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Utilisation of Health Care Services by Older Adults: A New Zealand Study

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ABSTRACT

This study uses data provided by 354 respondents aged 60 years and over from throughout New Zealand to test Andersen's behavioural model of health care utilisation incorporating expanded sets of indicators of predisposing, enabling, need, and health care utilisation constructs. When hierarchical multiple regression analysis was undertaken, 38% of the total variance relating to the number of visits to the GP was explained, representing a substantial increase compared with previous studies related to health utilisation behaviours of older adults. Other, less common measures of health care utilisation also provided higher R^2 values, with 41% of the variance in the number of prescription items used in the previous 12 months accounted for, and 25% of the variance of the number of other health professionals seen (other than the GP) over the previous 12 months explained by the predictors. While only 18% of the total variance was explained for the number of days spent in bed because of illness, this variable was considered suspect due to significant skewness. Unlike previous research, significant predictors were not predominantly need characteristics, with ethnicity and health worry proving to be consistent predictors of formal health care utilisation. These results suggest that using measures of health care which are more representative of the wide range of health services used by older adults, and using indicator sets more pertinent to the aged, increases the predictive power of the behavioural model.

Acknowledgments

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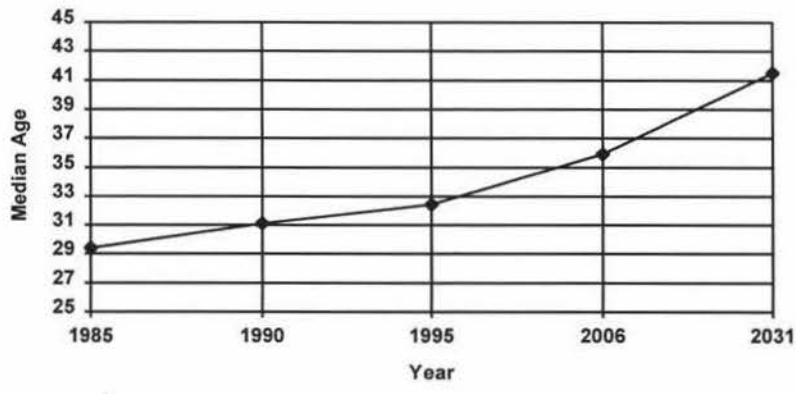
1. INTRODUCTION

Within North America, study of the utilisation of health care services by elderly individuals became increasingly necessary as the disproportionately high percentage of the total health care expenditure associated with the elderly became evident (Fisher, 1980; Waldo & Lazenby, 1984). A positive correlation in age and health care expenditure has important ramifications in New Zealand where the population, as in many countries, is ageing. While in 1995, 15% of the population were aged 60 years or older, it is expected that this age group will represent 17% of the population by 2006 and 27% by 2031 (Statistics New Zealand, 1991). The rate of ageing can be further highlighted by viewing the increases in the median age for New Zealanders from 1985 to projected figures up to the year 2031 (see Figure 1). In order to achieve maximum use of limited healthcare resources as the population ages and the number and percentage of elderly per head of population increases, the need for predictive theoretical models of health care utilisation on which optimal policy formation can be based becomes increasingly important.

Figure 1: Median Age in New Zealand from 1985 with projections to 2031



Note: Data from Statistics New Zealand (1995, p 23)

1.1 The Conceptual Model:

The most common theoretical framework used to examine utilisation of health care services is Andersen's (1968) behavioural model (Hulka & Wheat, 1985; Wan, 1989; Wolinsky & Johnson, 1991). This conceptual model proposes constructs of predisposing, enabling and need characteristics as determinants of health care utilisation. Predisposing characteristics are seen as those personal factors which make an individual more or less inclined to use health care services than others. Enabling characteristics represent those factors which, despite individual inclinations, inhibit or facilitate actually obtaining health care. Need characteristics reflect an individual's perception that it is necessary to use some form of health care. While an individual may be predisposed and able to access care, it is unlikely that care will be sought unless the individual sees a need for such care.

