

# University of St Andrews



Full metadata for this thesis is available in  
St Andrews Research Repository  
at:

<http://research-repository.st-andrews.ac.uk/>

This thesis is protected by original copyright

**"THE EFFECTS OF EXERCISE ON THE BEHAVIOUR AND SOCIAL  
INTERACTIONS OF MENTALLY HANDICAPPED PEOPLE WITH  
BEHAVIOURAL PROBLEMS IN INSTITUTIONS"**

**LINDA J CARDER**  
(SUBMITTED FOR THE DEGREE OF MSC IN 1990)



## DECLARATION

I, Linda Carder, hereby certify that this thesis has been composed by myself, that it is a record of my own work, and that it has not been accepted in partial or complete fulfilment of any other degree of professional qualification.

I was admitted to the Faculty of Science in the University of St Andrews under Ordinance General No. 12 on 1st October 1988 as a candidate for the degree of M.Sc.

I hereby certify that the candidate has fulfilled the conditions of the Resolution and Regulations appropriate to the degree of M.Sc.

(Supervisor)

In submitting this thesis to the University of St Andrews I understand that I am giving permission for it to be made available for use in accordance with the regulations for the University Library for the time being in force, subject to any copyright vested in the work not being affected thereby. I also understand that the title and abstract will be published and that a copy of the work may be made and supplied to any bona fide library or research worker.

To my parents

I would like to give special thanks to the following people for their contributions towards this thesis:

**Frances Marsh**, without whose valued support I would never have survived the practical study.

**Chris Cullen**, my supervisor, for arranging the study site, and for his constructive advice and criticisms.

**Margaret Whoriskey, John O'Shea, John Turnbull and the staff of Ward 2**, for their help and co-operation at the hospital.

**Phil Winn**, my second supervisor, for reading and commenting on drafts of thesis quickly and at short notice.

**Robin Fowler**, who helped with the PSION and the computing side of things.

**Phil Benson**, who helped with the printing of tables and figures.

**Sandra**, for her secretarial skills and patience.

# CONTENTS

	page no
ABSTRACT	1
CHAPTER 1 INTRODUCTION TO THE AREA	3
CHAPTER 2 INTRODUCTION TO THE SITE OF STUDY	38
CHAPTER 3 THE STUDY	45
CHAPTER 4 RESULTS	70
CHAPTER 5 DISCUSSION	99
CHAPTER 6 CONCLUSION	116
APPENDICES	
REFERENCES	

### ABSTRACT

Many mentally handicapped people in institutions display maladaptive behaviours such as aggression, self-stimulation, stereotypic behaviours and anti-social behaviours. Recent studies (eg Tomporowski and Ellis, 1984; Jansma and Combs, 1987; Bachman and Sluyter, 1988;) have shown that participation in physical exercise can reduce subsequent levels of maladaptive behaviour and may also increase social interaction. This study aimed to investigate further the exercise-behaviour relationship.

The study took place at a medium-sized mental handicap hospital and involved four male, adult residents with behavioural problems. Design was a multiple baseline design, with intervention beginning for the first subject after five baseline observations. Intervention consisted of individualised jogging, walking and outdoor games for a minimum of five and a maximum of 25 minutes on at least 3 days per week. Subjects had a minimum of 6 intervention days and a follow-up period consisting of at least 5 observations. The entire project lasted 31 observation days. Subject behaviour and resident-staff interaction patterns were observed for 10 minute focal periods in the ward within ten minutes of the intervention on intervention days and at the same times of day on non-intervention days. Additional measures were taken on sleeping patterns, occurrence of epileptic fits and blood pressure.

One subject did not undergo exercise. Results for this subject were used therefore as a control for environmental factors unrelated to the exercise. Daily figures of behaviour showed a small reduction in inappropriate behaviour overall, *less* socially-directed behaviour for one subject and no change for any subject in the amount of time spent mobile. Reduction in inappropriate behaviour was not maintained in the follow up phase and was replaced by more time spent "doing nothing". Both mobility and resident inappropriate behaviour were common predictors leading to social interaction. A resident was unlikely to be given attention if he was "doing nothing". Overall staff interaction levels were low. There was no change in blood pressure, sleeping pattern or occurrence of epileptic fits. The results were discussed in the light of their practical implications and directions for future work.

"What would the consequences be if we were to take a sane person who had been accustomed to enjoy society and were to lock him up in a small house with a keeper his only associate and no place for exercise but a miserable garden? We should certainly not look for any improvement in his moral and intellectual condition"

Anon (circa 1830).

This thesis investigated the role of exercise for people with mental handicaps. In particular, the practical study concerned itself with the effects of exercise on the maladaptive behaviours and social interactions of mentally handicapped people living in institutions. The quote is originally from the nineteenth century and is a critical statement concerning the treatment of the insane in the enclosed "lunatic asylums" of that time.

## CHAPTER 1

### INTRODUCTION TO THE AREA

1.1 Historical Background

1.2 Current Social Value

1.3 Health Benefits

1.4 Behavioural Effects

1.4.1 Disruptive Behaviour, Stereotypic Behaviour,  
Self-stimulation, Self-Injury.

1.4.2 General Behaviours: Social, Work, Sleep.

1.5 Independent and Dependent Variables

1.5.1 Exercise (IV)

1.5.2 Fitness, Physiology and Behavioural Change

(DV)

1.6 Maintenance

1.7 Summary and Statement of Hypotheses

## 1.1 HISTORICAL BACKGROUND

It has been argued throughout history that physical exercise is beneficial both to physical and mental health. The ancient Greeks gave high regard to the importance of intellect, for example, but they considered that maintenance of physical fitness and outward appearance was a "reflection of the mind". It was undisputed that a healthy mind could not exist in an unhealthy body. The attitude to exercising the body thereafter has swung from being a necessity for health and hygiene (in the sixteenth century) to its importance in its own right as an equal part of the whole person (as advocated by the Renaissance humanists), to its use for promoting moral behaviour and character (as in the nineteenth century public\* schools).

Current epidemiological studies show that people have high regard for the concept of "fitness" as a positive health and wellbeing criterion which can be voluntarily improved by physical exercise (Scottish Sports Council, 1988). Similarly, the number of participators in regular sport or exercise has increased dramatically over the past decade. Participation in outdoor recreation has also increased and has been associated with the increase in leisure time and greater environmental awareness.

---

\*"Public schools" in Britain are equivalent to the "Private schools" in the U.S.A. That is, they are privately, rather than state or government funded.

The growth in provision for sport and exercise for the mentally handicapped has been rapid in the last decade also. The Special Olympic movement was initiated in 1981 and enables both physically and mentally disabled people to participate at International level in sport. There is a general growth in outdoor recreation and outdoor holidays are increasingly available to people with mental handicaps. There is also a United Kingdom Sports Association for People with a Mental Handicap. The association promotes training, serves as a central co-ordinating body and holds conferences for anyone involved in sport and recreation for people with handicaps.

The above concerns are put into a practical context by looking at present initiatives for improving the quality of life of mentally handicapped people. The two most influential ideas which have emerged from recent developments in the mental handicap field are those of "normalisation" and "integration". One of the principles highlighted by the concept of "normalisation" is that the mentally handicapped person should "have the same opportunity for personal fulfillment and enjoyment as their normal peers" (Wolfensberger, 1972). As shown, regular participation in sport or physical recreation is becoming part of a normal pattern of life.

The concern for integration has meant that more handicapped people are being moved into community settings where they will have more contact with non-handicapped peers. Whether they can be accepted by these peers is influential to their "success" in a

community setting. There is evidence that the concept of "mental retardation" is associated with physical stigmata and clumsiness (Caruso and Hodapp, 1988) and it has been argued that social reactions and judgements can be affected by physical appearance (McGarry and West, 1975). The social aspects of physical exercise, recreation and fitness therefore must also be considered.

## 1.2 CURRENT SOCIAL VALUE

The current move towards physical activity and exercise arises from increasing medical knowledge and changes in leisure patterns. The drive and enthusiasm, however, is conveyed particularly through media promotion. Recent campaigns include "walkaboutabit", "be fit not fat", "choose life" and "eat your heart out". These campaigns are run by Health Education Councils and are designed to improve health and fitness through diet and exercise. They run alongside articles and images which project the negative consequences of being physically out of shape, sedentary or unfit and they lead to suggestions for exercise packages.

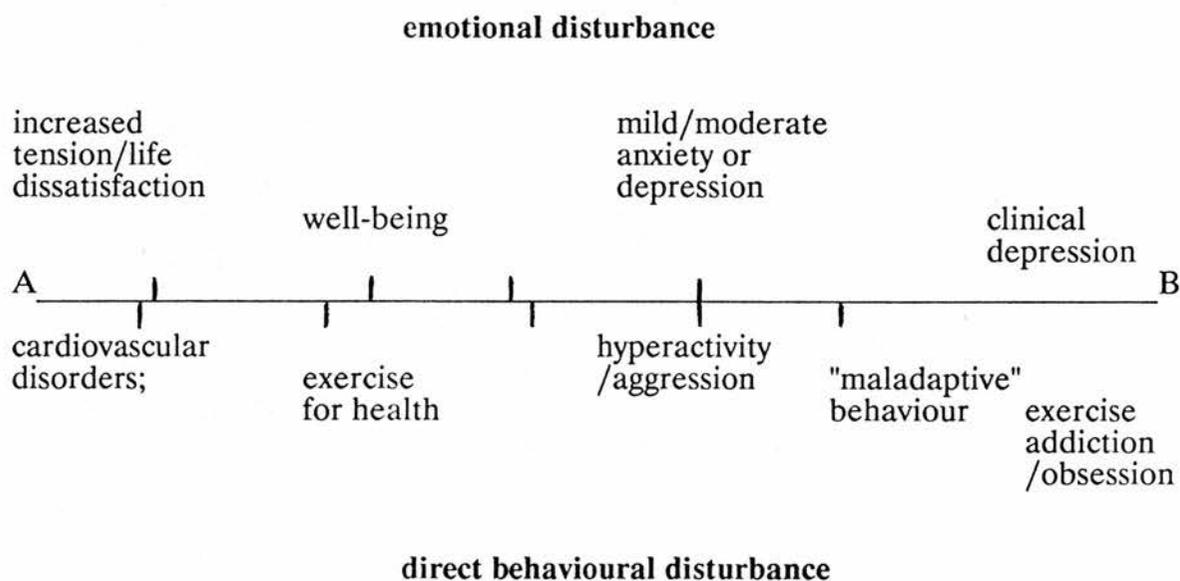
Campaigns by themselves are not evidence that physical exercise is "a good thing". Neither should they be taken as a sign that everyone should be striving to increase their fitness or exercise levels. Attempts to achieve current physical "ideals" are usually unsuccessful and may also be detrimental. Exercise and exercise-related variables can be viewed as a continuum: at one end of the exercise continuum lie problems of exercise addiction and

obsession. At the other end, a lack of any exercise at all may also contribute to physical or psychological problems (see figure 1).

As people differ in their own personalities, general physical/mental well-being and exercise levels, they will also differ in their needs for and responses to exercise. The role of exercise to alleviate the anxiety of people who are habitually stressed, for example, is addressed by Berger et al (1988). Another study has found that people with borderline hypertension were particularly responsive to the cardiovascular benefits of regular vigorous exercise (Sherwood et al, 1989).

There is also research to demonstrate that too much exercise may be detrimental; one study demonstrates withdrawal effects associated with cessation of running in habitual marathon runners, for example.\* Examples of researchers who have found a positive relationship between exercise and clinical depression are Conroy et al (1982) and Hertz et al (1982).

Figure 1 shows emotional disturbances such as depression and anxiety placed to the right of the continuum to indicate where increased physical exercise may be beneficial. Life dissatisfaction has been placed to the left to indicate where lack of exercise may play a causative role. It should be realised that where the relationships are complicated or unclear the examples given may equally well be found at different points on the line.



**Figure 1.** *Continuum of exercise and related emotional and behavioural consequences*

The above continuum A - B depicts increasing amounts of exercise. The branches indicate common types of emotional and behavioural life patterns where exercise may have a role to play in causation, prevention, maintainance or rehabilitation.

The reasons for exercise and the potential consequences of exercise differ according to placement on the above continuum. Whether this concept is adequately catered for by promotional forces or whether it is adequately grasped by the general population is questionable. The idea of a continuum of exercise and related variables demonstrates that there are some people for whom exercise will be beneficial and others for whom it should not be encouraged. The emergence and excitement of media activity demonstrates the considerable social pressure surrounding the desire to be physically fit and the corresponding high social value placed on its attainment.

The first section of this thesis presented the view that social factors may have particular relevance for people with mental handicaps. Wolfensberger (1983) in particular suggested that in order to gain acceptance minority groups should practice overcompensation or positive discrimination. This idea means that, where two images differ in the extent to which they are socially or culturally favoured, a mentally handicapped person should aim to conform to the image which has highest societal value. In the case of physical fitness, this can be taken as indication that a person with a mental handicap should aim to be more fit and more active than is the norm. It is debateable whether advocating a perfectionist drive towards physical fitness on this basis would be objectively beneficial.

### 1.3 HEALTH BENEFITS

There is now overwhelming evidence that the achievement and maintainance of physical fitness has important preventive and therapeutic implications for overall good health and well-being (Morgan, 1985; Morris et al ,1980; Paffenbarger et al, 1978). Its role in prevention of cardiovascular disease is widely acknowledged (Shephard 1981). Exercise has also proved successful in regulating hypertension (Astrand and Rodahl 1986) and body composition (Craddock 1978) and has been shown to influence positively type A behaviour\* (Friedman and Rosenman 1984). The recent Eurofit project also recognises the value of regular fitness testing in schools and recommends regular and standardised testing throughout Europe from an early point in life (Council of Europe Committee for Development of Sport).

Concepts of "fitness" obtained from the normal population pay direct attention to the "ability to carry out daily tasks..without undue fatigue.." (Physical Fitness Research Digest, July 1971). Even at a basic level an amount of strength and endurance is needed for normal functioning. Kasch (1976) and Diedsfeldt et al (1977) also suggest that regular exercise can delay normal deterioration in physical functioning and possibly mental functioning associated with increasing age. Where people are already suffering from some kind of mental handicap every effort should be made to alleviate or prevent further physical or

---

\*The type A person displays behaviour characterised by a sense of time urgency, high stress, increased tension and anxiety.

emotional disability. "Health" is not merely "lack of illness" and is associated with "vitality" and well-being.

On the other hand, whether improvements to health need to be attained through formal exercise training is arguable; a discussion of the concepts of "activity" and "exercise" suggests that gains can be achieved and maintained simply through increased activity (Monahan 1987). Monahan discusses reports of physiologists who are now advocating that people make adjustments to their lives which involve greater energy expenditure (eg walking to work instead of driving, gardening at weekends) to reduce their risk of cardiovascular disease and osteoporosis. The idea of just increasing activity rather than pursuing an all-round fitness goal is especially pertinent to sedentary individuals who most need exercise and may find compliance to high intensity exercise difficult.

A number of studies have focussed on the inactivity and sedentary lifestyles characteristic of residents in institutions, with the primary aim of improving their physical condition or some aspect of physiological functioning (eg Beasley, 1982; Gettman et al, 1979; Hesso et al, 1982; Paillard and Nowak, 1980; Tomporowski and Ellis, 1984). Studies have implemented mobility and joint exercises (McEwen, 1983) strength training (Brown, 1977) and cardiovascular endurance training (Gettman et al, 1979; Tomporowski and Ellis, 1984).

McEwen (1983), for example, involved adults from a long-stay psychiatric ward in 14 weeks of group exercises lasting for one hour, three times per week. Exercise incorporated stretching, walking, dancing and sitting games. Individuals were assessed by measuring changes between the beginning and end of the programme in degree of arm stretch, length of stride, degree of head mobility and balance. All improved on at least three parameters.

Gettman et al (1979) undertook a physiological study. The authors undertook running programmes with 50 male inmates from a county jail hospital. Volunteer inmates were randomly assigned to either a control group or an exercise group with 1, 3 or 5 days weekly of combined walk/run endurance oriented training. Sessions were 30 minutes in duration at an intensity of 85 - 90% maximum  $VO_2^*$  (maximum oxygen capacity), calculated and maintained by estimated heart rate. The total programme lasted for 20 weeks, with increased walk/run ratio progressions in the later stages of training. Measures taken included resting and recovery heart rate, maximal oxygen uptake (using treadmill) and body composition as well as levels of serum lipids and concentrations of metabolic fluids.

The results showed significant fitness improvements in  $VO_{2max}$  for all exercise groups in relation to frequency of exercise. Motivational problems also decreased with frequency. Significant reduction in resting heart rate occurred and speed increased on a

performance-related fitness test. The 5-day week group also showed significant positive change in skinfold fat measurement. It was demonstrated that there were significant fitness gains to be achieved from implementing training programs within an institution and that such a program is feasible. The study also suggested that the frequency of exercise was important.

Morgan (1970), Hesso et al (1982) and Chamove (1986) have commented on the poor physical condition of residents in psychiatric hospitals: lower physical working capacities (PWC) are associated with the length of time institutionalised. It may be argued that these are associated with the type of person and disability; the poor condition of many mentally retarded people may be due to their lack of opportunity to participate in exercise and not purely medical history. However, there will always be a wide range of individuals admitted to hospital. Some of these will have previously engaged in exercise and some not. Most studies agree that the greatest improvements are to be found in those with the lowest fitness levels and capabilities (see Chamove, 1988; Svendsen 1982).

The above-mentioned studies demonstrate the thoroughness of the physiological approach; relevant practical testing and precise stipulation of the independent variable which enable studies to be replicated. If future studies wish to control for the existence or non-existence of behavioural change in relation to fitness changes

they should attempt adequate intensity of exercise as a prerequisite.

The main point of this section is that cardiovascular fitness and physical improvements can be made with mentally handicapped and mentally ill individuals in the same way as with non-handicapped peers. Whether such people react in a similar way to additional aspects of an exercise program (structure, environment, challenge, social etc) remains to be clarified. In only one of these studies mentioned was there any direct attempt to measure behavioural effects of the exercise programme as well as fitness (Tomporowski and Ellis, 1984). This study is reviewed in the next section.

#### **1.4 EXERCISE AND BEHAVIOUR**

The background to the use of exercise as an environmental antecedent event to manage maladaptive behaviours stemmed from:

- 1) research demonstrating that increased interaction with the environment decreased inappropriate behaviours (Berkson and Mason, 1964)

Berkson and Davenport (1962) and Berkson and Mason (1964) were among the first to investigate the importance of the

environment for influencing the behaviour of severely and profoundly mentally-handicapped people. Berkson carried out a series of studies investigating the effects on behaviour of introducing toys (Berkson and Mason, 1964), stimulation (Berkson and Davenport, 1962) and simple change in environment (Berkson and Mason, 1963). The authors found that stereotypic behaviour tended to be highest where stimulation was low and that interaction with the environment decreased the frequency of such maladaptive behaviours. Studies have since been designed to improve the institutional environments of severely mentally handicapped people (eg Jones et al, 1983; Spangler and Marshall 1981). Related research has also led to the promotion of policies for increasing the amount of interaction a mentally handicapped person has with their surroundings and so improve their quality of life (eg Porterfield et al, 1980; Sturmey, Hogg and Crisp 1988).

2) the concept of setting events - which incorporates the idea of temporal sequencing of events and patterns of interactions (Wahler and Fox, 1981)

The concept of "setting events" refers to the observation that behaviour can be influenced by events which precede it. The example quoted by Wahler and Fox (1981) is that of a father who tells his son to "be a good boy": the number of disobedient behaviours from that child in a subsequent limited time period decreases. Wahler and Fox expanded the concept of setting events to include stimuli which were less specific than verbal direction

and could be further away in time. "Setting events" may effect behaviour by altering the person's physical, physiological, cognitive or behavioural environment or a combination of these.

3) anecdotal evidence and findings that it worked with disruptive children (Allen 1980)

Allen (1980) integrated brief periods (5 - 10 minutes) of continuous running, jogging or walking into the class routine of a group of handicapped children. Attentional capacities were increased substantially and there were fewer disruptions during lessons. The most common form of exercise which has been investigated has been running: it is easily instigated, involves least demand on motor skills and yet is a vigorous rhythmical activity which can be enjoyed by all.

4) theoretical ideas of optimal stimulation and "arousal" in the etiology of autistic and self-stimulatory behaviours (Hutt and Hutt 1968).

Hutt and Hutt (1968) suggested that people with autism have problems in the regulation of sensory input. It was suggested that such people may be bombarded with stimuli and unable to cope. Alternatively they may perceive an inadequate amount of stimulation from the environment. In order to compensate and to

provide vestibular and proprioceptive feedback, autistic people may engage in stereotypic or self-stimulatory behaviours\*.

#### **1.4.1 Disruptive Behaviour, Stereotypic Behaviour, Self-Stimulation & Self-Injurious Behaviour (SIB)**

Most of the investigations concerning the behavioural effects of exercise have involved one or other of the above. This is because such behaviours are common in the repertoire of mentally handicapped people and pose problems for both the client and staff. A person engaged in self-stimulation or stereotypic behaviours, for example, is often completely absorbed. This is detrimental to the learning process. A person can also do permanent damage to themselves or others. The use of exercise as a behavioural intervention to the range of behaviours now being called "challenging behaviours" (Kings Fund Centre, 1980) is a comparatively new area of research and one which has much potential.

There have been only a few studies (eg Bachman and Fuqua, 1983; Beasley 1982,) that have looked at behavioural changes associated with exercise whilst simultaneously attempting to standardise exercise intensity to aerobic fitness training using pulse rate

---

\*It should be noted that this is not the only theory concerning the etiology of autism or of stereotypic or self-stimulatory behaviour. It is, however, the one most relevant to this thesis.

formulations (Fixx, 1977; Vitale, 1983). Baumeister and McLean (1983) used pulse monitors to ensure pulse rates did not exceed a precalculated maximum. A recent study used the phrase "*increased physical exercise*" (McGimsey and Favell, 1988). It may be more appropriate to use this terminology when describing the independent variable. There is a frequently cited review of literature concerning physical fitness training and mental health which notes a lack of objective measurement in studies and difficulty in comparing studies using different procedures and populations (Folkins and Sime, 1981).

