct contribution of each variable to the composite. The pairs of variates have moderate to high coefficients, and this suggests that the noncognitive correlates are associated with premorbid temperament traits along multiple dimensions.

In the table below, the correlations were extracted from a canonical structure, and the canonical variable loadings show the association between the original variables and the variates.

Table 6-10 Correlations, standardised coefficients, canonical coefficients, and redundancy statistics for significant variates.

	Variate 1		Variate 2	
Temperament set	**Correlation**	**Coefficient**	**Correlation**	**Coefficient**
BR	.27	.30	-.27	-.05
PE	.29	.13	.81	.63
SS	.66	.24	.43	.27
EN	-.19	-.06	.28	.29
ER	.88	.69	-.29	-.31
AC	.17	.25	-.72	.38
AGE	.25	-.17	.08	.19
COGSTAT	-.78	-.31	.23	.08
% Variance *(pv)*	.28		21	
Redundancy *(rd)*	.17		13	
Noncognitive set				
DEP	-.54	-.30	.80	.69
I/A	.80	.87	.15	.24
VEG	.18	.08	-.19	-.05
IN	-.26	-.02	.26	.13
BD	.63	.66	.67	.43
PSY	.25	.22	-.20	-.55
% Variance *(pv)*	24		20	
%Redundancy *(rd)*	15		11	

From Table 6-10, the individual variates are interpretable as pairs, with each variate representing dimensions of the predictor variable that correlate with dimensions of the criterion variables. Only correlations in excess of .3 are amenable to interpretation because loadings on variate pairs are correlations and squared correlations of estimates below .3 would yield marginal measures of overlapping variance.

Dimensions of the noncognitive variables that contributed to the first variate include irritation/aggressive behaviours, overall behavioural dysregulation, and depressive signs. Emotional reactivity, sensory sensitivity, and cognitive status comprised the temperament and disease dimensions that were relevant to variate one. As a pair, the first variate indicates that Alzheimer's disease patients with a proclivity for aggressive behaviours and inappropriate behaviours but lower depressive profiles, were premorbidly more emotionally reactive, had low sensory thresholds (high sensitivity), and greater deficit in cognitive status. The second significant variate showed that patients with Alzheimer's disease who tended to manifest with depressive and dysregulatory behaviour appear to have had a premorbid perseverative temperament with low neuronal sensory thresholds (high sensitivity) and the tendency to maintain and attain a low level of stimulation (low activity).

In terms of the variance and redundancy statistics reported in Table 6-10, the noncognitive dimensions extract 24% of the variance from their own set in the first variate, and 20% from their own set in the second variate. Together, they account for 44% of the variance in the noncognitive set. Among the predictor variables, 49% of variance is extracted from this independent set.

The redundancy statistics indicate that the first noncognitive variate reduces 15% of the uncertainty in the temperament set, and the second noncognitive variate reduces the uncertainty by 11%. By combining the two one can deduce that the noncognitive dimensions explain 26% of the variance of the temperament set on the two significant variates, thus implying that having specific temperament traits may precede the occurrence of specific noncognitive manifestations. Similarly, the first temperament variate reduces 17% of the uncertainty in the noncognitive set, and the second temperament variate reduces the variance of the noncognitive set by 13%. Together they account for

30% of the variance in the first set. Overall, these statistics indicate that the canonical analysis is more robust for the first set of variables and the lower redundancy in the second set indicates that the interpretation should proceed with necessary caveats.

6.5 Conclusion

The analysis of data yielded the following results:

- Patients with Alzheimer's disease display a wide spectrum of noncognitive symptoms.
- Some symptoms occur more frequently in patients. For example, symptoms that are neurobehavioural are more commonly reported than the neuropsychiatric sequelae, suggesting that the profile of noncognitive symptomotology is heterogeneous.
- The qualitative descriptions of specific manifestations suggest common themes as well as some idiosyncrasies unique to patients.
- Concordance between raters is high and this indicates the absence of bias among primary observers who knew the subject in a premorbid and current role.
- Canonical analysis yielded two significant variates and related specific noncognitive dimensions to different temperament traits, thereby highlighting the predictive influence of temperament on noncognitive manifestations. The significant variates indicated dimensional relationships between depressive symptoms, irritability/aggression and behavioural dysregulation and sensory sensitivity, emotional reactivity, perseverance, activity, with cognitive status being the moderating disease variable.

Chapter 7 elaborates on the interpretation of results and includes discussions on the possible mechanisms underlying the dimensional relationship between premorbid temperament and noncognitive correlates utilising the delineation of disease process and underlying dysfunctional substrates.