However, Andersen's model has been shown to explain more of the variance in health care utilisation practices of the general population (Aday & Andersen, 1975; Aday, Andersen & Fleming, 1980; Andersen, 1968; Wolinsky, 1978) than when applied to the elderly (Branch, Jette, Evashwick, Polansky, Rowe & Diehr, 1981; Eve & Friedsam, 1980; McKinlay, 1985; Wolinsky, Aguirre, Fann, Keith, Arnold, Niederhauer & Dietrich, 1989; Wolinsky, Coe, Miller, Prendergast, Creel & Chavez, 1983; Wolinsky & Coe, 1984). The reasons for the lowered predictiveness of the model when associated with the elderly and the means of achieving a 'better fit' of the model will be discussed by:

1. Consideration of the conceptual model and the sets of measures used by researchers to embody the theoretical constructs incorporated in Andersen's behavioural model, and,

2. Reflection on the criticisms directed towards the application of this model to elderly persons' use of health care services and provision of possible improvements in approach.

1.2 Construct 1 - The Predisposing Characteristics

Andersen argued that individuals display greater or lesser propensities to use health services *prior to becoming ill* based on a variety of personal characteristics. The factors which influence these 'predispositions' can be classified as either demographic, social structural, or health beliefs.

1.2.1 Demographics

Demographics are measured by variables such as age, sex, marital status and family size, and are used to indicate an individual's life-cycle position. These demographic descriptors have been identified as being related *in some way* to the use of health care services. For example, married people make use of health services far less than non-married people (Evashwick, Rowe, Diehr, & Branch, 1984; Morgan, 1980; Verbrugge, 1979) and women have been shown to experience more disability days, utilise health services more than men (Kandrack, Grant & Segall, 1991), as well as outlive men generally (Waldron, 1976; Wingard, 1982).

However, demographic features of Andersen's model are generally not seen to act directly on health care utilisation practices, but rather *in association* with other characteristics. Cafferata (1987) has confirmed that studies identifying elderly married people as lower users of health care services than non-married elderly people were actually tapping in to the effect of living with others. With closer support systems, health care services are not required on as frequent a basis as when there are no emotional and physical carers 'on tap'. Similarly, sex differences in morbidity and mortality rates have also been linked to occupation (Arber, Gilbert & Dale, 1985; Jennings, Mazaik & McKinlay, 1984; Waldron, 1980), and acquired risks related to social roles, lifestyles and stress (Marcus & Seeman, 1981; Marcus, Seeman & Telesky, 1984; Ortmeyer, 1979). Further, health care utilisation practices and social supports are seen to differ by sex and race (Nelson, 1993).

Therefore, demographic indicators are not only used to provide hypotheses based on observed sex, age, marital status and family size differences on morbidity and mortality rates, but also to provide insight into ***illness behaviour***. This focuses more on acquired risks and social roles associated with demographic profiles rather than simply employing a biomedical approach (Kandrack et al, 1991) where a physical factor is seen to have a direct influence on health. On this basis, Cafferata (1987) and Wolinsky and Johnson (1992) included cohabitants as demographic measures in their studies, as this provides more information than just marital status about an elderly

person's close support systems and their consequent use of health services. Wolinsky and Johnson (1991) has also included a measure of the number of generations living in the household to further characterise lifecycle position, arguing that the increased social support offered by a multi-generational household would similarly decrease utilisation of health services by an elderly person. Demographic measures therefore are closely associated with aspects of social structure.

1.2.2 Social Structure

Social structure components draw on the individual's behaviours related to his/her position on a social scale and are typically measured by such variables as employment, education and ethnicity. Educational levels are associated with the type of employment obtained and socio-economic status, which in turn have been found to have an inverse relationship with health care utilisation (Corney & Murray, 1988). Ethnicity has also been shown to be related to differences in health behaviours (Jackson, 1967, 1985; Schur, Bernstein & Berk, 1987; Wolinsky et al, 1989) with different ethnic groups approaching illness from different beliefs and cultural mores. These variables are seen to impact not only on lifestyle patterns, but also as influences on one's life chances (Wolinsky et al, 1989), in that they affect opportunities for optimal health care from an early age, influencing risk of accidents and diseases, and availability of social supports.

Lifestyle patterns also involve consideration of health risk behaviours such as poor dietary habits, smoking and excessive alcohol consumption. Wolinsky et al (1983) found that amongst the elderly, a poor knowledge of the four basic food groups was an important predictor of physician utilisation and hospital admissions. They argued that a lack of nutritional knowledge indicated those individuals who were at 'nutritional risk' although, rather unfortunately, they did not assess the respondents' actual diets. Nutritional risk was considered by them to be a predisposing characteristic, having some relation to such social structure factors as education, income and ethnicity. It is perhaps surprising that other health risk behaviours, e.g. lack of exercise, have not been incorporated in research involving the behavioural model.