Tompsonski and Ellis (1984) stated that their exercise was "*designed to improve their aerobic fitness and general health*". Sixty-five profound - moderately handicapped adults were randomly assigned to an exercise, attention control or no intervention group. The exercise group underwent seven months of individualised aerobic exercise, five times a week for three hours at a time. Cardiovascular fitness increased and residents were able to run 3 - 5 miles daily without prompting by the end of the project. This was a major achievement considering the probable basic fitness level and motivational problem which are well-known within institutions. The groups were not compared on fitness, but general behaviour was measured before and after the intervention by the Adaptive Behaviour Scale (A.A.M.D., 1974). This demonstrated significant change on a dimension of community self-sufficiency, regardless of group. However, ward staff reported less aberrant behaviour and more compliance from the exercise group and

personnel involved with the project also noticed positive shorter-term social behaviour changes during the exercise.

Other studies investigating behavioural consequences have stated that the exercise should be "*mildly strenuous*" (Kern et al, 1982) "*light*" (Dodson and Mullens, 1969) "*vigorous*" and "*aerobic*" (Bachman and Sluyter, 1988).

However, authors have often stated exactly the type of exercise they used but failed to state to what degree the proposed exercise intensity and duration were achieved. This is another practical problem when dealing with mentally retarded, psychotic or depressed residents. Psychiatric patients and residents of mental handicap hospitals often find it difficult to initiate activity or to maintain concentration or attention for long periods. Any exercise programme has to build up gradually from whatever starting point is available. This may mean that a "three month training programme" may only be altering long-term physiological states in the last month. This is a factor to consider when interpreting the origins of any effects.

Jansma and Combs (1987) addressed both fitness issues and maladaptive behaviours in institutionalised mentally retarded/mentally disturbed adults. One hour fitness sessions involving strength conditioning (sit-ups, weights, bench presses) and cardiovascular training were undertaken daily over a period of

three weeks. The design was in an ABAB single subject design with one week baseline and maintainance. A token reinforcement programme was used to reinforce participation. Target behaviours included aggressive behaviours such as hitting and biting, stereotypic behaviours such as talking to self and hand-flicking and disruptive behaviours such as throwing objects and inappropriate touching. These were observed for one hour post-exercise using interval recording methods at the time when the subject usually displayed most maladaptive behaviour. Jansma and Combs found a "dramatic decrease of target behaviour during intervention phase and a clear increase during baseline and maintainance phases". Differences in individual percent occurrence of maladaptive behaviour between phases were distinct and their data showed decreases of up to 56% between the first baseline and intervention.

Watters and Watters (1980) investigated self-stimulation in a group of autistic boys using jogging, TV watching and normal academic lessons. Substantial decreases in self-stimulation occurred in post exercise observational sessions and there were no difference between the academic and T.V. watching sessions. Similar studies using jogging have reported decreases in self-stimulatory behaviour (Kern et al, 1982), inappropriate behaviour (Bachman and Fuqua, 1983), self-injurious behaviour and stereotypic behaviour (Baumeister and McLean, 1984) and otherwise disruptive or maladaptive behaviour (McGimsey and Favell, 1988). In many studies the terms are used interchangeably though there is growing awareness that SIB and stereotypy are not synonymous. It is also arguable as to whether SIB and self-stimulation have the same

functional relevances or maintaining variables (Chamove and Anderson, 1981; Repp et al, 1988). Disruptive behaviour may originate from social or environmental influences or be the result of neurological or physiological factors. Researchers looking at the etiology and maintainance of stereotypic and self-injurious behaviours have used socio-biological (Chamove and Anderson, 1981), organic (as in the Lesch-Nyhan syndrome), environmental (see Carr, 1977) and physiological approaches (Barron and Sandman, 1983).

Few studies investigating SIB or stereotypy have simulataneously measured levels of positive or interactional behaviour, except for assessing time on task or attention (see Kern et al, 1982). Watters and Watters (1980) found no associated increase in correct responding during a language training program, but no detrimental effects either. Stereotypy has also been reduced through "free play" sessions (Sisson et al, 1988) with increases in social behaviours. It is recognised, however, that the amount of reduction in inappropriate behaviour varies considerably with each individual and in many cases the intervention may be no more effective than previously tried methods of reducing maladaptive behaviour. The additional benefits of physical exercise, its relative independence from the behaviour of the indiviudal and its ease of implementation make it a desirable alternative or adjunctive intervention.

The research highlights an intensity effect, with a greater reduction in inappropriate behaviours following more vigorous exercise (Baumeister and McLean, 1984; Kern et al 1982 ). However,

amount of exertion actually expended in each study varies; length of exercise ranges from 5 mins (Allen, 1980) to 3 hours (Tomporowski and Ellis, 1984) with exercise as mild as "ball playing" (Kern, Koegal and Dunlap, 1984) moving only the arms, to regular specified workouts (eg Bachman and Fuqua, 1983) requiring increased effort over the course of the programme. Such programmes incorporate a number of additional factors - eg motivation - which need to be considered.

Bachman and Sluyter (1988) investigated the use of aerobic dance. Comparison of exercise versus no-exercise days showed for two subjects a significant decrease in inappropriate vocalisation, repetitive movements and off-task behaviour, with most reduction in repetitive movements. In conclusion, it appeared that vigorous exercise was most effective in influencing motor behaviour, perhaps due to its muscular relaxation effect (deVries, 1968).

#### 1.4.2. **General behaviours:***work, sleep, social behaviour*

Beasley (1982) implemented a jogging program with mentally handicapped adults and found increases in cardiovascular endurance and work performance as measured by rate of item completion. Fitness was measured using the Cooper walk/run test (Cooper, 1975) and a performance speed test. The number of days of absenteeism from their daily work placements remained unchanged. This contrasts findings that participation in regular exercise is associated with fewer days absent from work in the normal population (Donoghue, 1977). It is likely that there are

environmental differences; the opportunity to be absent from work is probably far less in a hospital setting and absenteeism is rarely a problem.

The mental health literature provides some information on social interaction and social skills although measures of depression or anxiety ratings have normally been the primary aims (see Blue, 1979; Martinsen, 1988a; Doyne et al, 1983). The picture is unclear, but in many cases global social and life skills such as dressing, feeding and eating have not significantly changed. The problem has been to quantify subtle changes in an objective, observable fashion and to assess to what degree changes have been due to resident or staff behavioural or attitudinal change. Baumeister and McLean (1984) reported increases in number of interactions in "trainable-mentally-retarded" people following exercise. This may have been due to the increased activity they observed - the students simply encountered more people. The nature of interactions was not stated.

McEwen (1983), in her study to improve mobility in psychiatric patients (see section 1.3) also reports subjective observation of improved social behaviours during group sessions; "she changed from a noisy, disruptive attention seeker to a sunny, welcoming, co-operative member" p207.

Crain et al (1981) also reported behavioural consequences following dance, with increases in social and interactional behaviour in 13 - 15 yr old "educable mentally retarded children".

This followed 30 mins rhythm, folk and body awareness dancing 3 times a week for 10 weeks. The added advantages of a dance-oriented program may be found in experimental results on body-image and self-concept. Ohwaki (1976) found enhanced body image following "dance therapy" in institutionalised mentally retarded adolescents, while Barton (1982) noted improved self-concept in "educable mentally retarded children". Studies which report improved cognitive changes in both geriatric and clinical populations hint that improvements may be due to increased confidence and self-image following an exercise programme (Brown, 1977; Diedsfedlt et al, 1977). Improvements in self-image are not restricted to dance exercise although dance may be an appropriate exercise to use if improvement in self-concept was a central aim for the particular individual. Measuring such variables, however, pose problems of objectivity and validity.

Sleep behaviour is also affected by exercise training and research has demonstrated a more regular sleeping pattern by individuals following an exercise programme (Baekland, 1970; Folkins, Lynch and Gardner, 1972). Doyne et al (1983) noted increased sleep behaviour in a previously unsettled depressed patient as her aerobic fitness improved. The precise effects in terms of REM sleep and stages of sleep have not been investigated.

### **1.5 INDEPENDENT AND DEPENDENT VARIABLES**

The research project can be more easily controlled and assessed when both the independent and dependent variables are

objectively defined. An exact knowledge of the intervention enables experimental procedures to be compared across studies. Differences in procedure or type of intervention can then indicate to the researcher which factors are the important or crucial ones. It is important that the dependent variables are objectively defined in order to demonstrate convincingly whether or not the intervention has been "successful".

This section therefore suggests firstly a definition of exercise as the independent variable and then ways fitness, cognitive and behavioural changes can be measured.

#### 1.5.1 Definition of Exercise

Although the papers reviewed in the thesis mostly mentioned "exercise", none provided an description of the term beyond an explanation of how their particular study was carried out. One which did explicitly state what they determined exercise to be was by Lees and Dygdon (1988). Their paper was a conceptual one aimed at understanding how exercise behaviour may be maintained. The authors defined exercise as:

*"a regular series of specific movements designed to stimulate or develop bodily muscles and endurance". p347*

This definition distinguishes it from general "activity" which usually implies a more haphazard moving about. The notion of physical

exercise here incorporates an idea of active, voluntary participation in gross muscle group activity which has some fitness training quality about it. Precisely which aspects of fitness improve depends upon the type of exercise.

Many of the studies reviewed in chapter 1 are more investigations of "activity" "play" or an "exercise program" evaluation than of the influence of exercise as defined. That is, there has been little consensus concerning the nature of the independent variable. Some authors have been unable to go beyond "do whatever they wished provided they continued to move at a pace faster than a normal walk" (McGimsey and Favell 1983). Behavioural outcomes rather than fitness improvements have not usually been the main aim of such programmes. It should be recognised that when people with mental handicaps are the participants it is often necessary to have a flexible approach to the type or intensity of exercise. It is rarely possible to construct an identical programme for people who may have differing physical abilities, preferences or motivational levels. However, studies do find positive changes in behaviour (see section 1.4.1). This highlights the complexity of the role exercise can play as an intervention strategy.

A full definition of "exercise" therefore considers all that goes along with it, that is, social and environmental context, organisational framework, extent of participation and interaction with the environment. Not all exercise will have the same appeal for different individuals. The ultimate aim is to tailor the type of exercise to the person and their circumstances. Improvements may

arise through one or more channel; physical, behavioural, social or cognitive.

This study includes "activity" with the definition of exercise proposed by Lees and Dygdon (1988). It proposes that exercise for mentally handicapped people does not need to consist of movements designed with fitness or endurance improvements in mind, although for some people these may be natural consequences of long term participation.

#### 1.5.2 Fitness

The following elements are taken from the recent Eurofit committee report 1987 and have been identified as dimensions of physical fitness. They comprise "fitness" as used in this study:

1. *cardio-respiratory endurance* (ie ability to USE oxygen inspired)
2. *strength* - both static strength and explosive power
3. *muscular endurance*
4. *speed* - agility and speed of limb movement
5. *flexibility*
6. *balance*.

Associated anthropometric measures are 1) *Height* 2) *Weight* and 3) *Body fat/composition*.

The multi-element nature of fitness means that different types of physical exercise will differ in the extent that they alter any particular dimension. There will also be differences in the time it takes for measurable changes to take place. When training for cardiovascular endurance or reduction in relative body fat, for example, there are particular recommended intensity levels. Exercise physiology research recommends exercise at around 80% of a person's maximum oxygen uptake capacity (VO<sub>2</sub> max) lasting for longer than 15 mins for aerobic conditioning and for a minimum of 90 mins per week. For maximum effects the exercise should be continuous. Training at 30-40% maximum for long durations brings about the fastest change in body composition (Astrand and Rodahl, 1986).

Once fitness is defined and the relevant dimensions have been categorised it is possible to identify how they may be measured. The Council of Europe Committee for the Development of Sport (1986) recommended a number of tests which may be used in evaluating each dimension of fitness change, above. These are:

1. Cardio-vascular tests; Heart rates (HR) at different work loads to determine VO<sub>2</sub> max and physical working capacity; bicycle ergometry/treadmill.

2. i) Hand Grip tests ii) Standing Broad Jump

- 3 Sit ups

4. i) Shuttle Run tests and ii) Plate Tapping

5. Sit and Reach

6. Flamingo Balance

Measurements of body composition changes can be obtained through underwater weighing, skinfold measurements using calipers, or electronically . Biochemical analyses can be done using serum lipids and analysis of metabolic fluids.

### **1.5.3 Cognitive and Behavioural Change**

The predominant way to measure mood changes has been by self-report questionnaires. These include the Profile of Mood States or POMS (McNair et al, 1971), the Stait-Trait Anxiety Inventory or STAI (Spielberger et al, 1984) and the Beck Depression Inventory or BDI (Beck, 1976). Studies have found that participation in vigorous exercise commonly reduced scores on the BDI for mildly and moderately depressed patients (Doyne et al, 1987; Fremont and Craighead, 1987), gave a more positive mood profile (Berger et al, 1988) and reduced state and trait anxiety in non-clinical subjects (Blumenthal et al, 1982). That so many studies corroborate one another suggest that these are real effects. However, self-report questionnaires need to be reinforced by more objective measurements. This is especially true when dealing with psychiatric people or mentally handicapped people who may find it difficult to rate themselves or to fill in questionnaires consistently. Nevertheless, self-report methods give clinically and socially

relevant data as they frequently involve personal assessments of social functioning as well as subjective mood state.

Behavioural change can be measured in a number of ways. Staff can rate behaviour or note instances of particular types of behaviour such as hitting, kicking or biting. They can also be asked to give subjective ratings or to fill in predetermined forms. Prepared checklists include the Adaptive Behaviour Scale (ABS) and the Aberrant Behaviour Checklist (ABC), but there are numerous others. These methods are commonly used and valuable when assessing a large number of people. They are also useful in mental handicap, to determine which residents would be suitable for community care and to identify which residents may need specific behaviour modification programmes. However, they often assess behaviour over a long period of time and are general in nature. They can also miss the important features surrounding the circumstances in which behaviour takes place. This means that interventions may be wrongly focussed on a maladaptive behaviour in a situation where it is the environment which is maintaining the behaviour shown and an alternative approach might be more beneficial.

An objective and systematic way to assess behavioural change is through direct observation. Observation may be undertaken by a variety of methods, all of which have their methodological merits and weaknesses. The most common observational method in the literature to assess the behavioural effects of exercise, for example,

has been by time-sampling, with interval or partial interval recording methods (eg Bachman and Fuqua, 1984; Bachman and Sluyter, 1988; Baumeister and Mclean, 1984; Kern et al, 1982; Kern et al, 1984).

"Time-sampling" is a rule of recording where the observation session is divided into successive short periods of time, or sample intervals. Behaviour is recorded at the end of each interval and noted only as occurring or not-occurring at that instant. In interval recording, the observer notes whether the behaviour occurred within the preceding interval. If "occurrence" is scored only when the behaviour occurred throughout the entire interval, this method is known as a "whole interval" procedure. Partial interval recording is when the behaviour is scored as occurring regardless of its duration or frequency within the interval.

Time-sampling is a useful and convenient method of collecting information quickly (see Barlow and Herson, 1985) and is good when responses have no clear beginning or end. However, continuity of behaviour is often lost and some behaviours may be lost altogether. Real-time recording enables unbiased estimate of both frequency and duration of behaviour and enables sequences of behaviour to be analysed. It is therefore the method used in this thesis. Real-time recording also has disadvantages. The most obvious one is that it is a demanding task for the observers themselves. For this reason, training of observers is necessary and observation periods are usually of shorter duration. However, it is

argued that real-time recording gives the most detailed picture of behaviour. The fact that it lends itself to sequential analysis and that hand-held computers are being more often used for observational procedures suggests that it may become predominant in future research (Bakeman and Gottman, 1986; Repp et al 1988).

## 1.6 MAINTAINANCE

The greatest difficulty experienced by those who try to modify behaviour involves how to ensure that changes are maintained. That is, once an exercise programme is in operation, how can the person be motivated to continue when special facilities or motivators are no longer available? Similarly, if adaptive behavioural changes take place, how can positive aspects be maintained between the exercise sessions? This section takes a multi-dimensional approach to look at these questions. There are two points; the first considers the maintainance of any positive behavioural changes which may occur subsequent to exercise and the second considers the maintainance of exercise behaviour itself.

If one behaviour is always a natural consequence of another then it is arguably only the initial behaviour which needs to be maintained. However, if exercise is serving as a setting condition there is likely to be a maximal time period for its effect. Certainly within the exercise-behaviour literature it appears that most

reduction of stereotyped or maladaptive behaviour occurs within the first hour and subsequently rises (Kern et al, 1982; Tomporowski and Ellis, 1984). On the other hand, Baumeister and MacLean (1984) reported that there may have been an effect lasting until the next day. Within this period any adaptive behaviour which is allowed to emerge through suppression of maladaptive behaviour needs to be focussed upon and encouraged.

Similarly if the function of the maladaptive behaviour is not being served then the behaviour may recur. It is necessary therefore to examine factors in the individual's social environment during the time he is not exercising. If there is less maladaptive behaviour exhibited subsequent to exercise it is important to look at what replaces that behaviour for the individual and investigate the reactions to those behaviours by significant others. Sometimes a person displays very little behaviour of any type. What to encourage here is debateable. Some may argue that only positive behaviours should be reinforced. The argument in this thesis is that it is better to be showing *some* signs of internal functioning than nothing at all. Once the person is responding, then there is behaviour to work with (see Goldiamond, 1974). The ultimate aim of a behavioural intervention should be to encourage adaptive behaviour and/or positive social interaction to improve quality of life for the resident.

Maintenance of behaviour includes transfer of control from people other than the individual to the environment and ultimately

to self-control. To promote *exercise behaviour* this involves finding out what the potential reinforcers within the exercise variable may be. It has been shown that exercise comprises many elements. There are immediate, short and long-term physiological and environmental consequences. However, the feedback immediately subsequent to an exercise period may be aversive, as in muscle soreness or shortness of breath. Positive fitness consequences may be further away in time by a matter of days or weeks. It is well known that people with mental handicaps respond better to more immediate rewards and tangible reinforcements. Thus they are less likely to continue if immediate consequences are aversive. Alternatively, social factors are strong motivators (Steptoe, 1988) for non-handicapped people. However, mentally handicapped people may differ in this respect and there may be problems in finding a similar reinforcer. Compliance studies and the rehabilitation literature provide starting points and the reader is referred back to Lees and Dygdon (1988).

For mentally handicapped people, especially, individual characteristics must be recognised and sensitively dealt with. The introduction of a procedure will inevitably be difficult for the first few sessions of exercise. There should be encouragement and prompting with rewards for increasing exercise durations. This section has amassed a few ideas concerning how significant others need to be involved for positive benefits of exercise to be maintained and how participation in exercise itself may be maintained.

## 1.8 SUMMARY AND FUTURE DIRECTIONS

The areas covered in this review are not mutually exclusive or indeed exhaustive. However, in those areas which have been chosen, different studies reflect different research methodology. The most objective criteria have been used in behavioural studies, with time-sampling the most commonly used strategy (section 1.5.3)

There is general agreement that exercise has beneficial or at least non-negative short-term outcomes and improvements in physical health have been unequivocal. It has been demonstrated also that programmes to improve the health and fitness of mentally handicapped people are just as viable as for the normal population (sections 1.1 - 1.3).

Research has suggested that physical exercise is effective in reducing levels of stereotypic, self-stimulatory, self-injurious and general maladaptive behaviours, with most studies reporting substantial differences between baseline and intervention phases. Studies have observed behaviour immediately subsequent to exercise and for a period of up to one hour and exercise sessions have ranged from 5 minutes to three hours (section 1.4.1).

There also seem to be positive changes in social interactional behaviour and self-image, although scales such as the ABS have so far failed to identify and quantify the precise nature of

subjectively evaluated changes. It has not been identified as to whether individual differences are due to the type of behaviour or individual or environmental characteristics (section 1.4.2).

No research has investigated the minimum level of exercise intensity which may be effective, although most research indicates an intensity-related effect. Similarly, physiological research has not progressed to the stage where many direct causal attributions can be made. Whether it is necessary to have active personal interaction with the environment has yet to be ruled out. *Type* of vigorous exercise does not seem to be important, although enjoyment and social factors may add to both adherence and maintainance.

It is therefore still a complex task to understand what exactly the crucial elements of an "exercise therapy" or intervention may be. However, at least quantitative and perhaps qualitative changes may be determined and the research reviewed gives some suggestions as to what changes in behaviour may be expected.

The practical study was designed therefore to investigate further the relationship between exercise and the behaviour of mentally handicapped people in institutions, using outdoor exercise as the independent variable. It also aimed to develop the work on social behaviour by taking direct observations of resident social behaviour and staff-resident interactions.

The main hypotheses of study were as follows:

- 1) Participation in outdoor exercise for between ten and thirty minutes would result in lower-than-usual levels of inappropriate behaviour being displayed immediately afterwards.
  
- 2) Participation in an exercise programme would lead to an increase in the frequency of social interactions in the period immediately following exercise. Social interaction is defined in terms of the resident's socially directed behaviour and staff attention as in section 3.4.3.

Additional empirical questions were;

- 1) would exercise would affect level of mobility?
  
- 2) what would replace 'inappropriate behaviour' in the resident's repertoire?
  
- 3) was there a characteristic pattern of staff-resident interaction?
  
- 4) would there be a change in the pattern of staff-resident interaction over the course of the study?

## CHAPTER 2

### **INTRODUCTION TO THE SITE OF STUDY**

2.1 The Hospital

2.2 The Ward

2.3 The Staff

2.4 The Exercise Facilities

2.4.1 Swimming

2.4.2 Soft Play

2.4.3 Physiotherapy

2.4.4 Recreation

2.4.5 Disco

2.4.6 Work

## 2.1 THE HOSPITAL

The hospital where the study took place was a medium-sized Scottish hospital for people with mental handicaps. It was established in 1968-9 and comprised 20 wards divided into three units: Eden (Wards 1 - 6), Tay (Wards 9,11,12 and a recently-built ward, Levendale) and Forth (Wards 15 -20). Between them wards covered the entire scope of mental and combined mental/physical handicap. Ward 5, known as Cleish Ward, contained some of the most profoundly mentally handicapped people. The wards for people with severe or profound handicaps and those for people with behaviour problems were kept locked.

The hospital was one of several mental handicap hospitals in Scotland gradually being run down with a view to moving residents into community settings. The discharge rate for the hospital was approximately 33 per year, with residents typically going to smaller group homes or hostels within the area. Around 350 of the 420 available beds were occupied and there were only 10 children under the age of 16. No further children were being admitted as residents. A school, located in the hospital grounds, was responsible for day care and teaching of the resident mentally handicapped children. Children from the immediate area also attended on a daily basis.

The Health Board land at the hospital site included the hospital itself, playing fields, bowling green and staff residences. It was surrounded by trees and fencing on two sides. The ground was separated from the main road by a 3 ft wall with entry and exit access for cars. The remaining side boundary extended to a

technical college. There were car and delivery parking facilities by the main entrance and behind the main building.

## 2.2 THE WARD

The study was conducted in Ward 2 of the hospital. This ward may be classified as a "medium to high-dependency ward"; its occupants for the most part required help with dressing, feeding or toileting and most needed to be escorted when leaving the ward setting. There were 23 permanent residents. A large number of residents in this ward displayed behavioural problems which would be unacceptable in society. Behaviours included stereotyped behaviours (twirling, finger waving, rocking, headbanging), persistent screaming, urination and defaecation on the ward, aggressive behaviour (biting and hitting) and extreme passivity. At least three members of the ward suffered from epilepsy and have tonic clonic seizures approximately once a fortnight.

Ward 2 consisted of a square area, 10m by 10m, a rectangular staff area separated by glass panelling and a corridor to the hospital exit. There were two side rooms; a "fun-room" and an additional room which was be used as an extra dining room. The sleeping areas were to the back of the living area and comprised rooms, bathrooms and linen cupboards. On entering the ward there was a doorway on the right hand side which led to an outside paved area.

The day room contained plastic-covered sofas and chairs arranged around the sides of the room. There was a long window which followed one side and looked out over a small patch of grass, to which there was an access door. There was a television and a video

machine in one corner; these were situated within a wall cabinet unit which stretched across the left-hand side of the living area. The front wall comprised the glass panel to the staff area and a window in the back wall which looked to the dining area. Both the off-ward rooms were furnished with chairs and tables.

### **2.3 THE STAFF**

Staff at the hospital worked on a shift rota. Day shifts were from 7 am - 3 pm and from 1 pm - 9 pm. There was thus an overlap period between 1 pm and 3 pm, to allow for staff communication of happenings on the ward. Staffing levels were low at the time of study and management acknowledged difficulty in maintaining minimum safety cover. The aim of the hospital was to have five staff on attendance in the difficult wards at all times. Part-time staff were employed to work shorter shifts and provide necessary cover outwith the overlap period. Many of the personnel worked overtime and worked eight days for a weekend off.

### **2.4 THE EXERCISE FACILITIES**

Whether or not a person attended any of the exercise facilities below depended on a number of factors. These included 1) their behaviour that day 2) whether or not they needed escort 3) whether there were staff available for that purpose. The list below thus identifies the facilities which existed in the hospital at the time of writing.

### **2.4.1 Swimming**

The school housed a 15m swimming pool, which was available for certain residents of the hospital on a timetabled basis. Regular classes took place and four or five residents attended at any one time according to need.

### **2.4.2 Soft Play**

All items in the soft play room were made out of multi-coloured, plastic-coated foam. It was an area designed so that an individual could play or vent aggression without doing any physical damage. At one corner there were steps and a slide, in another was a foam tunnel and there were various large shapes which could be thrown, hit or used constructively; eg cubes, balls, punch-bags. Four residents usually attended for a one-hour session and there were normally two staff available.

### **2.4.3 Physiotherapy**

The physiotherapists ran 13 exercise classes per week. These were held in the main hall and could comprise specific exercises (eg neck or head exercises) or more active games chosen by the residents. Games involved activities such as aiming with bean bags/balls, throwing, catching and relays. Sessions lasted approximately three-quarters of an hour and there were eight or nine residents and two staff per session. These classes provided exercise for a high number of the older residents and residents from the more able wards or therapy units. The physiotherapists also visited the wards of the more physically handicapped for specific remedial exercise work; improving muscle and limb

mobility and attempting to prevent the deterioration of tissue or the onset of muscle spasticity.

#### **2.4.4 Recreation**

The recreation room contained paints, jigsaws, books and toys for play. Residents from particular wards were timetabled for afternoon or morning sessions. Sessions took place in the recreation room or in the main hall. There were normally two staff per session and the number of residents attending varied from one to five. If the weather was appropriate recreation included walking in the hospital grounds and larger numbers participated.

#### **2.4.5 Disco**

A disco was held at the hospital on a Friday and a Sunday night. Music was provided on the stage of the main hall. The disco ran for approximately 2 hours and was available to all residents, provided that those who required escort were able to be escorted. Staff were there to encourage dancing and participation. Refreshments were served towards the end of the dancing.

#### **2.4.6 Work (Industrial Therapy Unit)**

The hospital had its own Industrial Therapy Unit which provided productive work for the more capable residents to do during the day. The Unit manufactured paving stones and cement work to order from the local community. The work involved lifting,

painting, mixing cement, moulding etc and therefore could be physically demanding.

## CHAPTER 3

### **THE STUDY**

#### 3.1 Rationale

#### 3.2 Choice of Subjects and Subject Characteristics

##### 3.2.1 Individual Characteristics

#### 3.3 Physiological Variables Affected by Exercise

##### 3.3.1 Sleep

##### 3.3.2 Epileptic Fits

##### 3.3.3 Blood Pressure

#### 3.4 Design and Collection of Behavioural Data

##### 3.4.1 Observation

##### 3.4.2 Observational Equipment

##### 3.4.3 Observational Criteria

##### 3.4.4 Observational Categories

##### 3.4.5 Observational Procedure

##### 3.4.6 Observer Reliability and Accuracy

#### 3.5 The Exercise

#### 3.6 Consent

### 3.1 RATIONALE

The study aimed to investigate the feasibility of an individual exercise programme intervention with a sample of residents of Ward 2 and to corroborate or otherwise the accumulating research evidence on the effects of exercise on behaviour for this client group (see chapter 1). That is, a number of authors (Kern et al 1982, Watters and Watters 1980, Tomporowski and Ellis 1984, Allen 1980) have found exercise can positively influence the behaviour of mentally handicapped or learning disabled individuals for a predetermined period following exercise. Some authors have found reductions in stereotypic behaviour (eg Baumeister and McLean 1984, Kern, Keogal and Dunlap 1984) while others have discovered improvement in more general disruptive or otherwise maladaptive behaviours (eg Allen 1980, Bachman and Sluyter 1988, McGimsey and Favell 1988, Jansma and Combs 1987). In both psychiatric patients and people with mental handicaps there is a suggestion that participation in exercise can also be socially beneficial; increasing social activity and interaction (eg Crain, Eisenhart and McLaughlin 1984, McEwen 1983).

The study was undertaken in an institutional setting for a number of reasons:

- 1) Residents of a mental handicap or psychiatric hospital are living in a restrictive environment and are particularly at risk of having little activity or engagement during the day. (Geddes 1974,

Chamove 1986). They may also display comparatively abnormal or non-existent play or active behaviour (Kielhofner et al 1983) and there may be little support from the environment for alternative constructive behaviour (Sturmey, Hogg and Crisp 1988).

2) A larger number of behavioural problems are found amongst severely and profoundly handicapped individuals in institutions (see Kaufman 1971).

3) Life in an institution is traditionally different to life in society (see Goffman 1961 cited in Davies 1989). There are organisational and political and general environmental factors which influence the life and behaviour of the individuals who live there. In particular, the quality of life of an individual in a ward setting can be very much related to the amount of interaction they have with ward personnel. It is suggested that ward staff behaviours are to an extent dependent upon the type of behaviour displayed by the residents (Duker et al 1989, McGarry and West 1975). An intervention which influences a resident's behaviour may therefore alter the behaviour of significant others in that environment. By doing so it may change the nature or number of interactions that particular resident may receive and affect overall quality of life.

Most research studies in the exercise-behaviour literature in mental handicap have involved children rather than adults. This study aimed to involve young (20 - 31 yrs) male adults; a group of

people whose non-handicapped peers are usually active members in society.

### 3.2 CHOICE OF SUBJECTS AND SUBJECT CHARACTERISTICS

The 4 residents were chosen for participation in this study according to their individual characteristics and the nature of their behaviour in the ward setting. They were chosen, after discussion with ward staff, as individuals who might benefit from some kind of regular exercise. They had differing levels of interaction with the ward staff: both G.U and N.P seemed to engage regularly with staff while T.E and S.P rarely had contact with the ward staff on duty.

#### 2.2.1 Individual Characteristics

##### G.U

G.U was 27 years old and was admitted to the hospital in July 1968. He weighed 6 stone 5.5 pounds and was approximately 4 ft 10 inches tall. He was diagnosed on admission as having Cornelia de Lange Syndrome (Amsterdam Dwarf) and had an oesophagal stricture. G.U was ambulant and non-epileptic. G.U required escort when leaving the ward setting.

G's major problems were written in his file as follows:

- 1) Temper tantrums and window banging
- 2) Aggressive behaviour - hitting and biting
- 3) Throwing meals
- 4) Throwing chairs and tables

- 5) Self-induced vomiting
- 6) Hoarding and throwing

G.U's high activity level, aggressive behaviour and attention-seeking behaviour gave reason for including him in the project. His behaviour disrupted the rest of the ward and took up staff time as well as mitigating against his move to a community setting.

G.U was prescribed medication as below. Of the drugs mentioned, pimozide, chlorpromazine and droperidol are drugs belonging to the group of major tranquilizers and have a dampening effect on behavioural tone. Procyclidine is an anti-Parkinsonian drug used to ameliorate the side-effects which can be produced by both chlorpromazine and, to a lesser extent, pimozide.

**Drugs:** 1) Regular prescription - Gariscon 10 ml; Procyclidine 5 mg; Chlorpromazine 150 mg; Pimozide 10 mg; Sodium Ironedetate 10 mls.

2) As required - Polytor Shampoo; Paracetamol; Droperidol 30 mg.

**Exercise:** G.U was timetabled to attend soft-play once per week and recreation twice per week. Attendance was not consistent.

Throughout the study G.U was also on a behavioural management programme for his hitting and biting behaviour. This was already in force at the beginning of the study and was still taking place once the study had ended.

S.P

S.P was 24 yrs old and was admitted to the hospital in December 1972. He weighed 7 stone 5 pounds. S.P was diagnosed as having psychogenic polydipsia, severe mental handicap, sensory impairments and Stills disease (a form of rheumatoid arthritis, which has associated behavioural symptoms). He had poor speech and needed help to wash. He was fully mobile, although most often moved with a rocking or hopping gait. In his file it was written that he was a "loner who does not mix" and "has no behaviour problems". He was described as being very passive and spent much of his time either asleep or engaged in inappropriate behaviour whilst wandering around the ward.

The inappropriate behaviour\* S.P displayed was usually in the form of biting his shirt, picking his nose, close and intense social staring (often described as "homosexual tendencies" by staff as they tended to be directed towards one or two particular male residents or towards staff). Other inappropriate behaviours included laughing to himself and stereotyped deep meaningless vocalisations. All these behaviours frequently accompanied an inappropriate rocking/hopping gait.

S.P was included in the programme as he had very little time outwith the ward and no exercise. He displayed high levels of inappropriate behaviour in the ward setting. (It should be noted that this was in contrast to his medical file notes).

---

\*see section 5 for a discussion on "inappropriate" and "appropriate" behaviour

The general behavioural effects of procyclidine, chlorpromazine and pimozide have been given above.

**Drugs:** Regular prescription - Ferrus Sulphate 150 mg; Piroxicam 20 mg, Kaolin and Morphine 20 mls; Pimozide 4 mg; Pimozide (evenings) 2 mg.

As required - Chlorpromazine 100 mg; Procyclidine 5 mg.

Exercise: S.P was not timetabled to spend any time outwith the ward setting, although occasionally attended soft play. He was escorted.

### N.P

N.P. was 31 yrs old and was admitted to the hospital in June 1973. He weighed 6 stone 5 pounds and was of small build. N.P's only diagnosis was of moderate mental handicap and he was described as having unpredictable behaviour. N.P was fully toilet-trained and capable of self-washing. He was fully ambulant and able to reply to and initiate conversation. N.P suffered from bad epilepsy and was often aggressive; banging windows, swearing and hitting out. He spent most of his time either wandering about the ward, watching television or sleeping.

N.P was chosen for the study on the basis of his aggressive and unpredictable behaviour, his activity level and because he

demonstrated no other obvious behavioural symptoms except boredom.

Of the drugs given, thioridazine, diazepam and droperidol are those which have behaviour-controlling effect. Valium is the proprietary name for diazepam, a minor tranquiliser. The drugs were used to control N.P's "unpredictable behaviour" and his aggressive behaviour when needed. Sodium valproate was given to control epilepsy.

**Drugs - Regular Prescription:** Thioridazine 150 mg; Terfenadine 60 mg; Opticron (x2); Build-up; Fresabin (2 sachets); Sodium Valproate.

**As required:** Bisacodyl Supplements; Diazepam 10 mg; Droperidol 15 mg.

**Exercise:** N.P attended soft play and would go for walks with the recreation staff.

### **T.E**

T.E was 22 years old and was admitted to the hospital in July 1976. His diagnosis was spastic diplegia on admission and he had an awkward and staggering gait. He was given an IQ of 30 and defined as "medium-grade" dependency, requiring help with dressing. T.E weighed 7 stone 10 pounds and was five feet four inches tall. He suffered from tonic clonic seizures approximately fortnightly. T.E spent most of his time asleep in the ward. He had little speech but could use Makaton, an adapted version of the Basic Sign

Language (BSL) for the deaf. T.E also had days when he was very aggressive and active.

T.E had extreme lack of movement and lethagy in the ward. He went out with his mother every Sunday and was then sociable and active. It was felt that he was capable of and would benefit from regular exercise during the week.

**Drugs:** Regular prescription: Sodium Valproate 400 mg; Procyclidine 5 mg; Pimozide 10 mg.

As required - Diazepam, Vitamin supplements, Droperidol (dosage not given), Paracetamol.

**Exercise:** T.E attended soft play.

### 3.3 PHYSIOLOGICAL VARIABLES AFFECTED BY EXERCISE

#### 3.3.1 Sleep

Anecdotal evidence from research in this area has shown exercise to positively influence sleeping patterns (Tomporowski and Ellis 1984, Doyne and Chambless 1983). The physiological release of muscle tension and the physical tiredness which result from exercise contribute to a better nights sleep. In psychiatric and normal populations the "well-being" feeling associated with having exercised are also likely contributors.

A questionnaire was developed to investigate the normal sleeping behaviour of each individual in the study. The questionnaire included questions pertaining to regularity of undisturbed nights

and ease/difficulty in getting to sleep or wakening. The questionnaire was to be general enough for staff to be able to complete on a daily basis without too much inconvenience. The questionnaire is presented in appendix 1.

### **3.3.2 Epileptic fits**

Two of the individuals suffered from epilepsy. Research suggests that a epileptic fits are more common when a person is inactive and less likely if he/she is initiating physical activity (although some types of fit may be induced through such activity) (Neill and Alvarez 1988). Many people feel that disruptions, anxiety and aggression are likely to induce fits; this is not generally confirmed in research (see reference above). Note was therefore taken of when tonic clonic seizures occurred in the residents and whether they were active or inactive at the time. Changes in frequency during the intervention programme were also noted.

### **3.3.3 Blood Pressure**

A person with excessively high blood pressure should not participate in exercise. Hypertension is common in sedentary persons. Exercise can reduce blood pressure over a period of time. It was therefore felt suitable to take the blood pressure for each resident before and after the instigation of the exercise programme.

### 3.4 DESIGN AND COLLECTION OF BEHAVIOURAL DATA

The study was designed as a multiple-baseline across subjects. Baseline observation sessions began on the same day for all individuals at between 3.00 pm and 4.00 pm each weekday. Intervention commenced with the first subject (G.U.) after 5 baseline observation sessions, while the remaining subjects continued in baseline. The second subject (N.P.) was introduced to the intervention procedure after G.U. had completed one week of intervention, while S.P and T.E. continued in baseline. T.E. was introduced to the intervention after S.P. had completed one week observation, although this amounted to only 4 sessions due to one day when S.P. was unavailable for exercise. N.P. continued with baseline throughout.

Observations took place in the half hour immediately after the exercise period for that subject on intervention days. Observation using the PSION consisted of ten minute focal periods of continuous recording of behaviour as it occurred; ie in real time. On occasions when more than one subject was undergoing intervention, each subject was taken for exercise and then observed before the next subject was taken out. Intervention sessions took place between 2.15 pm and 3.00 pm so that subsequent observation was always between 2.30 pm and 4.00 pm; as similar to the baseline observation times as possible. Time for observation was set at between 3.00 pm and 4.00 pm during baseline and follow up. During intervention, observation took place in the half hour immediately following the exercise period on exercise days and commenced once the subject had returned to the ward. Observation began at the same time of day on non

observation days. This was always between 3.00 pm and 4.00 pm except on one occasion, the 8th intervention observation for S.P., when observation began at 2.45 pm. On that day, 3 subjects were simultaneously involved in the intervention phase of the project. Where more than one subject was involved in exercise, the sequence of events was: S1, intervention-observation; S2 intervention-observation, then S3 intervention-observation. The intention was to provide exercise on a minimum of three days per week for each resident and for a maximum of twenty-five minutes at a time. As intervention took place on weekdays, the usual time period between sessions was one day, with a maximum of three days from Friday afternoon to Monday afternoon. An intervention session was ceased for any individual if he showed signs of unease by subjective assessment, or asked to go back to the ward. Intervention was ceased after a maximum of three weeks' duration. Intervention was ceased earlier if it was seen that there would be insufficient time to incorporate a follow-up period before the recommencement of autumn classes in the institution or if the resident was unwilling to exercise on consecutive occasions. There was to be a minimum of 5 observation sessions during intervention, however. The follow-up period lasted at least one week or five observation days. The entire project covered thirty-one observation days.

### **3.4.1 Observation**

It was decided that direct observation in real-time would give the most accurate and detailed picture of behaviour in the ward

setting. Here, samples were ten-minute focal samples. The procedure was developed in order to investigate interactional data in the analysis. It was decided that results from focal-sampling incorporating both staff attention to residents as well as individual resident behaviour would give more detailed information pertinent to the institutional setting. It was felt that taking samples at the same time each day over the five week period would give a sufficiently accurate representation of the sequences and amounts of time spent in particular categories of behaviour displayed at those times. Staff were informed that observation was taking place, but were not told the precise nature of observation; ie they were told that resident behaviour was being observed and that the resident's social interactions were also of interest. They were not told specifically that the study looked at staff-resident interaction patterns. Staff were also informed of the contents of the exercise programme for each individual, but not of any hypothesised effects on behaviour this programme might have.

#### **3.4.2 Observational Equipment**

Observations were taken with a small hand-held computer - the PSION organiser XP. The PSION is lightweight (225 g) and has a memory capacity is 32 kbytes ROM and 32 kbytes RAM. The machine can carry two datapacks to which data can be saved. Data can be transferred to a main computer terminal through a communication link. The surface of the PSION has 36 keys and 26 of these can be used for recording purposes.

The PSION was programmed to accept key headings for each session and to record particular keys pressed together with the

time in hours, minutes and seconds. The machine has an internal clock which is set to the current time and date to record data in real time.

Key headings were as follows:

RATER NAME

SUBJECT NAME

WARD LOCATION

CONDITION (baseline or exercise or follow-up)

Separate keys were assigned for each of the 10 subject behaviour categories; MN, SN, MSAP, SSAP, MSIN, SSIN, MNS-AP, SNS-AP, MNS-IN, SNS-AP. (See section 3.4.4.).

Keys were also assigned for the staff attention categories; C, S, N, P and the 'out of sight' category, X.

By this means sessions were individually identified to be used in analysis as required.

The data obtained were transferred into an IBM compatible personal computer using the mains adapter and COMMS link. It was then manipulated through a database (Dbase III+) within the computer.

### 3.4.3 Observational Criteria

Behaviour was categorised according to a "decision-tree" design. That is, classification began with a simple two-choice decision

concerning whether a resident was in a mobile position or not. Each decision branch then split into a further 2-choice decision concerning resident functioning. This led to a final 3-choice decision involving the type of function or behaviour. A summary of the categories chosen is given. The type of behaviours included for each resident within each category is provided in appendix 2.

Thus resident behaviour was divided initially as straightforward positioning as either

STANDING/WALKING (ie MOBILE) or  
SITTING/LYING (ie NON-MOBILE)

The subsequent decision involved whether the person was

DOING ANYTHING (eg was he just standing or was he standing and engaged in a task of some sort?).

DOING NOTHING (if sitting, this included being asleep).

Sleeping was classified as "nothing". This was because it makes no apparent impact on the immediate environment and gives no conscious feedback to the individual. It was considered relevant to distinguish between when the subject might be influencing his environment (and so gaining some kind of feedback) and when he was not.

Next, if the resident was DOING SOMETHING, was this

APPROPRIATE or  
INAPPROPRIATE

There are a number of ways in which behaviour can be classified as appropriate versus inappropriate and unless strict rules are applied the boundaries are not always clear.

The criteria for determining what was appropriate or inappropriate in this study was based on that used by Cullen and his colleagues when investigating interactions in the ward of a mental handicap hospital (Cullen et al 1983); that is, value judgements had to be made as to whether the behaviour was *culturally* valued or acceptable for an adult of the same age living outside the institutional setting. It can be argued that continual demand for attention is appropriate in this setting - where staff attention was limited. However, it is equally true that an adult who consistently repeated the same phrase over again to someone else, with no apparent contextual reason, would not be displaying behaviour which was culturally valued. A fuller discussion of this categorisation is presented in section 5.

The final decision for categorisation was between

SOCIALLY DIRECTED or  
NON-SOCIALLY DIRECTED (predominately self-directed)

Socially-directed behaviour was classified when the resident was within one metre of other person(s) with gaze/attention/behaviour directed to that person, or when he was engaged in a game or activity with another person, or if he was engaged in a social behaviour such as smiling or verbal behaviour which was actively addressing someone else. Socially-directed behaviour could be appropriate (such as asking for something, welcoming, appropriate responding, referring to something) or inappropriate (such as directed abuse, aggressive behaviour persistent pestering or contextually inappropriate, directed speech).

When a resident is being talked to or given staff attention this may be related to the amount of socially directed behaviour displayed by the resident. A category of resident social behaviour was therefore one which it was felt would be valuable in subsequent sequential analysis.

At the end of the decision-making process, the corresponding key (eg Sitting;Socially-directed; Inappropriate = key labelled SSIN) was pressed on the PSION organiser. There was no further action until the behaviour changes or the staff gave attention (see section 3.4.5). The time of keypress was automatically retained in the memory of the computer.

Four additional categories captured the time residents were being given some form of attention from staff. These were:

COMMAND ie when they were being given a command.

NEGATIVE when staff spoke to or physically interacted in a fashion which had an overall negative tone - eg being told off, pushed out of the way etc.

SOCIAL when staff gave some form of verbal social chit-chat.

POSITIVE when staff gave verbal or physical encouragement in some way - eg praised, cheered, hugged etc.