Criticism has been directed against early studies of health care utilisation for also ignoring, to a large extent, the importance of social supports (Ward, 1978). Since then, research has indicated that lower illness rates and faster recovery rates are associated with individuals who have supportive relationships with others (McIntosh & Shifflett, 1984), and people who have weak or absent social contacts are less likely to use preventative health services e.g. medical and dental checkups (Berkman & Syme, 1979). Subsequent researchers have shown more commitment to capturing this concept using a wide variety of measures. Wolinsky and Johnson (1991; 1992) using data from the Longitudinal Study on Ageing (LSOA), and Nelson (1993), have considered respondents' involvement in volunteer work in the

preceding 12 months, social and telephone contacts in the previous two weeks, and attendance at church or other group events. Cheng (1992) used a 10-item scale to identify elderly females who were upset by their perceived loneliness and found that they also exhibited high physician utilisation rates.

Both demographic and social structure dimensions encompass behaviours influenced by other people, be they family, friends, or society in general, and Jewett, Hibbard & Weeks (1992) preferred to consider them as a single dimension of sociodemographic characteristics. Indeed, it is a tenuous argument that would separate any of the demographic indicators from the implications of their inevitable social context and on that basis Jewett et al's conjunction of dimensions is both conceptually appropriate and consistent with Andersen's initial model. Within this study therefore, demographic and social structural aspects will be considered together as sociodemographic characteristics.

1.2.3 Health Beliefs

The third dimension of predisposing characteristics is that of **health beliefs**. This component encompasses those *attitudinal* features that influence an individual's health utilisation behaviours. Andersen and Newman (1973) argued that individuals who value health highly would exhibit different health utilisation patterns than individuals who placed low value on their health. Belief (or not) in the efficacy of medical treatment, attitudes to personal health maintenance and internal

versus external control over health are also seen to affect health service utilisation. Dean (1986) found evidence for lower professional consultation rates amongst individuals who doubted the efficacy or benefits of medical science. Sanders (1982) asserted that 'fatalists' are less likely to seek advice than those who believe that their own actions determine their fate.

Despite this, it has been noted by various researchers (Mechanic 1979; Strain, 1991; Ward, 1978; Wolinsky & Johnson, 1991) that consideration of health beliefs in terms of elderly utilisation practices has been excluded by most users of the behavioural model. However, when addressed, the most common markers for this dimension include an indication of the degree of worry their overall health status during the previous 12 months had caused them (Wolinsky & Johnson, 1991; 1992), importance attributed to health maintenance behaviours (Cleary, Mechanic & Greenley, 1982), and how much control the individual perceives they have over their own future health (Wolinsky et al, 1983; Strain, 1991) using health-specific locus of control items. Strain (1991) also asked respondents to indicate the degree of importance they attached to such health behaviours as diet and nutrition, regular exercise, avoiding smoking, using car seat belts, etc., to their overall health. Additionally, Strain used a 22 item list to investigate degree of medical scepticism. She found that in an elderly population, medical scepticism and lack of confidence in the worth of health maintenance activities was associated with less health service utilisation.

Predisposing characteristics, then, incorporate personal descriptives which influence an individual's health care utilisation behaviours. The research evidence, to date, emphasises the importance of conceptualising and measuring the notion of predisposing characteristics in a variety of ways. A number of recent studies (e.g. Wolinsky & Johnson, 1991; 1992; Nelson, 1993; Strain, 1991) have noted the importance of additional indicators such as health beliefs, social contacts, and cohabitants, but relatively few studies have attempted a multifaceted assessment of such indicators. With this in mind, the present study seeks to build on the findings of previous research by measuring an expanded set of predisposing characteristic indicators. In this way, further clarification of the nature of the relationship between predisposing characteristics and health care utilisation may be gained.

1.3 Construct 2 - Enabling Characteristics

While predisposing characteristics embody features which influence an individual's propensity to use health services, enabling characteristics encompass those features which affect whether the health services are ***obtainable*** for an individual. These features are often categorised as *familial resources* or *community resources*. Familial resources are used to reflect degree of self-sufficiency and are typically measured by telephone access, income, the presence of health insurance and whether the person has regular health care service providers. Community resources are used to reflect the availability of health care services (Cafferata, 1987; Eve, 1988; Jewett et al, 1992; Wolinsky & Johnson, 1992; Wolinsky et al, 1989;). These are most commonly measured by physician/hospital bed to population density ratios and geographic location. Together, within the Andersen model, these

resources are believed to capture the accessibility features which *enable* use of health care services.