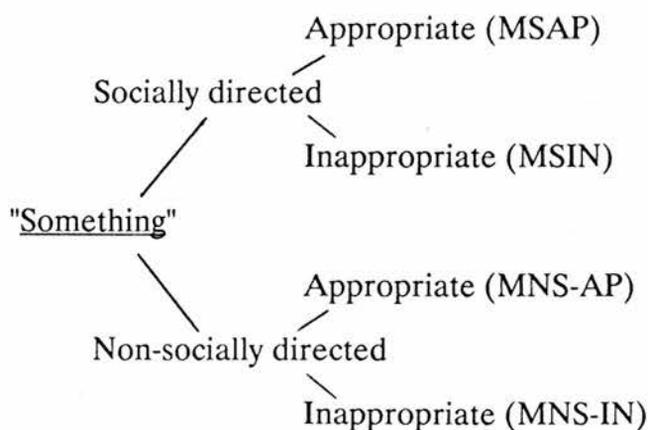
This enabled calculation of the amount of attention the residents received, the type of attention and when this occurred most often.

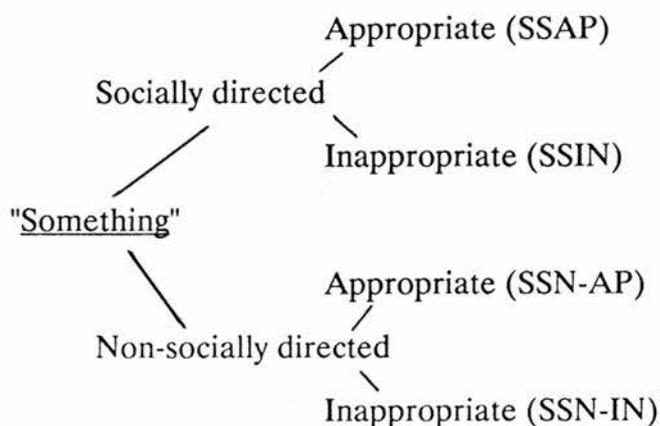
To complete categorisation, a category was included to record when the person was out of sight of observation.

#### 3.4.4 Observational categories

The final categorisation was therefore as follows:

MOBILE "Nothing"(M - standing, MN - wandering about)



SITTING/LYING "Nothing" (SN)

## BEING GIVEN ATTENTION BY STAFF -

Command (C) Social (S) Negative (N) Positive (P)

## OUT OF SIGHT (X)

The categories of resident behaviour derived for analysis from this study were "Inappropriate Behaviour", "Socially-directed Behaviour" and the postional category of "Standing/walking". Standing/walking represented the amount of time that the subject was on his feet rather than in a sitting or lying position and was taken as an indication of mobility.

The categories themselves were therefore not independent: the category of "inappropriate behaviour" included inappropriate behaviour when standing/walking as well as when sitting/lying. Similarly, "socially-directed behaviour" was appropriate and inappropriate, mobile (s/w) and non-mobile (s/l). The category

for staff behaviour was "Staff Attention", irrespective of the nature of attention.

The percentage of time spent in each category over the course of the study at each time of day was calculated. Calculation of resident behaviour involved totalling the number of seconds spent in each category at the appropriate time and dividing by the total number of seconds observed. The "staff attention" keys were removed from the sequence of data so that resident behaviour was calculated as a continuous stream; that is, the behavioural data A...O...B was treated as if the resident displayed behaviour A until the key for behaviour B was pressed although a form of attention was also given during that time (see section 2.4.5.2).

The amount of staff attention given was treated in the same way: the number of seconds from the onset of each particular attention key to the subsequent keypress was totalled and divided by the number of seconds of observation. In the example given above this involves calculation of the time O...B. The end of staff attention was signalled by the next resident behaviour (B) and so the time calculated was accurate.

Totals for both resident and staff behaviour were converted to percentages. Time out of sight during any session was subtracted from the overall total of time and percentages calculated from the remainder. Non-parametric statistics were used for analysis of the percentaged data. It was felt that these were more appropriate as they make fewer assumptions concerning the distribution of scores

and its approximation to normality. The number of data points obtained or this section of analysis was considered too few for such assumptions to be justified.

### **3.4.5 Observational Procedure**

#### **3.4.5.1 Preparation**

Prior to observation a week was spent taking informal notes and preliminary data. This was done to become familiar with the categorisation, make any necessary changes and to become accustomed to the observational setting. It also enabled the residents to become used to the presence of an observer in the ward so that reactivity during the project would be minimised (Kazdin 1979). Time was also spent getting to know the residents themselves and the behaviours they displayed in a variety of settings. By the beginning of the programme, therefore, observer attendance was not new to staff, subjects or setting.

#### **3.4.5.2 Real-time Observation**

To look at staff and resident behaviour in an interactive way the data collection was designed to enable sequential analysis to take place and so explore changes in patterns of behaviour.

Observation was carried out in real time with a focal sampling method; each individual was observed continuously over a ten minute period. Behaviours were recorded as they occurred, with subsequent keys pressed as behaviour changed from one category to another. Once a key was pressed, there was no further action required until either the resident changed his behaviour or staff

gave attention. When staff attention was directed at the resident, the appropriate attention key was pressed (M,N,O,P) and at the end of the attention period the observer looked back to the resident and pressed the appropriate key to record his behaviour. For practical analysis purposes it was assumed that the resident did not change his behaviour in the intervening period; this assumption was based on preliminary observation that staff interaction times were normally short in duration and so there was little opportunity for this to occur.

#### **3.4.6 Observer Reliability and Accuracy**

In order to maintain accuracy (see Suen 1987) and intra-observer reliability (ie recording categories in the same way throughout the project and not "drifting" which is a common phenomenon) a standard video-tape was rated at three times; the first day of study, the Monday of the middle week and in the week following completion of the study. The video was watched by the observer, who recorded behaviour with the PSION as it occurred on the tape. The same behavioural categories and decision tree classification system were used as in the main study.

The video-tape was of ten minutes duration. The data obtained for each session was downloaded onto the main computer from the PSION.

Each pair of sessions was compared: first-middle; middle-end; first-end. Intra-observer agreement figures were calculated by a second-by-second analysis in the same way as inter-observer reliability measures can be presented (Harrop 1989). A matrix was drawn

up with the sessions and keys pressed along each axis as shown on page 68. For the intra-observer reliability videotape eight behavioural codes were utilised; an 8x8 matrix was therefore drawn up with the earliest session pair forming rows and the later session columns (see appendix 3). The keypress and real time entries were then compared second by second. That is, for each second of observation a tally was placed by hand in the appropriate column/row cell. The diagonals therefore showed when both sets of data were in agreement as to both time of keypress and the key pressed. Diagonal tallies were then totalled and transformed into a percentage score by dividing by the total number of seconds of observation including non-agreement, and multiplying by 100.

An example matrix is given:

In session 1 key A is noted for 9 seconds followed by key B for 3 seconds then key C for 3 seconds. Session 2 notes key A for 7 seconds and then key B for 6 seconds and key C for 2 seconds. For the first 7 seconds, both sessions are in agreement. For the next 2 seconds there is disagreement, with the observer recording A in session 2 and recording B in session 1. For the subsequent 3 seconds, both were again in agreement, with a recording of key B. The next is a disagreement (session 2 is C while session 1 still has B). The final 2 seconds are agreements on C. The matrix is therefore as follows, with the sum of the diagonals indicating the

total number of seconds in which there was agreement of both keypress and time pressed (Harrop, 1989).

		session 2		
		A	B	C
session 1	A	7		
	B	2	3	1
	C			2

total agreement = 12  
 total disagreement = 3  
 total intra-observer  
 agreement =  
 $\frac{12}{15} * 100$   
 = 80%

### 3.5 The Exercise

The exercise took place outside and in the afternoons for as long as the resident would stay outside and for a maximum of 25 minutes. Exercise involved jogging and walking, with the intensity regulated by the individual. There was encouragement and prompting to keep the individual as active as possible during this time and at a pace faster than a gentle walk. The exercise ranged from vigorous jogging and hopping down the length of a field for one individual, to walking with occasional "runs" for another. The type of exercise was left flexible as individual capabilities and behavioural characteristics were so different. However, subjects were not stationary for more than 10 seconds at any time.

### 3.6 Consent

It was important to obtain consent from the medical consultant and from the subjects themselves where possible. Where the person concerned was unable to give formal consent this was given by the nursing officer in charge. It was agreed that exercise would be at a pace determined by the resident and that if participants did not want to cooperate there would be no pressure placed on them to do so. Residents would, however, be encouraged verbally. In actuality, T.E. did not want to participate on two occasions; after two attempts at verbal persuasion he was not given exercise on those days. Details of the exercise project were circulated for ward staff. An example of the form is given in appendix 4.

## CHAPTER 4

### **RESULTS**

#### 4.1 Observer Drift

#### 4.2 Daily Rates of Behaviour

##### 4.2.1 Standing/Walking

##### 4.2.2 Inappropriate Behaviour

##### 4.2.3 Appropriate Behaviour

##### 4.2.4 Socially-Directed Behaviour

##### 4.2.5 Staff Attention

#### 4.3 Distribution of Time

#### 4.4 Sequential Analysis

##### 4.4.1 Attention - Summary

##### 4.4.2 Appropriate, Inappropriate and Neutral

##### 4.4.3 Socially-Directed/Non-socially Directed

##### 4.4.4 Standing/Walking and Sitting/Lying

#### 4.5 Sleeping Patterns

#### 4.6 Blood Pressure

#### 4.7 Epileptic Fits

#### 4.8 Summary of Results

## 4 RESULTS

The programme was undertaken in the hospital during the summer months when no other classes or programmes would affect the project. In order to have completed the study before the autumn programme of sessions began, no intervention was carried out for N.P. Observations were continued for N.P throughout the duration of study however. These were used as control data, to support real changes in behaviour which were independent from changes due to ward routine changes or disruptions.

### 4.1 OBSERVER DRIFT

The observer watched and rated a video-tape using the same behavioural categories as in the study. The same video-tape was viewed three times; at the beginning, middle and end of the project. Agreement was calculated using the method given in section 3. Figures obtained for agreement were 81% between session 1 and 2, 71.5% between session 2 and 3, with 78.8% between sessions 1 and 3. Calculations for Kappa (Cohen 1975) reached 0.71, 0.62 and 0.77, respectively. The tables generated from the raw data are provided in appendix 3.

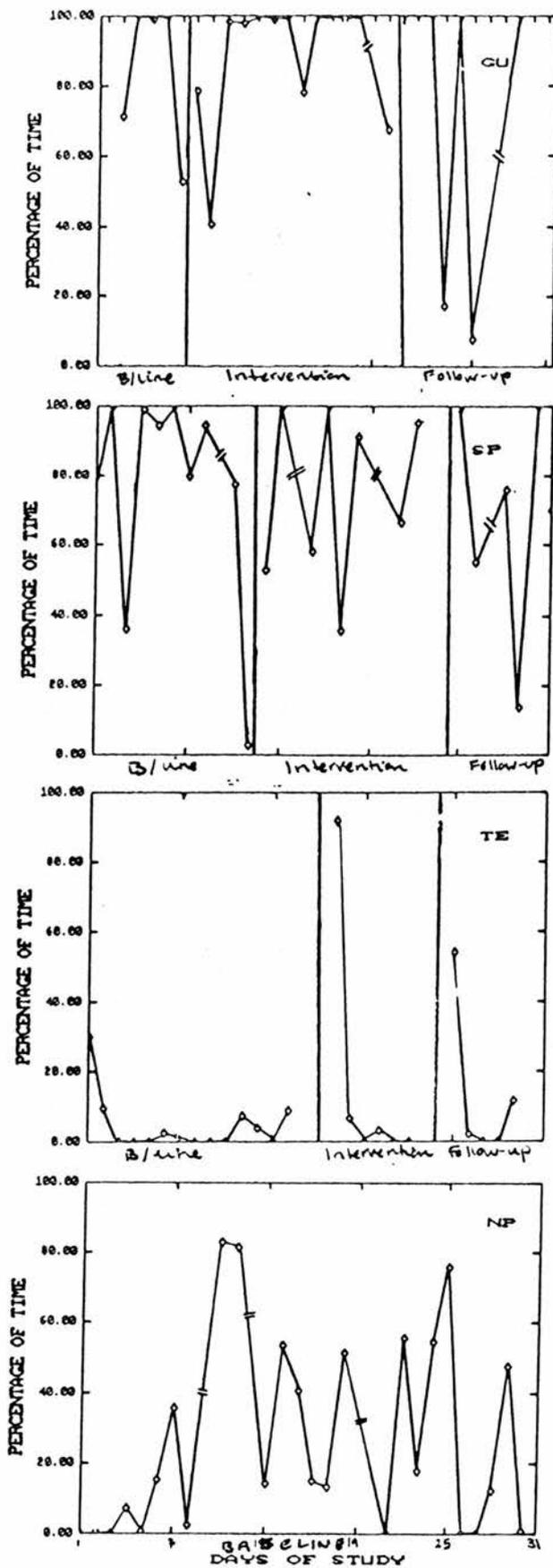
### 4.2 DAILY RATES OF BEHAVIOUR

#### 4.2.1 Standing/Walking

The percentage of time spent in a standing or walking position (ie mobile) is presented for each day of study (see figure 2. There was no effect of intervention which was revealed by statistical testing for any individual (Kruskall-Wallis: G.U.  $H=3.0$   $df=2$   $p=0.868$ ; S.P.  $H=7.95$   $df=2$   $p=0.604$ ; T.E.  $H=2.38$   $df=2$   $p=0.935$ ; all NS see table 1). If time spent mobile is taken as an indication of activity level, the figure shows G.U. and S.P. were more active individuals in comparison with N.P. and T.E.

Figure 2. Daily percentages of time spent mobile (standing or walking) for each individual over the study.

STANDING/WALKING



**Table 1.** Median percentages of time spent mobile (standing/walking) for the three phases of the study for each individual. Kruskal-Wallis probability values indicate the likelihood that obtained differences between the medians was due to chance alone.

STANDING/ WALKING		N OF OBS	MEDIAN	PROBABILITY
GU	BASELINE	5	98.8	H=0.32 DF=2 P=0.868 NS
	INTERVENTION	12	98.7	
	FOLLOW-UP	7	100	
SP	BASELINE	10	87.5	H=1.01 DF=2 P=0.604 NS
	INTERVENTION	9	90.2	
	FOLLOW-UP	5	65.8	
TE	BASELINE	14	1.3	H=0.13 DF=2 P=0.935 NS
	INTERVENTION	6	1.5	
	FOLLOW-UP	5	2.2	

The Kruskal-Wallis test is a non-parametric form of the analysis of variance test (ANOVA) and has a null hypothesis of no difference between k (here, 3) independent samples from a continuous distribution.

In this and subsequent tables;

- 1) "N OF OBS" refers to the number of behavioural observations at each phase of study; baseline, intervention and follow-up.
- 2) The median values are the median percentages calculated for behaviour at each level.
- 3) "H" is the H statistic for the Kruskal-Wallis test; larger values indicate greater probability of the null hypothesis being rejected. The value for "P" is the level of probability obtained by the analysis. Values of less than 0.05 indicate that differences obtained between the scores occurred less than 5% of the time and so were significantly unlikely to have occurred by chance. These are marked with an asterisk.

#### 4.2.2 Inappropriate Behaviour

G.U.

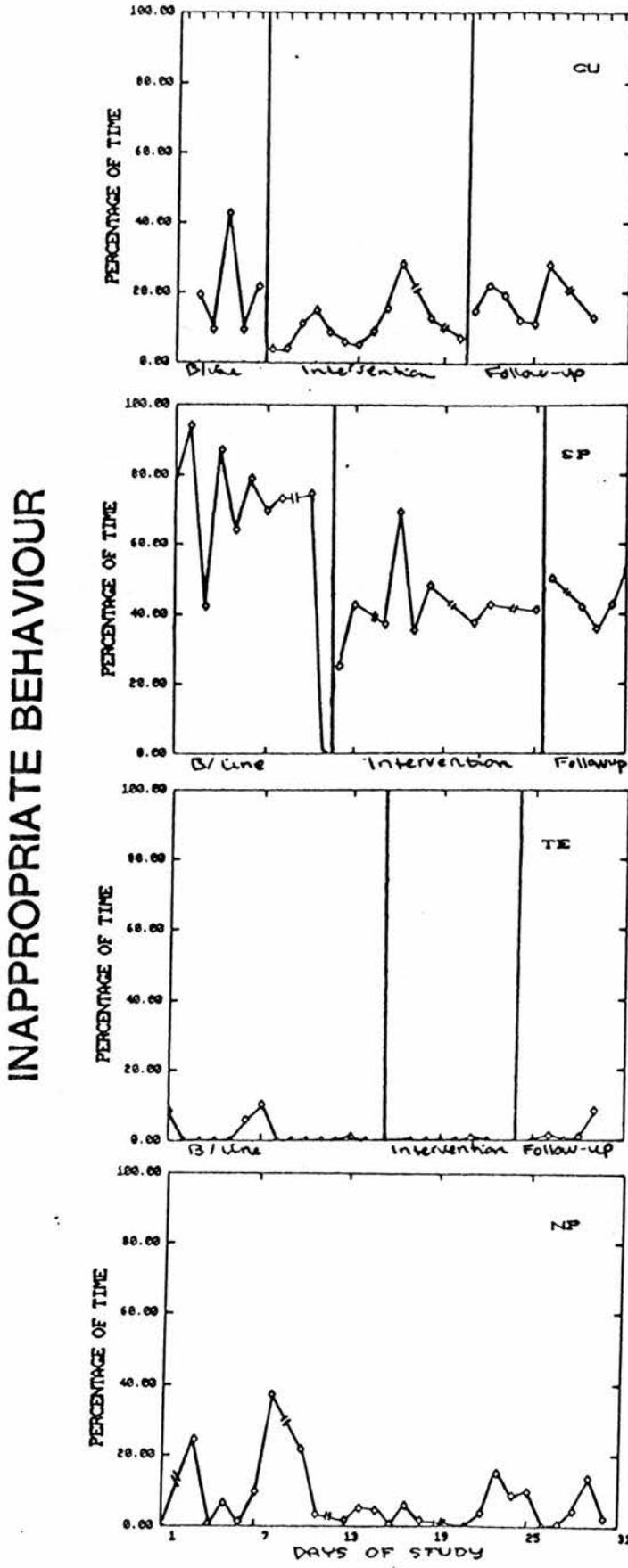
The percentage of time G.U. spent in "inappropriate behaviour" at Time B (between 3pm and 4pm) is shown in Figure 3. A Kruskal-Wallis test was performed to compare

baseline, intervention and follow-up periods of data. The test gave a probability value of 0.057 ( $H=5.75$ ;  $df=2$ ) indicating that the null hypothesis of equivalent means could not be rejected at the 95% level of significance (see table 2).

**Table 2.** Median percentages of time spent in inappropriate behaviour during the three phases of study for each individual. Kruskal-Wallis probability values indicate the likelihood that obtained differences between medians was due to chance alone.

		N OF OBS	MEDIAN	PROBABILITY
INAPPROPRIATE BEHAVIOUR				
GU	BASELINE	5	19.4	$H=5.75$ $DF=2$ $P=0.057$ NS
	INTERVENTION	12	9	
	FOLLOW-UP	7	14.9	
SP	BASELINE	10	74.2	$H=8.2$ $DF=2$ $P=0.017^*$
	INTERVENTION	9	41.2	
	FOLLOW-UP	5	42.7	
TE	BASELINE	14	0	$H=2.57$ $DF=2$ $P=0.27$ NS
	INTERVENTION	6	0	
	FOLLOW-UP	5	0.9	

Figure 3. Daily percentages of time spent in inappropriate behaviour by each individual over the study.



\*G.U. showed a decrease in the percentage of time he spent in "inappropriate behaviour" (eg throwing objects, pestering, being aggressive) at the beginning of the intervention (day 7). This remained especially low following the first seven exercise days. The amount of inappropriate behaviour then increased to a peak at exercise day 10 (day 16). This peak was inconsistent with the remaining levels during intervention. The level of inappropriate behaviour returned to nearer baseline at follow-up, with the largest difference occurring in the days immediately subsequent to the intervention. Effects overall were small.

### S.P.

Figure 3 shows that S.P. spent a high percentage of his time behaving inappropriately. Only two days during baseline showed a percentage of less than 50%. A Kruskal-Wallis test was performed to compare baseline, intervention and follow-up sessions. The results revealed a significant inequality in the levels of inappropriate behaviour (Kruskal-Wallis Inappropriate,  $H=8.2$   $df=2$   $p=0.017$ ; see table 2). This inequality existed primarily between the baseline and exercise periods. There was no significant difference between the level of inappropriate behaviour during the intervention and during follow-up.

The average percentage of time spent in this category was calculated by totalling the percentages for each phase and dividing by the number of datum points. S.P.'s percentage of time in "inappropriate behaviour" decreased from an initial average of 66.5% for the first phase of the study ( $n=10$ ) to 42.2% during intervention ( $n=9$ ). The graph shows a large decrease at day 12. This was the day prior to his exercise programme. Levels of inappropriate behaviour appeared to remain stable at approximately two-thirds baseline level with a slight increase on the final three consecutive days after the close of the intervention.

### T.E.

Figure 3 shows that T.E. did not spend much of his time behaving inappropriately - an average of 1.8% (n=14) over baseline. Statistical analysis revealed no change over the course of the study. (Kruskall-Wallis baseline, intervention, follow-up  $H=2.57$   $df=2$   $p=0.27$ ; table 2) Over the course of the study T.E. was asleep for over 50% of the time on all but three occasions. The intervention phase was shortened for T.E. as the length of study was limited, his overall low level of behaviour became a problem for initiating activity and he showed greater reluctance to participate as the programme continued.

### N.P.

As no intervention procedure was carried out for N.P. the effect of an intervention programme on non-participants in the same ward could be controlled for and compared. A Wilcoxon test was performed to compare behaviour at the beginning of the study with behaviour over the rest of the project. Baseline numbers of observations used were 6, 9 and 12. These represented durations of 6, 12 and 16 days and the initiation of the exercise programme for G.U., S.P. and T.E., respectively. The baseline figures were matched for statistical analysis by taking a systematic sample of every fourth datum point from remaining data until the matching was complete. The results of a Wilcoxon signed ranks test showed probability values of 0.68, 0.4 and 0.51, ( $W=36, 95.5, 162$ ) respectively. These results indicated that there were no significant differences in N.P.'s levels of inappropriate behaviour which could be directly attributable to the instigation of intervention for another individual.

Visual inspection of the graph for N.P. did reveal a large drop in the amount of inappropriate behaviour between days 10 and 19 of the study. During this time there was intervention in progress with two others in the ward. The greatest amount of inappropriate behaviour for N.P. occurred on day 8 and amounted to over 40% of the time. Comparison with the levels of inappropriate behaviour for G.U, S.P and T.E gave no indication that this was related to a general disturbance on that particular day.

### 4.2.3 Appropriate Behaviour

G.U.

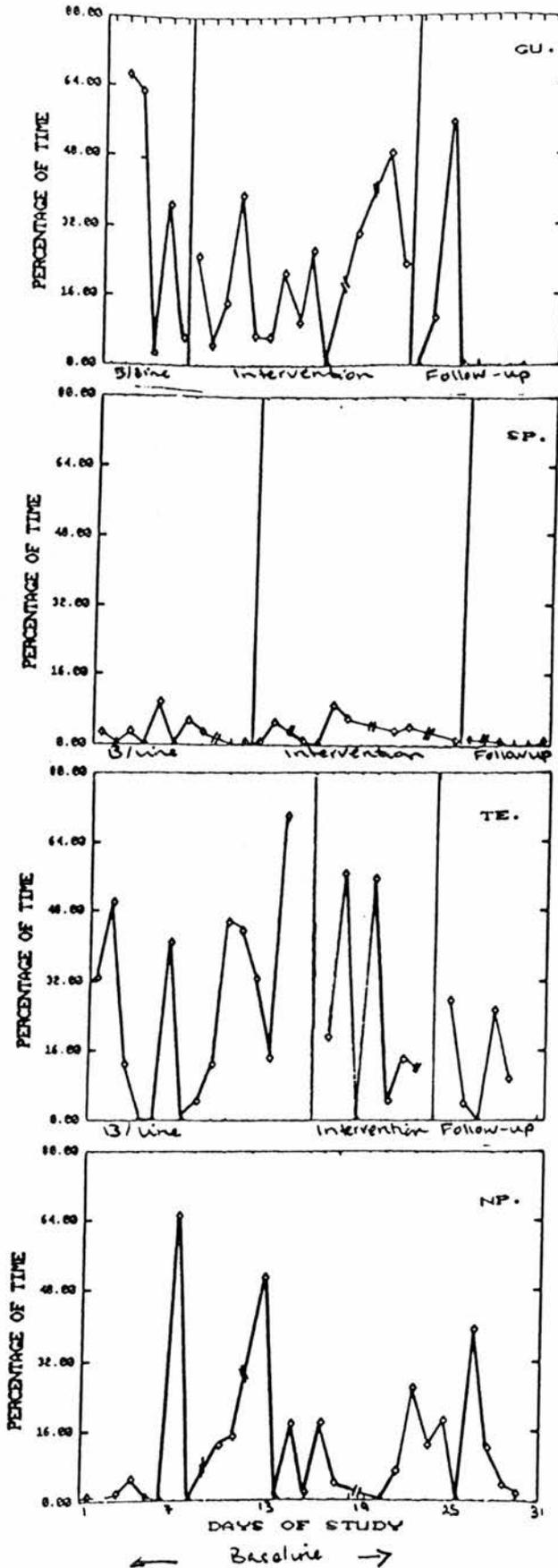
No difference in appropriate behaviour across the study was shown for G.U. ( $H=3.76$   $df=2$   $p=0.152$  NS see table 3). Figure 4 confirmed this finding: the percentage of time G.U. spent in appropriate behaviour fluctuated over the project with no obvious change in any phase. However, G.U displayed no appropriate behaviour on three of the seven days when follow-up observations and no exercise were taking place.

**Table 3.** Median percentages of time spent behaving appropriately during each phase of study for each individual. Kruskal-Wallis probability values indicate the likelihood of obtained differences between medians being due to chance alone.

APPROPRIATE BEHAVIOUR		NO OF OBS	MEDIAN	PROBABILITY
GU	BASELINE	5	36.8	$H=3.76$ $DF=2$ $P=0.152$ NS
	INTERVENTION	12	17.7	
	FOLLOW-UP	7	0.4	
SP	BASELINE	10	2.85	$H=6.43$ $DF=2$ $P=0.041^*$
	INTERVENTION	9	3.3	
	FOLLOW-UP	5	0.2	
TE	BASELINE	14	23.4	$H=1.19$ $DF=2$ $P=0.55$ NS
	INTERVENTION	6	16.5	
	FOLLOW-UP	5	9.4	

Figure 4. Daily percentages of time spent in appropriate behaviour for each individual over the study.

# APPROPRIATE BEHAVIOUR



### S.P.

Statistical analysis revealed a statistically significant difference across the study in the amount of time S.P. spent behaving appropriately. ( $H=6.39$   $df=2$   $p=0.041$  sig at  $p 0.05$ ). This difference was primarily between intervention and follow-up phases of study and can be attributed to the finding that S.P. displayed no appropriate behaviour at all on two of the five follow-up days and less than 2% on the remaining three. As levels of inappropriate behaviour did not show any significant change (see figure 3) it may be suggested that there was a corresponding increase in the amount of time S.P. spent "doing nothing" over this time.

### T.E

T.E showed no change in the percentage of time in appropriate behaviour over the study ( $H=1.19$   $df=2$   $p=0.55$  NS). This is also confirmed by inspection of the figure 4. The level of appropriate behaviour was variable and there was no consistent pattern.

### N.P

Figure 4 shows that the N.P. also varied in the percentage of time he spent in appropriate behaviour. There is a peak on day 7 of the study - this is the day that intervention was started for G.U. There is also a peak on day 13; the day subsequent to the beginning of intervention for S.P. Thereafter, no obvious differences in daily level of appropriate behaviour occurred.

#### 4.2.4 Socially-directed behaviour

The daily percentages of time each subject spent in socially-directed behaviour are displayed in figure 5.

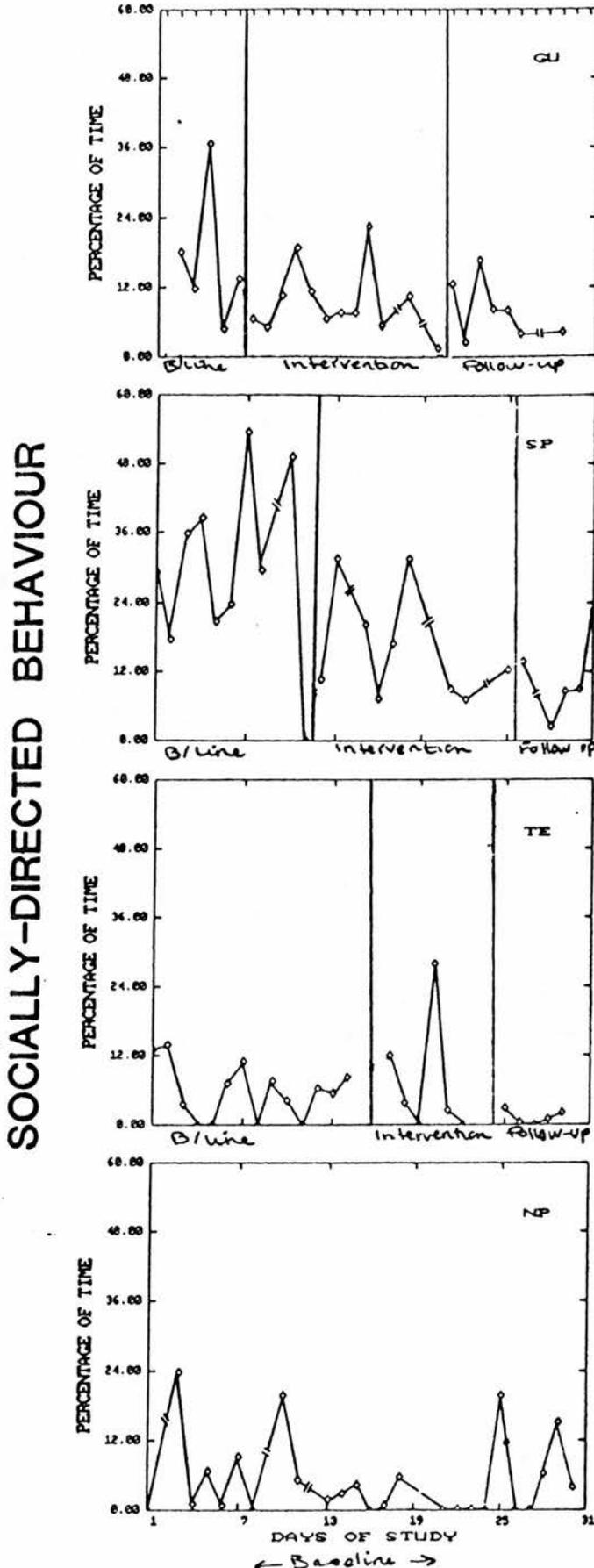
**G.U.**

There was no consistent pattern to the amount of time G.U. spent in socially-directed behaviour. There was a tendency for G.U. to display less socially-directed behaviour over the course of the study and especially during follow-up. Results were statistically insignificant. (Kruskall-Wallis socially-directed behaviour  $H=3$   $DF=2$   $p=0.223$  NS see table 4)

**Table 4.** *Median percentages of time spent in socially-directed behaviour during the three phases of study for each individual. Kruskal-Wallis probability values indicate the likelihood that obtained differences between medians was due to chance alone.*

	N OF OBS		MEDIAN	PROBABILITY
SOCIAL BEHAVIOUR GU	BASELINE	5	13.5	$H=3$ $DF=2$ $P=0.223$ NS
	INTERVENTION	12	7.6	
	FOLLOW-UP	7	8	
SP	BASELINE	10	29.4	$H=7.95$ $DF=2$ $P=0.019^*$
	INTERVENTION	9	10.7	
	FOLLOW-UP	5	9	
TE	BASELINE	14	5.9	$H=2.38$ $DF=2$ $P=0.305$ NS
	INTERVENTION	6	3.15	
	FOLLOW-UP	5	1.1	

Figure 5. Daily percentages of time spent in socially-directed behaviour for each individual over the study.



**S.P.**

A Kruskal-Wallis test for differences in socially-directed behaviour showed a significant difference ( $H=7.95$   $DF=2$   $p=0.019$  sig at  $p$  0.05). Median percentages of time spent in this type of behaviour across the study suggested that the difference was primarily between baseline and intervention (see table 4). The daily figures suggest that S.P. spent significantly less time in socially directed behaviour from the beginning of the project onwards.

**T.E.**

Over the baseline period T.E.'s socially directed behaviour ranged from 0% to just above 12% (see figure 4). In the last five days of study no day reached above 5%. The intervention phase revealed a large fluctuation in percentage levels of social behaviour with a range from 0% (days 20 and 23) to above 27% (day 21). There was no significant difference attributable to the different phases of study (socially-directed  $H=2.38$   $DF=2$   $p=0.305$  NS).

**4.2.5 Staff Attention****G.U.**

There was no significant change in the amount of staff attention G.U. received (Figure 6). G.U. received a high percentage of interaction time with staff in comparison to the other members of the study. On one day over 60% of the time he was observed was spent attended to by one or other staff member. The figure shows that G.U. received less attention both immediately prior to and subsequent to the exercise intervention. There is an especially large drop on the day following cessation of the programme and thereafter levels appear to remain low relative to intervention and initial days of study. Statistical analysis did not yield a significant result ( $H=5.39$   $DF=2$   $p=0.068$ ; table 6).

Table 6. Mean percentage of time staff spent giving attention to each individual over each phase of study. Kruskal-wallis probability values indicate the probability that differences obtained were due to chance alone.

STAFF ATTENTION		N OF OBS	MEDIAN	PROBABILITY
GU	BASELINE	5	5.2	
	INTERVENTION	12	4.85	H=5.39 DF=2
	FOLLOW-UP	7	1.4	P=0.068 NS
SP	BASELINE	10	2.15	
	INTERVENTION	9	4.0	H=3.8 DF=2
	FOLLOW-UP	5	0.0	P=0.15 NS
TE	BASELINE	14	0.0	
	INTERVENTION	6	1.75	H=6.04 DF=2
	FOLLOW-UP	5	0.0	P=0.049*

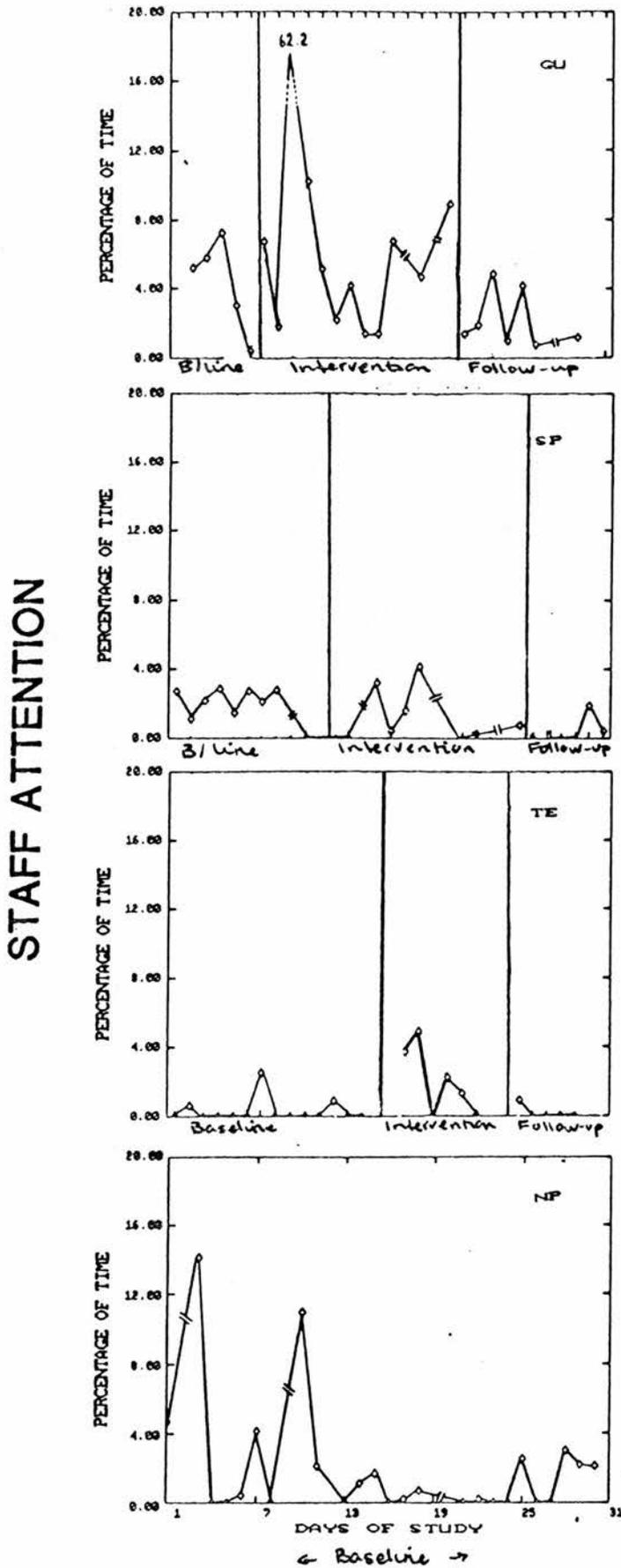
### S.P.

Statistical analysis did not reveal any consistent changes in the percentage of time that S.P. was given staff attention between the onset of observation, onset of his programme and follow up (H=3.8 DF=2 p=0.15 NS Table 6). However, the figure shows that less attention was given in the later stages of the exercise and that this continued through the follow-up phase. S.P. received little attention on the days surrounding both the beginning and end of intervention. S.P. received less than 5% attention from staff on all days in the project.

### T.E.

T.E. was given no attention by staff on 17 of the 25 periods in which he was observed. The level of staff attention did not exceed 5% at any stage. Four of the days when attention was given occurred during the intervention. The difference between conditions was found to be significant (H=6.04 DF=2 P=0.049 adjusted for ties; Table 6).

Figure 6. Daily percentages of time each resident was given attention by staff over the course of study.



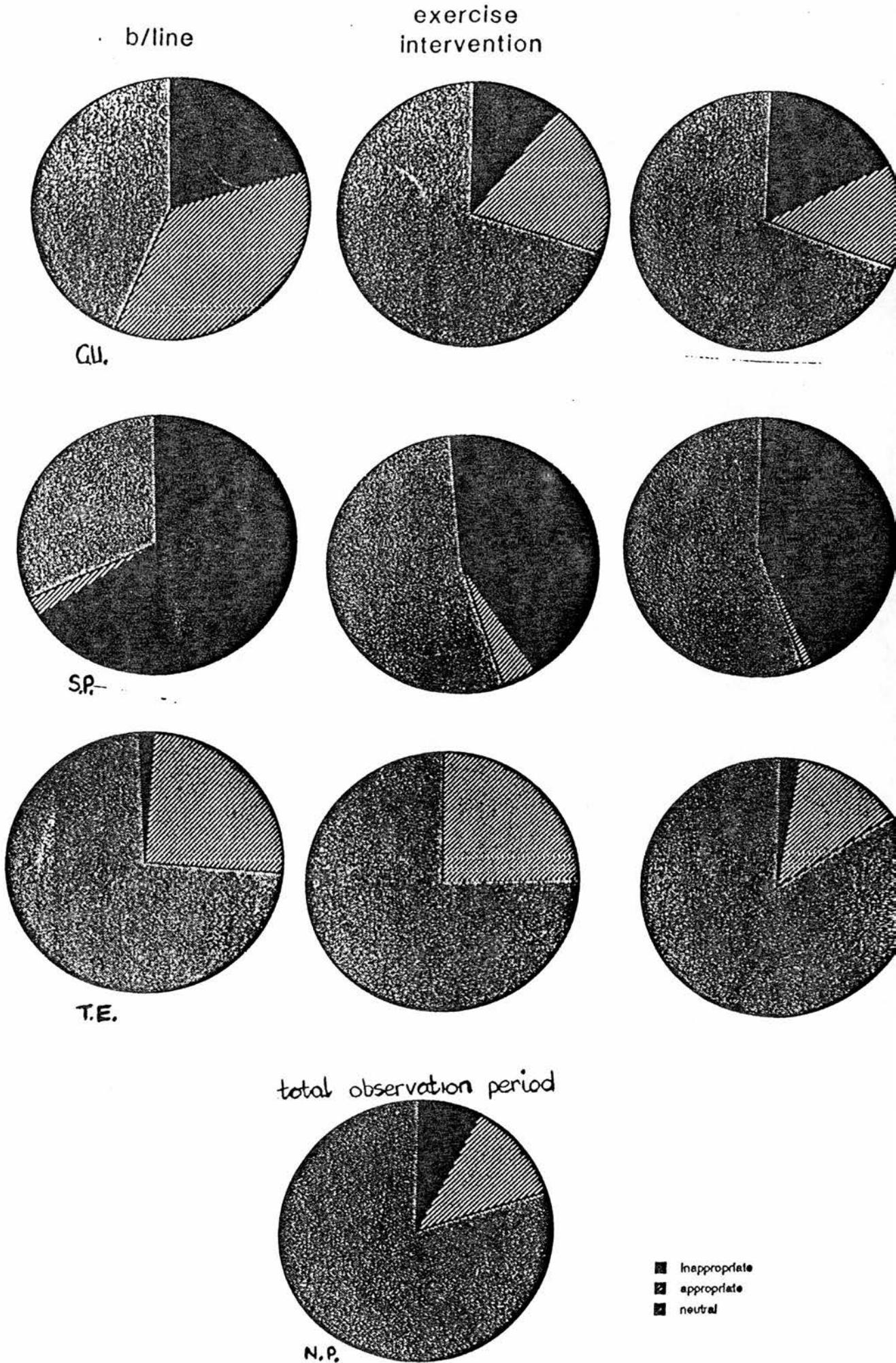
**N.P.**

N.P. received most attention in the first 11 days of study. The maximum percentage reached was 14.1% (day 3), with 11% observed on day 10. Thereafter N.P. did not receive attention for more than 3% of his observed time. This lack of attention overlapped to a large extent with the intervention period. The average value obtained over the course of study was 1.96%.

**4.3 DISTRIBUTION OF TIME**

The relative percentage of time each individual spent in appropriate, inappropriate and neutral behaviour over the study was calculated by totalling the percentages for each period and dividing by the relevant number of observations. The resultant charts are shown in Figure 7. The differences between individuals were easily seen. S.P. spent the largest average percentage (66%) of his time behaving inappropriately during baseline, with relatively little time (3%) behaving in an appropriate manner. T.E., in contrast displayed only 2% inappropriate behaviour. Most of his time was taken up "doing nothing". Notes taken during the study revealed that this corresponded most often to his being asleep on a sofa at the back of the ward. G.U. apportioned his time most evenly, with approximately equal average percentages of time in appropriate and neutral behaviour (Fig 7).

Figure 7. Average proportion of time spent in Inappropriate, Appropriate and Neutral Behaviour for each individual over the course of the study.



Even so, on average, 22% of the time G.U. was behaving inappropriately.

During the intervention phase all individuals showed on average less inappropriate behaviour and all showed an increase from this at follow-up. The reduction appeared most evident in S.P., with a drop from 66.5% to 42.2%. There was no real increase in the amount of appropriate behaviour to take its place at this time. (see figure 4 and section 4.1.3 above). G.U. showed a reduction in inappropriate behaviour, but again a corresponding increase in "neutral" rather than "appropriate" behaviour. T.E. showed less inappropriate behaviour. It is difficult to say by what this was replaced due to the large amount of time T.E. spent asleep.

Follow-up data were compared to both baseline and intervention. For G.U. there was an increase in inappropriate behaviour to near baseline level. The average amount of appropriate behaviour over follow-up was **slightly less** than baseline and similar to the amount shown during the exercise project (13% post-intervention; 19% during intervention). S.P. showed little change between the active and follow-up phases of the project. T.E. showed less appropriate behaviour than at any other time and more time spent "doing nothing".

N.P. spent 74.7% of time in neutral behaviour, 12.8% behaving appropriately and 12.5% behaving inappropriately.

#### 4.4 SEQUENTIAL ANALYSIS

The aim of generating sequential data was to answer the following questions:

- 1) Did staff attention reliably occur following any particular types of resident behaviour?
- 2) Was there any difference at any stage during the project or at follow-up in any transitional relationship(s) found?