Penchansky and Thomas (1981) further refined this dimension by identifying five aspects that are related to, but not the same as, familial and community resources. They sought to define the concept of access to health care resources by providing ".....a set of more specific dimensions describing the fit between the patient and the health care system" (p 127) rather than consider enabling characteristics as consisting of essentially economic and location parameters. The set of dimensions they proposed are affordability, acceptability, accessibility, accommodation and availability. Of these, affordability and acceptability are most closely affiliated with familial resources, with accessibility, accommodation and availability approximating community resources.

1.3.1 Affordability

Affordability is concerned with a person's ability to pay for services, having health insurance and knowledge of government subsidy schemes, and the relative worth attached to the expected outcome relative to the total financial cost. Eve (1988) included in her measures of enabling characteristics, annual family income, subjective opinions on whether their income was sufficient, satisfaction with lifestyle and ability to manage on current income, to tap into this aspect of access. Gribben (1992) in a rare New Zealand study using the Andersen model as a framework, asked individuals from Auckland whether the doctor's fee ever prevented them from going to the doctor

when they believed they needed a consultation. He found that while 30% of respondents answered in the affirmative to this question, patient fees also included in his study were not associated with health care utilisation. Gribben explained this inconsistency by suggesting that answers to the direct question reflected dissatisfaction with costs rather than actual use of health care services. In contrast, Stoller (1982) found financial resources to be the most important, predictive, enabling characteristic for the volume of physician visits.

Related to this is the issue of 'moral hazard' (Stoller, 1982) where it has been argued that health service costs which are too low may encourage overuse by the client, or over-treatment by the health provider. In attempting to remove all financial barriers to use of health services by providing a generous government-subsidised insurance coverage, a window of opportunity exists for health providers to overservice, knowing that remuneration is guaranteed from a faceless public money pool. At the same time, health service over-utilisation may also be patient generated. An elderly client, feeling lonely, may seek the 'free' services of an friendly and approachable general practitioner rather than make an effort to make more appropriate social contacts. This complete freedom of access does not allow optimal use of resources to maximum advantage, but rather uncontrolled, and essentially non-productive, expenditure. While Stoller noted that this area has been widely written about, a formula to determine 'optimal' health costs not only remains elusive, but has only partial and tentative support for its worth. After all, an aged person who is lonely enough to

have to visit the doctor for social contact could be considered as needing psychological support which (arguably) should be provided by health care resources. Andersen's model represents the *process* of health care utilisation but is not nested in a context of social conscience. This must be provided by the formulators of public policy when using the model as a basis on which to manage health care resources.

1.3.2 Acceptability

Acceptability looks at the individual's preferences for personal attributes in health care providers and for the physical environment in which they work (e.g. surgery, consulting rooms etc.) and compares them to the attributes and practices of the existing providers. This has been most commonly considered by looking at patients' reactions to their health providers' age, sex, ethnicity, or religious affiliation. Examples of this include male patients preferring not to see a female doctor, or a Muslim preferring not to be treated by a Jehovah's Witness. Penchansky and Thomas (1981) also looked at this aspect of access by questioning how satisfied people were with the appearance of their doctor's offices, with the neighbourhood in which the offices are located and with the other patients usually seen at the doctor's offices. Conversely, they argue that this component includes the preferences of health carers regarding clientele attributes. For example, health carers may prefer not to treat 'welfare' clients or Europeans.

Some support for the discriminability of this variable has been provided by the findings of Snider (1980) where use of health services by the elderly was shown to be influenced more by subjective evaluations measured by satisfaction ratings of healthcare and the provider than behavioural aspects of the health seeking process. Snider also suggests that established patient-doctor relationships encourage use of health care services and it is arguable that having a regular doctor taps into the 'acceptability' component of access, although other researchers (Aday et al, 1980) have considered having a regular source of medical care as a measure of 'accessibility'. Kuder and Levitz (1985) have labelled this the 'usual source effect' where increased utilisation rates are positively related to the length of time a person has been consulting with a particular health care provider. In their 1991 study, Wolinsky and Johnson measured residential stability to tap into this dimension, suggesting that geographic permanence allows people to become familiar with the health care services available locally to them and to establish relationships with selected health care providers. The only effect found in their study was that people who had lived in their neighbourhood for five years or more were less likely to use home health services, the opposite to expectations. Similarly, Gribben (1992) found a negative association with length of time using the same doctor and utilisation. As Gribben noted, it is easy to offer rationalisations for this unexpected result - people may be less likely to 'bother' a doctor if there has been a long-standing relationship, or they may be bored with the same doctor and wish to try out 'fresh markets' - but it is impossible to definitively

explain the *reasons for* these patterns of health care utilisation within the confines of his study. The value of having a regular doctor or not as a measure of an enabling characteristic remains obscure.