The ELAG programme is a computer programme designed to analyse sequential data (Bakeman 1983). The programme generates frequencies, transitional probabilities and z-scores for the occurrence of specified pairs of behavioural codes; a given code (Giv) and a target code (Tg). These codes may be together in a sequence (lag 0 - lag 1; lag 0 - lag - 1)) or separated by any number of intermediate codes (eg lag 0 - lag 3; target code is three codes further on in the sequence). A lag with a plus (+) indicates that the target behaviour is further on in time from the given behaviour. A lag with a minus sign (-) indicates that Tg precedes Giv. The programme can accommodate data where adjacent codes are identical. For this analysis it was specified that no code could be followed by itself and thus the diagonals of the contingency tables produced are zeros. Elag works on a chi-square model, with the calculated expected frequencies taking into consideration the number of times that both the given behaviour (lag 0) and target behaviour occur. It is not necessary, therefore, that each behaviour occurs with equal frequency. Codes must be mutually exclusive and exhaustive. As the significance of results is less reliable when expected frequencies are low, the programme allows for combining of categories and recoding.

For analysis "Staff attention" was taken as the given event, with the preceding behavioural events as the target behaviours of interest. This was a lag sequential analysis with transitions from lag 0 - lag -1 (the preceding code). Staff attention could have occurred following any one of inappropriate, appropriate or neutral behaviours with equal frequency. Equally staff attention could have followed either socially-directed or non-socially directed behaviour and either the resident being mobile (standing/walking) or

not (sitting/lying). Analysis determined whether attention occurred regardless of resident behaviour or whether resident behaviour was an influential factor.

The results of the sequential analysis are displayed in figures 7 - 10. The full data set generated by ELAG is given in appendix 5.

1) The numbers in the arrow-boxes represent the percentage of possible times that staff attention was preceded by this behaviour.

2) The size of arrow-head corresponds to the frequency of transitions expressed as a percentage of the number of times that the category (eg "Inappropriate Behaviour") occurred.

3) The numbers in brackets and the number in the "Staff Attention" box refer to the total number of occurrences of that behavioural category.

4) Transitions which occur significantly more often than would be expected by chance are marked with an asterisk (\*). Where the transition is significantly LESS often than would be expected it is marked with a double asterisk (\*\*).

It can be understood that categories of "Appropriate", "Inappropriate" and "Neutral" are mutually exclusive and exhaustive (see section 3.4.3) and therefore totals in the arrow boxes add to 100%. Similarly, for "Socially-directed" and "Non-socially-directed" and for "Standing/walking" versus "Sitting/lying".

Figure 8. G.U. Percentage of time staff attention was preceded by each type of resident behaviour over the study.

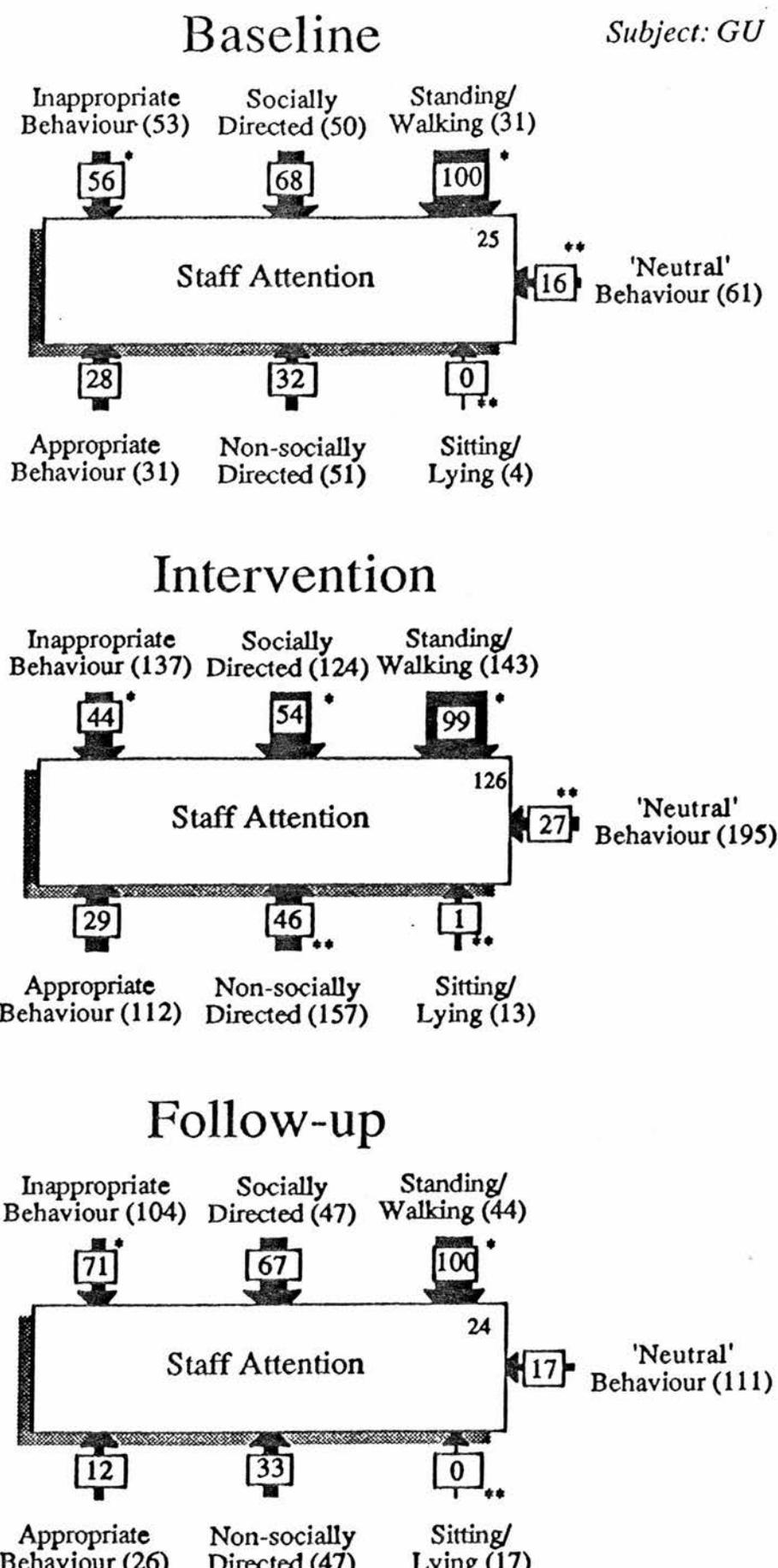


Figure 9. S.P. Percentage of time staff attention was preceded by each type of resident behaviour over the study.

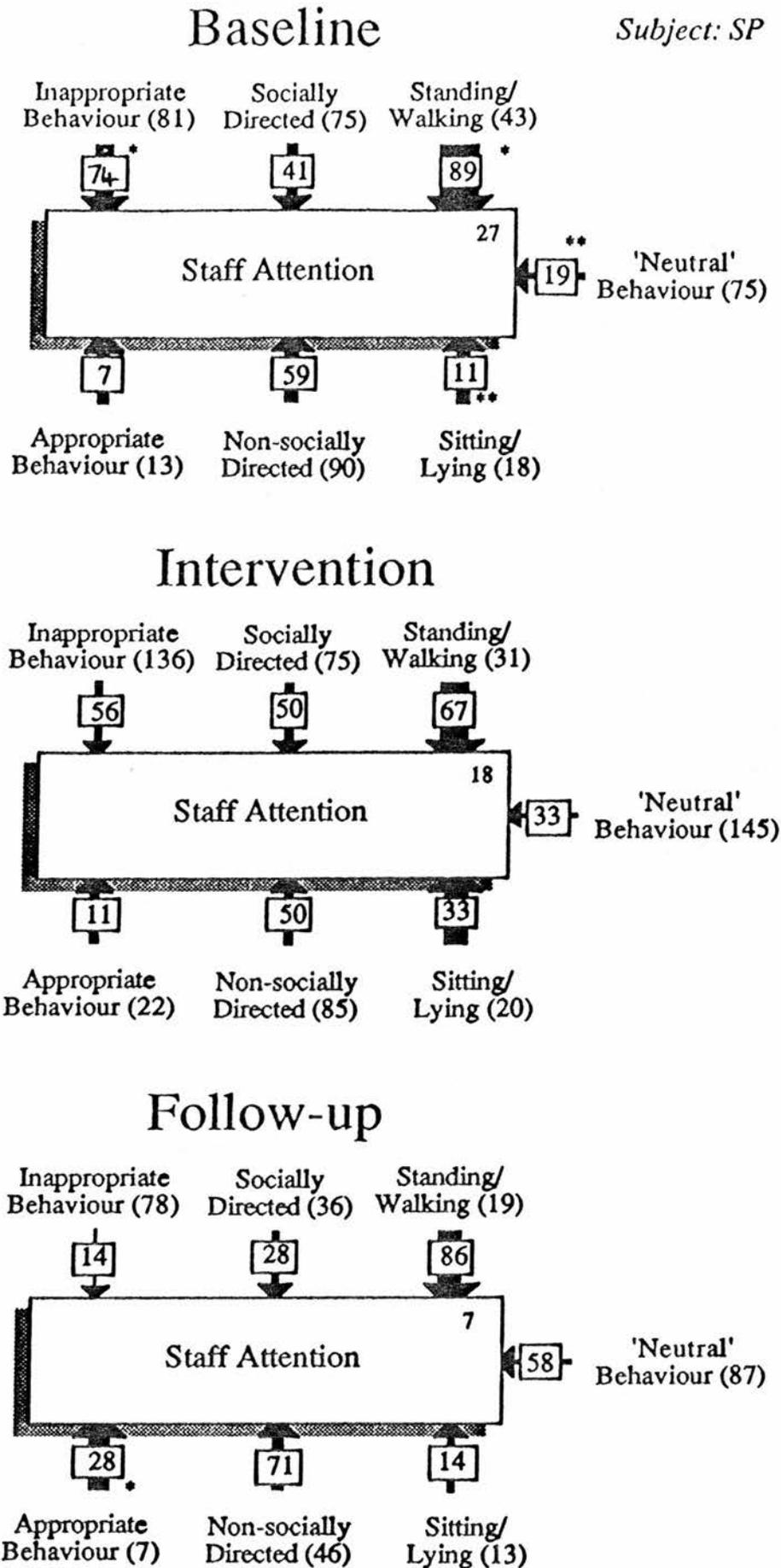


Figure 10. T.E. Percentage of time staff attention was preceded by each type of resident behaviour over the study.

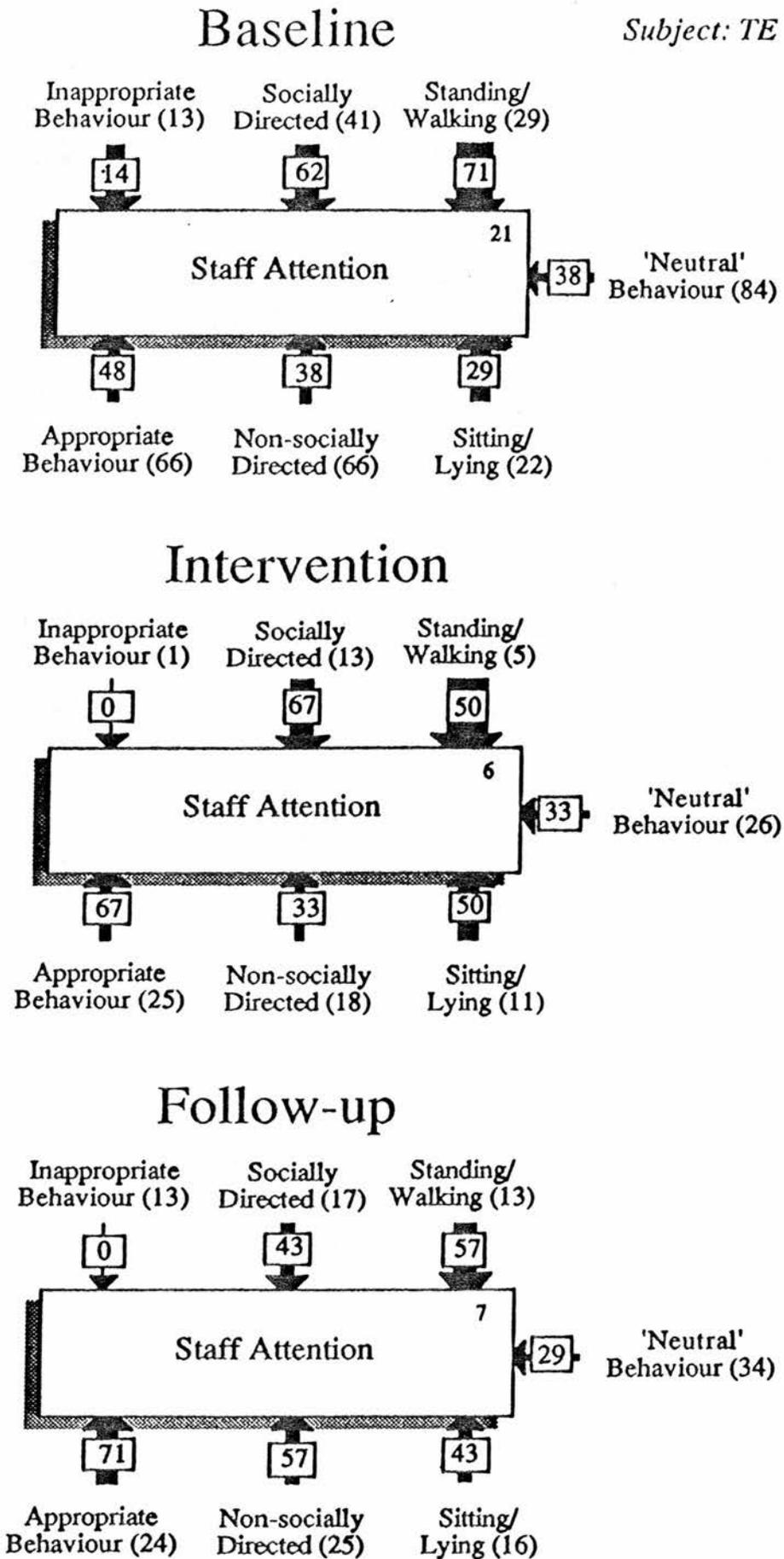
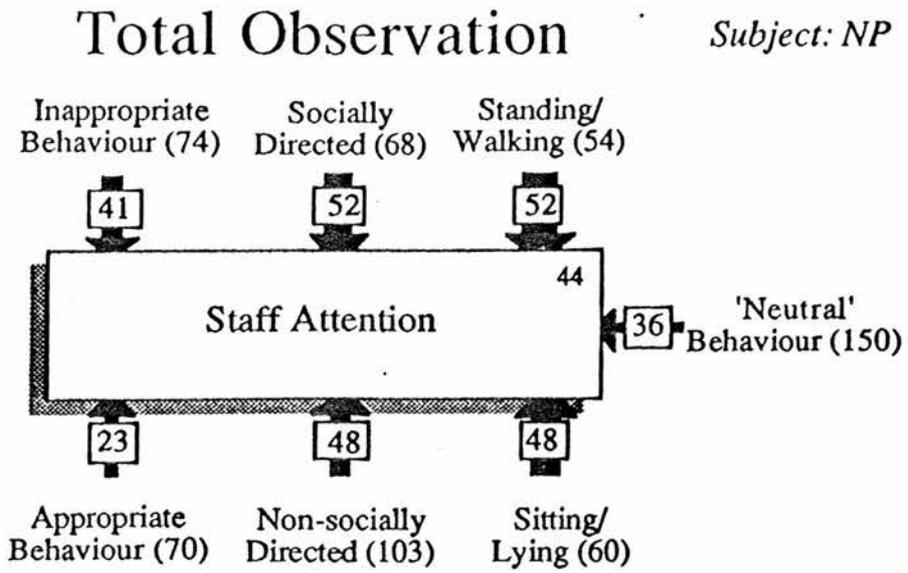


Figure 11. N.P. Percentage of time staff attention was preceded by each type of resident behaviour over the total observation period.



It should be noted that each phase sometimes represented a different number of observation days and the frequencies of staff attention as displayed are not directly comparable across conditions. For this purpose the average daily frequencies (see below) can be used.

#### 4.4.1 Attention - Summary

Staff attended to G.U. a total of 25 times (an average of 5 times per observation session) at baseline, 126 times during the exercise project (average = 10) and 24 times (average = 3) at follow-up. S.P. was given attention 27 times (an average of 3 per observation session) during baseline, 18 times (average = 2) during intervention and seven times (average of once only per session) at follow-up. Attention was given to T.E. approximately once per observation session for each phase of study (total of 34 times over the study). N.P. (fig 11) was given attention on 44 occasions during the entire observation period.

#### 4.4.2 Appropriate, Inappropriate and Neutral Behaviour

Figures 8 and 8 show that at baseline for G.U. and S.P. staff attention was preceded by inappropriate behaviour significantly more often than would be expected by chance, taking into account the number of times that both behaviours occurred. For G.U. this pattern did not change over the project. For S.P. (fig 9) the relation between staff attention and inappropriate behaviour was significant ( $z=2.47$   $p$  0.05) at baseline but not during intervention. Staff attended to neutral behaviour most frequently at follow-up, although this was not statistically significant ( $z=0.38$   $p$  0.05 NS). T.E. (fig 10) was attended to most often when he displayed appropriate behaviour. There was no consistent pattern of staff attention to N.P. (fig 11). Caution must be taken in interpretation of these results as the number of incidents of staff attention given to both S.P. and T.E. overall was low (see figs 9 and 10).

#### 4.4.3 Socially-directed or non-socially directed behaviour

There was a tendency for attention to G.U. to follow his socially-directed behaviour more often than would be expected by chance alone. This was significant during intervention ( $z=1.98$   $p < 0.05$ ). For S.P. T.E and N.P there was no unequal distribution of attention according to whether behaviour was socially-directed or non-socially directed and this did not change at any time in the study.

#### 4.4.4 Standing/walking or sitting/lying

Staff attention was significantly related to resident mobility at all phases of the project for G.U. ( $z=1.96$   $z=2.7$ ,  $z=3.1$ , respectively) and at baseline for S.P. ( $z=2.27$   $p < 0.05$ ). The distribution of attention to S.P. continued to bias towards the times he was standing/walking, but levels were insufficient to reach significance. Attention to T.E. or N.P. was not significantly related to whether he was sitting or standing ( $z=1.27$ ,  $z=0.5$  and  $z=0.38$ ;  $p > 0.05$  NS at baseline, intervention and follow-up, respectively).

### 4.5 SLEEPING PATTERNS

There was no change in the usual sleeping patterns for each resident that could be detected. All residents were in bed by 10.00 pm each day and were asleep within 2 hours. G.U. usually slept through each night as did NP. T.E. and S.P. had occasional disturbed nights, usually for toilet purposes. All residents were usually still asleep when someone went to get them up in the morning and were up by 7 am. A sample of the data are given in appendix 6.

#### 4.6 BLOOD PRESSURE

There were no problems with high blood pressure either before or after the project for any individual and no differences that could be attributable to anything other than natural variability.

Blood pressures were as follows:

G.U.	Before study	systolic	- 98 mm/hg
		diastolic	- 78 mm/hg
	After study		- 90 mm/hg
			- 74 mm/hg
S.P.	Before study	systolic	- 112 mm/hg
			- 67 mm/hg
	After study		- 120 mm/hg
			- 75 mm/hg
T.E.	Before study	systolic	- 120 mm/hg
			- 74 mm/hg
	After study		- 107 mm/hg
			- 58 mm/hg
N.P.	Before study	systolic	- 98 mm/hg
			- 64 mm/hg
	After study		- 99 mm/hg
			- 70 mm/hg

#### 4.7 EPILEPSY

T.E. suffered four tonic clonic seizures over the period of study. These were on 11, 15, 26 July and 1 August 1989. N.P suffered three seizures. These occurred on 12 July, 1 August and 16 August 1989. This frequency of occurrence of seizure was consistent with each subject's normal pattern of behaviour.

#### 4.8 SUMMARY OF RESULTS

The main results found were:

- 1 There was a reduction in inappropriate behaviour from baseline to intervention for all individuals when comparing average rates at each phase of study. When daily rates were compared, the reductions in inappropriate behaviour were statistically significant for one subject (S.P). This reduction was maintained at follow-up. Overall effects were small.
- 2 S.P. showed a significant DECREASE from baseline in the amount of time he spent in socially-directed behaviour. No significant changes in socially-directed behaviour occurred for any other subject.
- 3 No individual showed a statistically significant increase in appropriate behaviour over the course of study. S.P displayed significantly LESS appropriate behaviour during the follow-up phase.
- 4 The exercise programme did not alter the amount of time any resident spent mobile.
- 5 Attention by staff was not independent of resident behaviour. Mobility (standing/walking) and amount of inappropriate behaviour displayed were the most common predictors of staff attention. A person was least likely to get attention if he was "doing nothing". During intervention, staff attention followed socially-directed behaviour by G.U significantly more often than if his behaviour was non-socially directed. Overall levels of staff attention to both S.P and T.E were extremely low.
- 6) The programme seemed to have a positive effect on the amount of attention given by staff to T.E

CHAPTER 5  
**DISCUSSION**

5.1 Subject Behaviours

5.2 Social Interaction

5.3 The Exercise

5.4 Behavioural Categories

5.5 Observer Reliability and Accuracy

5.6 Mediating Variables

5.7 Quality of Life

## 5.1 SUBJECT BEHAVIOURS

The results showed individual differences in response and yet similarities across subjects for a reduction in "inappropriate behaviour". The size of effect in the present study was smaller than reported by Jansma and Combs (1987) who found a clear reduction in maladaptive behaviour between baseline and intervention for all 5 of their subjects. That study revealed a mean percentage reduction of 56.2%.

The results of the present research are also less clear cut than the 32.7% mean reduction in inappropriate behaviour given by Watters and Watters (1980). However, both of these studies grouped data together to achieve their results: given that individual differences occur in both initial levels and types of inappropriate behaviours it is debateable as to what extent such grouped results over subjects is meaningful. No graphic data was supplied by Watters and Watters (1980). This study averaged data across baseline, intervention and follow-up; decreases in inappropriate behaviour were demonstrated for each individual. It was felt that it was not appropriate to group data over three very different individuals. It is argued that visual presentation of the data obtained is essential for a full understanding of what results were achieved.

The types of inappropriate behaviour for S.P were most frequently self-stimulatory and stereotyped acts. These are the types of

behaviour which have been shown to be most influenced by exercise or increased stimulation (Baumeister and Maclean, 1984; Berkson and Mason, 1964; Kern et al, 1984). This may partly explain why S.P showed the largest decrease in inappropriate behaviour. However, the reduction was maintained at follow-up when no exercise was taking place. This indicates that either the exercise was not the only influential factor present during the study or that changes were resilient against reversal. The first indication of a decrease in inappropriate behaviour occurred on the day *preceding* the beginning of his intervention. The reason why this should have occurred is unknown. There was no similar decrease in levels of inappropriate behaviour on that day for the remaining subjects.

It is also possible that factors such as personal attention and observer presence were contributory factors. It would be interesting to find out whether levels of inappropriate behaviour increased once the observer was no longer in the ward at all. More unobtrusive measures, undertaken by regular members of the ward setting, might enable this to be investigated further.

McGimsey and Favell (1988) showed improvements in "hyperactive" and "agressive" behaviours following daily exercise for 8 out of 10 institutionalised mentally retarded individuals. Ratings were used rather than direct observation but the type of multiple baseline design, length of study (35 days) and exercise

("do whatever they wished provided that they continued to move at a pace faster than a jog") were comparable.

The fact that ratings were undertaken by people who were cognisant of the experimental procedure inevitable introduces the possibility of bias in McGimsey and Favell's data. However, in this study too, it would have been difficult to ensure that ward staff did not know what was going on and it is perhaps important that they *should* know and be involved. McGimsey and Favell report a gradual, but consistent decrease in disruptive behaviours over their study. The observational criteria used in the present study were likely to accentuate daily fluctuation as they represented intense observations of individual behaviour over a shorter time period.

The finding that decreases in inappropriate behaviour in this study were not dramatic and consistent is also similar to that shown by Baumeister and McLean (1984). In their study, increasing amounts of exercise produced more steady decreases in occurrences of maladaptive behaviour. Exercise progressed from 1 mile to 2 miles and then to 3 miles in the final phase. The least exercise (1 mile) resulted in slight and variable change; only when the exercise was increased to 3 miles did individuals show consistent improvement.

The hospital study here was undertaken over a six-week time-period with individuals whose starting levels of exercise were low. Thus, motivational factors had to be overcome before any

"exercise" took place. It could be argued that the first few data points represented a larger proportion of time spent prompting and encouraging participation than exercise as defined by Lees and Dygdon (1988 see section 1.3.1). A longer intervention would reveal more clear results concerning the effects of exercise per se and more intensity-related effects.

Kern et al (1982) documented improvements in appropriate behaviour during their study. The present study revealed no unequivocal changes in appropriate behaviour during the intervention phase of the study. Any reduction in the amount of inappropriate behaviours observed was replaced by more neutral behaviour - or more time "doing nothing".

This is a clinically significant finding and perhaps one which is not surprising. It may have been related to the institutional setting where the research took place. There were, for example, few opportunities at the hospital for residents to engage in many form of appropriate behaviours. There were no pieces of equipment, functional activities or engagement provided in the ward except for the television or radio. When severely handicapped individuals are left to self-occupation for four hours and have no facilities available it is little wonder that they sit and do nothing.

However, it is important to try to increase aspects of behaviour which may be beneficial to the individual or may be modified to

become so. Benefits may be in terms of more interaction with staff or other residents and these may be accomplished through the exercise participation itself (Bachman and Sluyter 1988; Pasch, 1977) at the time of exercise. At other times it may involve more on-task behaviour or simply more engagement. The results confirmed therefore that, when post-exercise or longer-term behavioural change is of interest, some additional input is required for positive behaviours to be encouraged and maintained.

There was no change in standing/walking (mobility) for any subject. This is in contrast to Baumeister and MacLean (1984) who reported increases in pacing activity and a slight reduction in "sitting" (p388) for subjects over the treatment phase of their study. It is also not consistent with the idea that lower levels of exercise might *increase* tension and agitation, as put forward by Dodson and Mullens (1969) with respect to psychiatric patients. The lack of a result here may have related to the intensity of exercise achieved. It suggests that 'fatigue' was not a predominant mediator of behavioural change in this study.

## 5.2 SOCIAL INTERACTION

The data did not find any positive changes in social interaction by looking at resident behaviours only. Indeed, the only finding was a negative one, in that S.P reduced his level of socially-directed behaviour. The objective data therefore cannot support the suggestions in the literature (eg Crain et al, 1981; McEwen, 1983) that participation in exercise increases social behaviours; at least

not in the immediate period following exercise. Changes in social behaviours **during** the exercise itself were not assessed. However, assessing social behaviour is a more complicated task than observing resident socially-directed behaviour only. It is suggested that the data assessing staff-resident interaction provide a more meaningful account of the social interaction patterns during the study.

Subjects received less attention overall towards the end of the study. This may have been related to a decrease in inappropriate behaviour. However, amount of time spent in inappropriate behaviour returned to nearer baseline levels at follow-up for all individuals. Staff behaviours may have been modified by the presence of an observer, although attempts were made to be as unobtrusive as possible. The observer visited the ward on several occasions before the study and spent a week using the computer to observe there. However, the staff may have been conscious of a newcomer in the ward in the early stages, especially if they thought that they were being observed themselves. By the end of six weeks they were more likely to relapse to a more realistic pattern of interaction and behaviour for the situation. A programme effect is supported by the finding that levels of staff attention to T.E were greater during the study and almost non-existent both before and afterwards.

It was disturbing to find so few occurrences of staff interaction, for it confirmed common opinion that institutional life is not very rewarding in terms of social interaction experiences. However, it

did emphasise where training needs can be directed to most benefit. It is reiterated that staffing levels at the time of study were very low, both in terms of the usual number of staff on duty and ideal levels. Observation on staff availability (ie the number of staff available for interaction at any given time in the ward) is important when assessing resident-staff interactions and resident social behaviour.

It was found that resident behaviour preceding staff attention was not randomly distributed; the resident was more likely to get attention if he displayed inappropriate behaviour and significantly less often if he was "doing nothing". The study also showed that resident mobility was a predictor of staff-resident interaction and so confirmed findings by Duker et al (1989) who found that individuals with high levels of mobility were more effective in increasing the amount of interaction that they had with staff.

Staff attention was also not randomly distributed amongst residents, with G.U receiving more than half of the total amount of attention given to the four individuals on any day. G.U was one of the most active and mobile subjects in the study and so this is consistent with the above findings. Much of his behaviour was socially-directed and at intervention this was found to be a predictor of staff attention. S.P was also very active, but displayed much less verbal socially-directed behaviour. Studies could undertake a more fine-grained analysis of types of "socially-directed", "standing/walking", "inappropriate behaviour" or "staff

attention" behaviours. It may be, for example, that staff pay attention to inappropriate behaviours that influence others rather than those which are self-focussed. Equally, staff attention may not depend upon mobility only, but mobile behaviour that is inappropriate.

There was no change in mobility level over the course of study. If the staff attention data above are taken as valid, this suggests that a person was likely to get LESS attention of any kind if inappropriate behaviour decreased. S.P received very little attention in the follow-up phase of study. His decrease in inappropriate behaviour was maintained but he displayed very little appropriate behaviour and more time "doing nothing". It could therefore be argued that an exercise intervention which had this effect was not improving S.P's quality of life a great deal. When he was behaving inappropriately he was gaining attention, which was removed when his inappropriate behaviour decreased. This demonstrates again the importance of positive follow-up techniques and encouragement by staff for alternative behaviours.

### **5.3 THE EXERCISE**

This study found, along with others of its kind (see section 1.4.2) that it was difficult to provide all subjects with the same intensity of "exercise". In this study the subjects concerned had behavioural problems which included aggressive and violent outbursts. There were also ethical considerations to consider: it was essential not to force an individual to participate at any stage if he did not want to.

This meant that the exercise had to be flexible and tailored to the individual's capabilities/motivation level on each particular day. The person taking the exercise session had to use judgement as to when to encourage and when prompting could be aversive.

For example, the exercise was most vigorous and imaginative for G.U - there was more of a behavioural repertoire to work with and G.U was an active individual. For S.P, his stooping and rocking gait was seized upon at an appropriate time to initiate jogging movements. For both these individuals, there was progress over the sessions. For T.E, exercise usually comprised a long walk around the hospital grounds and was steady rather than vigorous. It was difficult to initiate activity with T.E and he would not come out on several occasions.

An example of a "typical" exercise session for G.U is given in appendix 6. It is suggested that future research also keeps daily notes on exercise sessions. The keeping of such "field notes" has been standard practice amongst ethologists for many years (Martin and Bateson, 1986). Indeed, most ethologists would not consider implementing a behavioural research project *without* taking a notebook. Although notes will be subjective they contribute to an understanding of what factors an individual responds to and enable easier identification of important or recurring features of behaviour.

Exercise did not affect the frequency of occurrence of epileptic fits, nor did it significantly alter sleeping patterns or blood pressure. This may again be due to the length of study and intensity of exercise. It was unlikely that the exercise level obtained was improving "fitness" (see chapter 1, section 1.3) in a measureable form. However, exercise brought about no detrimental effects in any subject and this is an important finding. It is suggested again that the use of exercise in both psychiatric and mentally handicapped populations is likely to be an adjunct to any other intervention package. Exercise is a non-invasive procedure which may have positive health benefits to individuals and can be identified with by staff. This alone makes it worth attempting.

#### **5.4 BEHAVIOURAL CATEGORIES**

The categories of "appropriate" and "inappropriate" behaviour were chosen on the value-judgment basis given by Cullen et al (1983). That is, categorisation of "appropriateness" and similarly "inappropriateness" involved judgement as to whether the behaviour was appropriate for a particular person of the same age in the culture outside the institutional setting. "Neutral" behaviour was a category which consisted largely of inactivity. There were very few facilities on the ward itself and it may be argued that doing nothing was appropriate for the situation. However, it was not considered that remaining inactive and/or unalert for long periods was a culturally valued behaviour, nor would it help a person to acquire any new skills or experiences. The data for T.E., who was inactive for most of his time, for example, do not suggest that he had a particularly rewarding lifestyle.

The line between what is appropriate and what is not is therefore a difficult one and although the guidelines are given above, judgements are not always easily made. The types of behaviours for each category are illustrated in the appendix (appendix 2). It was felt that categorisation in this way would be more relevant to finding solutions to the problems posed by inappropriate behaviour; that is, if interventions are designed to improve the quality of life for the resident, then behaviour should be classified according to behaviours which can help his acceptability to society, his positive interactive experiences or his ability to function in a valued way.

It was also noticed during discussions on the ward that staff perceptions of what was appropriate and what was inappropriate were different from that of the observer. It is suggested that this is an obstacle presented by the length of time most of the ward staff had worked in the setting and the types of behaviours they were prepared to accept and indeed *expected*. It is important when undertaking research of this kind that the observer remains aware of what is culturally accepted and not what is acceptable to those who work in the institution itself.

##### **5.5. OBSERVER RELIABILITY AND ACCURACY**

It is acknowledged that reports of inter-observer reliability measures were lacking in this study. This obviously detracts from

the quality of the research. Attempts were made to obtain reliability on several occasions during the study. However, the decision tree method of categorisation was complex and required training in order for the reliability observer to familiarise himself with the procedures. The originally intended reliability checker was absent from the hospital due to unforeseeable circumstances at two of the times measurements were needed. A second observer was introduced to help out, but had great difficulty with undertaking the observation without sufficient practice.

It is necessary that observers have ample time to get to know the behavioural categories and how they relate to the individuals concerned. This should involve specific training, with reliability criteria being established between observers beforehand by real observation or by video and with plenty of discussion. It is also important to know the individuals, their behaviours and the characteristics of the setting before observation takes place. It would have been essential therefore, for the second observer to have access to this familiarity if reliability figures are to be accurate. It would be better to have no figures at all than to present figures which were knowingly inaccurate.

Calculation of observer drift was undertaken to determine the intra-observer reliability and accuracy of the study (Suen, 1987). These figures were well within the limits of acceptability for research, with kappa values greater than 0.6 between each repeated measure. Experimenter bias, if present, was at least

consistent throughout the study and behaviours were categorised in a consistent fashion. Therefore, the absolute changes in behaviour were real ones. What cannot be determined is the extent to which other observers would have obtained similar results using the same categorisation.

## 5.6 MEDIATING VARIABLES

The problem of what variables may mediate the relationship between exercise and maladaptive behaviours has not been addressed so far in the thesis. This sub-section of discussion explores a possible framework for understanding. It does not, however, claim to give any definitive answers.

There seems to be a link between exercise and a reduction in a number of maladaptive\* behaviours. However, the number of factors which influence any behavioural decision is large. The exercise - behaviour relationship is unlikely to be a direct one. That is, whether behaviour change actually occurs will be due to the cumulative contribution of a number of mediating influences.

An idea of the relationship may be conceptualised by taking parallels from the established exercise - cardiovascular disease

---

\*"maladaptive" behaviour here encompasses any behaviour which does not appear to have any adaptive significance for the individual and/or mitigates against positive learning experiences for the individual and/or is disruptive to others in the environment.

relationship. Here the links are mainly unambiguous and each step can be demonstrated. Each factor, such as being overweight, hypertensive, "stressed", or smoking etc has a well researched link which increases the likelihood of a heart attack. The more of these which apply to a particular person, the more they are at risk of heart disease. The number which are active at any particular moment when a particularly stressful "trigger" occurs increases the probability of an attack at that time.

The above gives a good framework within which to understand the possible processes in the exercise-maladaptive behaviour relationship. From the research and exercise physiology evidence, exercise has a positive beneficial effect on sleep behaviour (Tomporowski and Ellis, 1984), tension (deVries, 1968), negative affect, (eg Doyne and et al, 1983; Morgan 1985) physiological arousal (Long, 1988), the occurrence of epileptic fits (Neill and Alvarez, 1988) and possibly on self-image enhancement (Ohwaki, 1976) as well as physical appearance. If a person is tired, feeling low or tense, under or overstimulated he is more likely to engage in maladaptive behaviour. Thus the number of these occurring when a person is in a setting where such behaviour is potentiated or where the factors are exacerbated, then again the chance of maladaptive behaviour increases. The extent to which physical exercise can ameliorate any of these, will contribute to its overall effect. From this point of view, for each individual the effect of exercise on maladaptive behaviour will depend on the degree of match between the precipitating variables and the ability of exercise to redress the imbalance. Individual interpretations as to

the importance of each variable therefore can be major determinants of the final result.

For behavioural effects in institutions the extraneous factors surrounding "exercise" may be particularly relevant. That is, the social contact; enjoyment; integration; group/lone type of exercise; structure/lack of structure; etc may be mediators between the actual exercise and behavioural or mood changes. These central features should be placed in any conceptual or theoretical framework as they have important implications for the success of any implemented programmes.

## 5.7 QUALITY OF LIFE

"Quality of Life" has been mentioned on several occasions. "Quality of life" can be easily understood as a general concept. The term is now being more systematically evaluated and researchers are trying to devise more specific criteria to make easier the task of identifying positive change. It is generally accepted that quality of life may be assessed in terms of an individual's *social and physical* environment and through his *personal wellbeing* (Emerson, 1985). Engel and Bergsma (1988) suggest that there are four levels; *macro* (societal), *meso* (social), *personal* and *physical*. Schalock et al (1989) refer to *social indicators*, *psychological indicators* and *goodness of fit*. All these interpretations cover the same basic dimensions; personal satisfaction/well-being, health, quality of social interactions/friendships, recreation, living environment and

*how well the individual fits with his environment.* This last element is important, for it recognises the need for assessors of quality of life to assess person and environment together. Schalock et al also derive a Quality of Life Index comprising ratings on factors of environmental control, community involvement and social relations. The criteria most relevant to research and therefore to this thesis were put together by Whitaker (1989). Whitaker states four variables used to quantify this qualitative concept. These are:

i) improvement in personal skill/ability ii) increase in adaptive (appropriate) behaviour iii) wider range of activities iv) more societal contact (for a person who may never have the opportunity to go outside their institutional setting, I have interpreted this to be equivalent to increased staff-resident interaction) v) decreases in negative or inappropriate behaviours.

The practical study provides information on variables ii), iv) and v). Assessment and measurement of "quality of life" is inevitably difficult. However, intervention in mental handicap should be concerned with improving the lives of people who cannot do so for themselves. Research which attempts to gain standard measures on the above-mentioned variables should therefore be made; to guide training needs, social policies and behavioural intervention procedures.

## CHAPTER 6

### CONCLUSION

The results of this study have implications for practical intervention strategies which seek to use exercise to reduce maladaptive behaviour in institutional settings.

The average amounts of time each resident spent in inappropriate behaviour decreased in the ten minute focal period following exercise, but was replaced by more time spent "doing nothing" rather than appropriate behaviour. It is suggested that staff need to be trained to concentrate on the occurrence of appropriate behaviour and to interact positively when a resident is unoccupied. The data did not support the increases in resident social behaviour suggested by the literature. They suggest that to increase social interaction, at least in institutional settings, is a more complex task involving both resident behaviours and staff reactions.

It is likely therefore that "exercise therapy" will be a complete package of elements and "success" not always assured. It is suggested that exercise be used as additional input, rather than a panacea which will quickly improve the quality of life for mentally handicapped people with behavioural problems. The difficulties encountered in this study, the staff-resident interaction patterns and the individual characteristics of the residents themselves suggest that an exercise programme must be tailored individually.

Studies still need to be undertaken using objective methodology, but the use of field notes will be invaluable at all stages of the

project from categorisation of behaviour to evaluation. It is advised that behavioural categories are kept as simple as possible and that several observers are trained in the observational methodology before the project takes place. Measures of observer drift as well as inter-reliability measures are seldom taken and are an important addition to ensuring accuracy of data.

It is reiterated that the study does provide limited support for the effect of exercise in reducing maladaptive behaviours for mentally handicapped people. It has not demonstrated any increase in social behaviours on the part of the resident and more research is needed concerning its effect on overall quality of life. The main concluding directions which this study wishes to put forward to researchers who wish to pursue this area are as follows;

- 1) ASSESS INDIVIDUALS; EXERCISE IS NOT A PANACEA
- 2) ASSESS SOCIAL INTERACTION AS A TWO-WAY PROCESS
- 3) USE OBJECTIVE METHODOLOGY, BUT TAKE FIELD NOTES

**APPENDIX 1.** An example of the questionnaire designed to give information on the sleeping patterns of the residents over the course of the study.

INFORMATION ON SLEEPING PATTERNS

would be grateful if you would answer these questions each weekday morning for each of the four residents involved in the exercise project. Each question needs no more than a quick answer or a tick/cross, unless you would like to give more information.

-----

NOTE .....

At what time did he go to bed?

How long was he awake about 2 hours after this time (or when someone looked in on him, whichever was sooner) ?

Did he sleep without disturbance throughout the night?

Is this usual for him?

Does he wake when someone attempts to get him up in the morning?

At what time did he get up?

THANK YOU FOR YOUR HELP

**APPENDIX 2.** The type of behaviours which were used in the categorisation of resident behaviour for recording purposes.

## MOBILE

- Positional category; Standing position

## SITTING

- Positional category; Sitting or lying position

## NEUTRAL BEHAVIOURS ("DOING NOTHING")

a) **Mobile and neutral** - examples; standing or walking but not engaged or occupied in any other respect; wandering about the room, standing in a corner unoccupied etc.

b) **Sitting/lying and neutral** - examples; sitting on the chairs but unoccupied and not watching the television, sleeping, lying on the floor.

## SOCIALLY-DIRECTED BEHAVIOURS

a) **Appropriate** - examples; talking to someone, waving to someone in the appropriate circumstances, pointing something (appropriate) out to someone, appropriate smiling.

b) **Inappropriate** - examples; hitting someone, tugging at someone's arm, biting someone, throwing something at someone, shouting or swearing at someone.

## NON-SOCIALLY DIRECTED BEHAVIOURS

a) **Appropriate** - examples; self-occupied with a book/magazine or other appropriate object, on-task behaviour, putting objects away, watching the television.

b) **Inappropriate** - self-stimulation, SIB, inappropriate vocalisation, inappropriate use of objects, throwing objects around the room.

**APPENDIX 3.** The contingency tables produced when tallying occurrences of agreement and disagreement for calculation of observer drift over the study.

TEST FOR OBSERVER DRIFT

SESSION 2

	O	A	B	C	E	F	I	K	TOT
O	8		8			3			19
A									0
S									
E			30						30
S									
S				49	4	45			98
I									
O	4	1	5	2	212				224
N									
F				16	24	161			201
1									
I								1	1
K								27	27
TOT	12	1	43	67	240	209	0	28	

TOTAL AGREEMENT = TOTAL OF DIAGONALS = 487  
 TOTAL AGREEMENT+DISAGREEMENT = TOT SECS = 600

INTRA-OBSERVER AGREEMENT  
 (BETWEEN SESSION 1 AND SESSION 2) =  
 AGREEMENT/AGREEMENT+DISAGREEMENT AS PERCENTAGE  
 = 487/600 \* 100 = 81%

SESSION 3

	O	A	B	C	E	F	I	K	TOT
O	10		4			5			19
A			3						3
S									
E			31	42	2	10			85
S									
S				23					23
I									
O		1		6	206	17			230
N									
F	2			64	12	132			210
2									
I							1	1	2
K					1			27	28
TOT	12	1	38	135	221	164	1	28	(600)

TOTAL AGREEMENT = 430  
 TOTAL DISAGREEMENT = 130

TOTAL NO OF SECS AGREEMENT+DISAGREEMENT = 600  
 INTRA-OBSERVER AGREEMENT  
 (BETWEEN SESS2 AND SESS3) = 430/600  
 X 100%  
 = 71.5%

SESSION 3

	O	A	B	C	E	F	I	K	N	TOT
O	14		2		2	2				20
A										0
S										
E	4		33							37
S										
S				17	12	24				53
I										
O			2	50	143	67				262
N										
F	3			29	46	117				195
1										
I						3	1			4
K			3		5			20		28
N						1				1
TOT	21	0	40	96	208	214	1	20	0	(600)

TOTAL AGREEMENT = 473  
 TOTAL DISAGREEMENT = 165  
 TOTAL NO OF SECS AGREEMENT+DISAGREEMENT = 600  
 INTRA-OBSERVER AGREEMENT  
 (BETWEEN SESS1 AND SESS3) = 473/600  
 X 100%  
 = 78.8%

**APPENDIX 4.** An example of one of the forms produced and given to the resident to signify willingness to participate in the programme. The form was signed by themselves or the nurse in charge. Consent was also obtained from the medical consultant.

CONSENT TO PARTICIPATE IN AN EXERCISE PROJECT

I am going to ask you for your help in a project I am doing. I want to know whether you are willing to do this, so I am going to read something out to you to let you know what it is. If you can, I'd like you to let me understand whether you are happy to be part of it.

I would like you to come with me each day for half an hour or so outside. Sometimes we will be running, some days walking and other days I will just sit with you and talk or read something with you. I want to make the running as much as possible, so that you will have to work hard. (Do you understand what I am saying?).

The project will last for 8 weeks. I would like to see if this can make things better for you in any way. We can let others know then, what it is like for you. (Do you understand that?).

Can you indicate whether or not you are willing to do this? If not, I'll get someone who knows you well to do this part or to help you.

I am willing/not willing\* to take part in the project as above.

---

I have read the above/have been present\* whilst the above was read out to the person concerned. I know the person well and, because he/she\* appears to be not able to communicate his/her\* consent I am helping to make this decision. I consent/do not give consent\* for \_\_\_\_\_ to participate in the above project.

Signed: \_\_\_\_\_

Position: \_\_\_\_\_

Delete as appropriate

**APPENDIX 5.** A sample of the data generated by the ELAG programme of sequential analysis. No behaviour can be followed by itself; hence the corresponding column/rows are zeros.

Lags: -1  
 Codes: 11 12 16 25  
 Names: inapapprneutattn  
 Opts: SAZ ABA PCS WZF WPF WFF NCL ORD

£Codes	£Cd/Ln	Endcas	Endgrp	Endseg
4	20	98	33	99

Format (2014)

To this,           ...Recode these...

11	22	13	17	19
12	14	18	20	
25	23	24	26	
16	21	15		
-9	27			

Group 1. Case 1. 12 Segments, 570 Events.  
 UNIT 13? linda.doc

Lag 0

	inap	appr	neut	attn
Freq	137.	112.	195.	126.
Prob	24.0	19.6	34.2	22.1

Lag -1

Tg=	inap	appr	neut	attn
Giv=	Freq 0.	17.	90.	28.
inap	Prob .0	12.6	66.7	20.7
	Zsco 99.99	-3.46	5.11	-2.26

Lag -1

Tg=	inap	appr	neut	attn
Giv=	Freq 14.	0.	65.	32.
appr	Prob 12.6	.0	58.6	28.8
	Zsco -4.04	99.99	3.53	.25

Lag -1

Tg=	inap	appr	neut	attn
Giv=	Freq 66.	55.	0.	65.
neut	Prob 35.5	29.6	.0	34.9
	Zsco -.39	.09	99.99	.31

Lag -1

Tg=	inap	appr	neut	attn
Giv=	Freq 56.	36.	34.	0.
attn	Prob 44.4	28.6	27.0	.0
	Zsco 3.15	.94	-3.77	99.99

**APPENDIX 6.** A sample of the completed sleeping pattern forms, indicating no change in sleeping pattern over the project.

INFORMATION ON SLEEPING PATTERNS

I am a psychology student looking at the effects of physical exercise for a number of residents in Ward 2 at [redacted]. I would be grateful if you would answer these questions each weekday morning for each of four residents involved in the exercise project. Each question needs no more than a quick answer or a tick/cross, unless you would like to give more information. Thank you.

Linda Gardner  
student, St Andrews.

DATE 25.8.89 (Fri.)

	9.30	WITH DAY STAFF	WITH DAY STAFF	9.30
What time did he go to bed last night?	9.30	WITH DAY STAFF	WITH DAY STAFF	9.30
Was he awake about 2 hours after this time (or when someone looked in on him, whichever was sooner)?	NO	NO	NO	NO
Did he sleep without disturbance throughout the night?	YES	YES	TOGET ++	YES
Is this usual for him?	YES	YES	YES	YES
Was he awake when someone went to get him up in the morning?	NO	NO	NO	NO
What time did he get up this morning?	6.30AM	6.30AM	6.30AM	6.30AM

THANK YOU FOR YOUR HELP

INFORMATION ON SLEEPING PATTERNS

I am a psychology student looking at the effects of physical exercise for a number of residents in Ward 2 at . I would be grateful if you would answer these questions each weekday morning for each of four residents involved in the exercise project. Each question needs no more than a quick answer or a tick/cross, unless you would like to give more information. Thank you.

Linda Gardner  
student, St Andrews.

DATE 21-8-89. (Mon.)

		With day staff	With day staff	With day staff
What time did he go to bed last night?	11 am			
Was he awake about 2 hours after this time (or when someone looked in on him, whichever was sooner) ?	No	No	No	No
Did he sleep without disturbance throughout the night?	Yes	Yes	Up, wet bed x 3	Up x 1
Is this usual for him?	Yes	Yes	No	Yes
Was he awake when someone went to get him up in the morning?	Yes	No	Yes	No
What time did he get up this morning?	5.15 am	6.35 am	6 am	6.30 am

THANK YOU FOR YOUR HELP

INFORMATION ON SLEEPING PATTERNS

I am a psychology student looking at the effects of physical exercise for a number of residents in Ward 2 at \_\_\_\_\_ I would be grateful if you would answer these questions each weekday morning for each of four residents involved in the exercise project. Each question needs no more than a quick answer or a tick/cross, unless you would like to give more information. Thank you.

Linda Carder  
student, St Andrews.

DATE 21/7/89 (FR).

	9 30 pm	9.30 pm	9.30 pm	9.30 pm
What time did he go to bed last night?	9 30 pm	9.30 pm	9.30 pm	9.30 pm
Was he awake about 2 hours after this time (or when someone looked in on him, whichever was sooner) ?	NO	NO	NO	NO
Did he sleep without disturbance throughout the night?	YES	YES	UP TO TOILET TWICE	YES
Is this usual for him?	YES	YES	YES	YES
Was he awake when someone went to get him up in the morning?	NO	NO	YES	NO
What time did he get up this morning?	6.30 am	6.30 am	6.30 am	6.30 am

THANK YOU FOR YOUR HELP

**APPENDIX 7:** An example of a typical exercise day for G.U.  
Sessions lasted for a maximum of 25 minutes and took place in the  
playing fields outside the ward in the hospital grounds.

#### Tuesday 1/8 Exercise Session G.U.

We left the ward at gone 2.30 pm. I took G.U. to the upper field and this time there was no problem going onto the grass. We walked quickly up to the top end of the field and we managed a good 2 - 3 minute constant run down. At all stages it took a lot of "Come on G" and "Let's jog". It was a cooler day and breezy. Progress is quite slow; still most of the time is spent walking. We had followed a path from the ward. The total time outwith the ward amounted to 20 minutes and all the time G.U was on his feet and moving. G's pulse was approximately 110 - taken by radial pulse.

#### Friday 4/8 Exercise Session G.U

G.U. started a spontaneous jog as soon as we arrived at the grassy area of the field. He seems to have associated both person and place with this activity. We managed a brief jog up the field, albeit with several stops. We had some sideways hops and steps together and when he stopped he laughed and echoed "jogging", punching the air with his fists. Still much of the rest of the time is spent walking or standing and he stopped for a good while to pick up objects. Time outwith the ward amounted to 17 minutes, with distance twice the length of the field (400 metres or so) and around the hospital grounds before going back in the ward.

1. A.A.M.D. American Association on Mental Deficiency. The A.A.M.D. Adaptive Behaviour Scale Revision 1974.
2. Allen, J.J. (1980) Jogging can modify disruptive behaviours. Exceptional Children, 12(1), 66-70.
3. Aman, M.G., Singh, N.N., Stewart, A.W., and Field, C.J. (1981) The aberrant behaviour checklist: a behaviour rating scale for the assessment of treatment effects. 485-491.
4. Astrand, P.O. and Rodahl, K. (1986) Textbook of Work Physiology. London: McGraw-Hill.
5. Bachman, J.E. and Sluyter, D. (1988) Reducing inappropriate behaviours of trainable mentally impaired students using antecedent exercise. Journal of Applied Behaviour Analysis, 16, 477-484.
6. Bachman, J.E. and Sluyter, D. (1988) Reducing inappropriate behaviours of developmentally disabled adults using antecedent dance exercise. Research in Developmental Disabilities, 9, 73-83.
7. Bakeman, R. and Gottman, J.F. (1986) Observing interaction: An introduction to sequential analysis. Cambridge University Press.
8. Bakeman, R., Adamson, L.B. and Strisik, P. (1987) Lags and Logs: Statistical Approaches to Interaction. In M.H. Bornstein and J. Bruner (Eds.) Interaction in Human Development. Hillsdale, New Jersey: Erlbaum.
9. Barron, J. and Sandman, C.A. (1983) Relationship of sedative- hypnotic response to self-injurious behaviour and stereotypy by mentally retarded clients. American Journal of Mental Deficiency, 88, 177-186.
10. Barton, B.J. (1982) Aerobic dance and the mentally retarded - a winning combination
11. Baumeister, A.A. and MacLean, W.E. (1984) Deceleration of self-injurious responding by exercise. Applied Research in Mental Retardation, 5, 385-393.
12. Beasley, C. (1982) Effects of a jogging program on cardiovascular fitness and work performance of mentally retarded adults. American Journal of Mental Deficiency, 86(6), 609-613.
13. Beck A. (1978) The Beck Inventory.
14. Berger, B., Friedmann, E. and Eaton, M. (1988) Comparison of jogging, the relaxation response and group interaction for stress reduction. Journal of Sport and Exercise Psychology, 10, 431-447.
15. Bergsma, J. and Engel, G.L. (1988) Quality of life. Health Policy, 10, 267-279.
16. Berkson, G. and Davenport, R.K. (1962) Stereotyped movements of mental defectives 1. Initial survey. American Journal of Mental Deficiency, 66, 849-852.

17. Berkson, G. and Mason, W.A. (1963) Stereotyped movements of mental defectives III. Situation effects. American Journal of Mental Deficiency, 68, 409-412.
18. Berkson, G. and Mason, W.A. (1964) Sterotyped movements and mental defectives IV. The effects of toys on the character of the acts. American Journal of Mental Deficiency, 68, 511-524.
19. Blue, F.R. (1979) Aerobic running as a treatment for moderate depression. Perceptual and Motor Skills, 48, 228.
20. Blumenthal, J.A., Snaders-Williams, M.C., Needels, T.L. and Wallace, A.G. (1982) Psychological changes accompany aerobic exercise in healthy middle-aged adults. Psychosomatic Medicine, 44(6), 529-536.
21. Brown, B.J. (1977) Effects of an isometric strength training programme on intellectual and social development of trainable retarded males. American Corrective Therapy Journal, 31, 44-48.
22. Carr, E.G. (1977) The motivation of self-injurious behaviour; a review of some hypotheses. Psychological Bulletin, 84(5), 800-817.
23. Caruso, D.R. and Hodapp, R.M. (1988) Perceptions of mental retardation and mental illness. American Journal on Mental Retardation, 93(2), 118-124.
24. Chamove, A.S. (1986) Effects of activity on the behaviour of schizophrenic patients. British Journal of Clinical Psychology, 25, 125-135.
25. Chamove, A.S. and Anderson, J.R. (1981) Self-aggression, stereotypy and self-injurious behaviour in man and monkeys. Current Psychological Reviews, 1, 245-256.
26. Chamove, A.S. (1988) Exercise effects in psychiatric populations; a review. Paper submitted at a symposium for physical education, health and psychology. Bisham Abbey, 1, 1-34.
27. Cooper, D. (1975) "Aerobics". Penguin.
28. Council of Europe Committee for the Development of Sport. (1988)EUROFIT. Handbook for the Eurofit Tests of Physical Fitness. Rome.
29. Craddock, D. (1978) Obesity and its management. Churchill Livingstone, volume 3, London.
30. Crain, C., Eisenhart, M. and McLaughlin, J. (1981) The application of a multiple measurement approach to investigate the effects of a dance program on educable mentally retarded adolescents. Research Quarterly, 55, 231-236.
31. Cullen, C., Burton, M., Watts, S. and Thomas, M. (1983) A preliminary report on the nature of interactions in a mental handicap institution. Behaviour Research and Therapy, 21(5), 579-583.

32. Davies, C. (1989) Goffman's concept of the total institution: Criticisms and revisions. Human Studies, 12, 77-95.
33. DeVries (1986) Effect of acute exercise on resting action potentials in muscles.
34. Diesfeldt, H.F.A. and Diesfeldt-Groenendijk, H. (1977) Improving cognitive performance in psychogeriatric patients; the influence of exercise. Age and Ageing, 6, 58-64.
35. Dodson, L.C. and Mullens, W.R. (1969) Some effects of jogging on psychiatric hospital patients. American Correctional Therapy Journal, 23(5), 130-135.
36. Donoghue, S. (1977) The correlation between physical fitness, absenteeism and work performance. Canadian Journal of Public Health, 68, 210-213.
37. Doyne, E.J., Chambless, D.L. and Beutler, L.E. (1983) Aerobic exercise as a treatment for depression in women. Behaviour Therapy, 14, 434-440.
38. Doyne, E.J., Ossip-Klein, D.J., Bowman, E.D., Osborn, K.M., McDougall-Wilson, I.B. and Neimeyer, R.A. (1987) Running versus weight-lifting in the treatment of depression. Journal of Consulting and Clinical Psychology, 55, 748-754.
39. Duker, P.C., Boonekamp, J., Brummelhuis, Y., Hendrix, Y., Hermans, M., Van Leeuwe, J. and Seys, D. (1989) Analysis of ward staff initiatives towards mentally retarded residents: clues for intervention. Journal of Mental Deficiency Research, 33, 55-67.
40. Engel, G.L. and Bergsma, J. (1988) Quality of Life. Health Policy, 10, 25-31.
41. Fixx, J.F. (1977) The Complete Book of Running. New York: Random House.
42. Folkins, C.H. and Sime, W.E. (1981) Physical fitness training and mental health. American Psychologist, 36(4), 373-389.
43. Fremont, J. and Craighead, L.W. (1987) Aerobic exercise and cognitive therapy in the treatment of dysphoric moods. Cognitive Therapy and Research, 11(2), 241-251.
44. Friedman and Rosenman (1984) Type A Behaviour and Your Heart.
45. Geddes, D. (1974) Physical activity: a necessity for severely and profoundly mentally retarded adults. Journal of Health and Physical Fitness, 45, 73-76.
46. Gettman, L., Pollock, M.L., Durstine, A.W., Ayres, J. and Linnerud, A.C. (1979) Physiological responses of men to 1,3 and 5-day per week training programs. Research Quarterly, 47, 638-646.
47. Goldiamond, I. (1974) Towards a constructional approach to social problems. Behaviourism, 2, 1-84.
48. Greist, J.H., Klein, M.H., Eischens, R.R., Faris, J., Gurman, A.S. and Morgan, W.P. (1979) Running as treatment for depression. Comprehensive Psychiatry, 20(1), 41-54.

49. Harrop, A., Foulkes, C. and Daniels, M. (1989) Observer agreement calculations: the role of primary data in reducing obfuscation. British Journal of Psychology, 80, 181-189.
50. Herson, M. and Barlow, D.H. (1976) Single Case Experimental Designs. Strategies for Studying Behaviour Change. New York: Pergamon Press.
51. Hesso, R. and Sorenson (1982) Physical activity in treatment of mental disorders. Scandinavian Journal of Social Medicine, Supplement 29, 153-159.
52. Hutt, S. and Hutt, C. (1968) Stereotypy, arousal and autism. Human Development, 2, 277-286.
53. Jansma, P. and Combs, C.S. (1987) The effects of fitness training and reinforcement on maladaptive behaviour of institutionalized adults, classified as mentally retarded/ emotionally disturbed. Education and Training in Mental Retardation, December, 268-279.
54. Jones, M.L., Lattimore, J., Ulicny, G.R. and Risley, T. (1987) Ecobehavioural Design: Programming for Engagement (Chapter 5), 123-155.
55. Kasch, F. (1976) The effects of exercise on the ageing process. The Physician and Sports Medicine, 4, 64-68.
56. Kaufman, M.E. (1971) The effects of institutionalization on development of stereotyped and social behaviours in mental defectives. American Journal of Mental Deficiency, 71, 581-585.
57. Kazdin, A.E. (1977) Assessing the clinical or applied importance of behaviour change through social validation. Behaviour Modification, 4, 427-451.
58. Kern, L., Koegal, R.L., Dyer, K., Blew, P.A. and Fenton, L.R. (1982) The effects of physical exercise on self-stimulatory behaviour and appropriate responding in autistic children. Journal of Autism and Developmental Disorders, 12, 399-419.
59. Kern, L., Koegal, R.L. and Dunlap, G. (1984) The influence of vigorous versus mild exercise on autistic stereotyped behaviours. Journal of Autism and Developmental Disorders, 14(1), 57-67.
60. Kielhofner, G., Barris, R., Bauer, D., Shoestock, B. and Walker, L. (1983) A comparison of play behaviour in nonhospitalized and hospitalized children. American Journal of Occupational Therapy, 37(5), 305-312.
61. King's Fund Centre (1985) Facing the Challenge: An ordinary life for people with learning difficulties and challenging behaviour. Edited by R. Blunden and D. Allen.
62. Lees, L.A. and Dygdon, J.A. (1988) The initiation and maintenance of exercise behaviour: a learning theory conceptualization. Clinical Psychology Review, 8, 345-353.

63. Long, B. (1988) Stress management for school personnel. Stress-innocation training and exercise. Psychology in the schools, 25, 314-325.
64. Martin, P. and Bateson, P.P.G. (1986) Measuring Behaviour. Cambridge: Cambridge University Press.
65. Martinsen, E.W. (1988) Aerobic exercise in the treatment of non-psychotic mental disorders. An exploratory study. Paper submitted for publication. 1-26.
66. McEwen, B. (1983) An evaluation of the need of the long-stay psychiatric patient for organised exercise. Australian Journal of Physiotherapy, 29(6), 202-209.
67. McGarry, M.S. and West, S.G. (1975) Stigma among the stigmatized: resident mobility, communication ability and physical appearance as predictors of staff-resident interaction. Journal of Abnormal Psychology, 84(4), 399-405.
68. McGimsey, J.F. and Favell, J.E. (1988) The effects of increased physical exercise on disruptive behaviour in retarded persons. Journal of Autism and Developmental Disorders, 18(2), 167-178.
69. McKechnie, A.A., Wilson, F., Watson, N. and Scott, D. (1982) A preliminary report on the effectiveness of connective tissue massage.
70. McNair, D.M., Lorr, M. and Droppleman, L.F. (1971) Profile of mood states manual. San Diego: Educational and Industrial Testing Service.
71. Monahan, T. (1987) Is "activity" as good as exercise? The Physician and Sports Medicine, 15(10), 181-186.
72. Morgan, W.P. (1970) Selected physiological and psychomotor correlates of depression in psychiatric patients. From Contemporary Readings in Sport Psychology. Charles Thomas.
73. Morgan, W.P. (1985) Affective beneficence of vigorous physical activity. Medicine and Science in Sport and Exercise, 17(1), 94-100.
74. Morris, W.P., Pollard, R., Everitt, M.G. and Chave, S.P.W. (1980) Vigorous exercise in leisure time: protection against coronary heart disease. Lancet, 8206, 1207-1210.
75. Neill, J.C. and Alvarez, N. (1989) The effects of the everyday environment on epileptic activity in three mentally retarded individuals. Electroenceph. and Clinical Neuropsychology, 1-9.
76. Ohwaki, S. (1976) An assessment of dance therapy to improve retarded adults body image. Perceptual and Motor Skills, 43, 1122.
77. Paffenbarger, R.S., Hyde, R.T., Wing A.L. and Steinmetz, C.H. (1984) A natural history of athleticism and cardiovascular health. JAMA, 252, 491-495.
78. Paillard, M. and Nowak, K.B. (1985) Use exercise to help older adults. Journal of Gerontological Nursing, 11(7), 36-39.

79. Porterfield, J., Blunden, R. and Blewitt, E. (1980) Improving environments for profoundly handicapped adults. Behaviour Modification, 4(2), 225-241.
80. Ransford, C.P. (1981) A role for amines in the antidepressant effect of exercise: a review. Medicine and Science in Sports and Exercise, 14(1), 1-10.
81. Repp, A., Felce, D. and Barton, L.E. (1988) Basing the treatment of stereotypic and self-injurious behaviours on hypotheses of their causes. Journal of Applied Behaviour Analysis, 21(3), 281-289.
82. Schalock, R.L., Keith, K.D., Hoffman, K. and Karan, O.C. (1989) Quality of life, its measurement and use. Mental Retardation, 27(1), 25-31.
83. Scottish Sports Council (1988) Concepts of fitness and health - an exploratory study: summary. Research Digest, 10, 1-14.
84. Shephard, R.J. (1981) Ischaemic heart disease and exercise. Croom Helm: London.
85. Sherwood, A., Light, K.C. and Blumenthal, J.A. (1989) Effects of aerobic exercise training on hemodynamic responses during psychosocial stress in normotensive and borderline hypertensive type A men: a preliminary report. Psychosomatic Medicine, 5, 123-136.
86. Sisson, L.A., Babeo, T.J. and Van Hasselt, V.B. (1988) Group training to increase social behaviours in young multihandicapped children. Behaviour Modification, 12(4), 497-524.
87. Spangler, P. and Marshall, A.M. (1983) The unit play manager as facilitator of purposeful activities among institutionalised profoundly and severely retarded boys. Journal of Applied Behaviour Analysis, 16, 345-349.
88. Spielberg, C.D., Gorsuch, R.L. and Lushene, R. (1970) State-trait anxiety inventory manual. Palo Alto, C.A. Consulting Psychologist Press.
89. Steptoe, A. (1988) Why do people exercise? Paper presented at the symposium for sport, health and psychology. Bisham Abbey England, December.
90. Sturmey, P., Hogg, P. and Crisp A.G. (1988) The promotion of purposeful activity in micro-environments for people with a mental handicap: prefatory remarks. Adaptive Behaviour Research and Therapy, 10, 3-5.
91. Suen, H.K. (1988) Agreement, reliability, accuracy and validity: Toward a clarification. Behaviour Analyst, 11, 343-357.
92. Svendsen, D. (1982) Physical activity in the treatment of mentally retarded persons. Scandinavian Journal of Social Med Supp, 29, 253-257.
93. Tomporowski, P.D. and Ellis, N.R. (1984) Effects of exercise on the physical fitness, intelligence and adaptive behaviours of institutionally mentally retarded adults. Applied Research in Mental Retardation, 5, 329-337.

94. Vitale, F. (1973) *Individual Fitness Programmes*. Englewood Cliffs: New Jersey: Prentice-hall.
95. Wahler, R.G. and Fox, J.J. (1981) Setting events in applied behaviour analysis: toward a conceptual and methodological expansion. Journal of Applied Behaviour Analysis, 14, 327-338.
96. Watters, R.G. and Watters, W.E. (1980) Decreasing self-stimulatory behaviour with physical exercise in a group of autistic boys. Journal of Autism and Developmental Disorders, 10(4), 379-387.
97. Wolfensberger, W. (1972) *The principle of normalisation in human services*. Toronto: National Institute on Mental Retardation.