It is perhaps notable that Gribben's (1992) study purported to look specifically at the effects of affordability, accessibility and accommodation, ignoring the acceptability and availability components offered by Penchansky and Thomas' concept of access. It is unclear which of the three selected dimensions Gribben believed he was measuring using length of time spent with the same doctor, as this was not specified in his study. The difficulty in defining and establishing measures pertinent to acceptability issues has meant that this area remains largely ignored by researchers, compared to other aspects of access.

1.3.3 Accessibility

Accessibility pertains to the "relationship between the location of supply and the location of clients" (Penchansky & Thomas, 1981, p 128), and involves consideration of transportation resources, and travelling times, costs and distances. Donabedian (1976) included in his concept of access the idea of 'geographical accessibility' which incorporates location of health services and the degree of client effort required to access services. In this respect, the accessibility component straddles the dimensions of familial and community resources by looking at both how the individual can access health care services (self-sufficiency) as well as how health care services allow

people in general to access them (a community consideration). Again, few studies have incorporated variables to measure this component, but Gribben (1992) used mode of travel and travelling time to the doctor as part of his study. Here, neither measure was associated with utilisation of health care services. Generally, while some studies have shown rural populations and not urban populations to be influenced by accessibility of services, focus has been on distance needing to be travelled (Morell, Gage & Robinson, 1970) rather than ease of access.

1.3.4 Availability

Availability shadows Andersen's dimension of community resources in that it refers to the adequacy of volume and types of health care services related to client demand. Availability is intimately linked to population and health care services ratios. Aguirre, Wolinsky, Niederhauer, Keith and Fann (1989) found that people in areas with greater supplies of health care services use those services more. On that basis, Wolinsky and Johnson (1991) used a 10 point population density measure as a proxy for the relative supply of physicians and hospitals in a community, and their findings supported those of Aguirre et al. Within New Zealand, a study by Malcolm and Clayton (1988) indicated wide variation in availability of general practitioner services ranging from one general practitioner per 1351 head of population in central Auckland to 1: 2500 in Invercargill, with a national ratio of 1:1908. Although this represents an increase in availability of general

practitioners by 6% from 1986 to 1987, overall utilisation rates had increased by only 1%. Malcolm and Clayton noted wide discrepancies in utilisation rates associated with the differences in doctor/population ratios, with higher utilisation rates associated with lower doctor/population ratios. Unfortunately, it remains unclear whether this usage rate reflects necessary treatment rates, optimal treatment rates or overuse of the system. Because of this, population/health care services ratios on their own offer little to the understanding of utilisation patterns. Within the present study, therefore, measurement of this particular feature of Penchansky and Thomas' concept of access will not be undertaken.

1.3.5 Accommodation

Accommodation relates to the way health care resources are arranged to accommodate the needs of their clients, and the client's ability to accommodate to the requirements of the services. Penchansky and Thomas (1981) see this variable as including such factors as appointment systems, waiting times, hours of operation, walk-in facilities and telephone facilities, and client satisfaction with these 'accommodations'. Cox (1986) used satisfaction with medical care as a measure of health beliefs (a dimension of predisposing characteristics), arguing that this equates to trust in the medical system, but within Penchansky and Thomas' concept of access, satisfaction with medical care sits more comfortably as a feature of accommodation.

While accommodation factors consider the 'user friendliness' of the services provided by the health carer, some caution must be offered to avoid conceptualising this variable as simply 'customer satisfaction with service operations', as satisfaction does not necessarily equate with utilisation patterns. While Gribben (1992) found that lower waiting times were associated with higher doctor consultancy rates, few other studies using Andersen's model have focussed on this particular variable. Despite this, 'user friendliness' is seen as an important part of product attractiveness within most, if not all, accepted business practices, and the external validity of this variable merits it worthy of further investigation.

Although Penchansky and Thomas (1981) provided evidence for the discriminability between these concepts using factor analyses, it is clear that the non-specificity of the measures used to represent them make the five concepts difficult to distinguish from each other on the basis of direct effects. Subsequent researchers have used measures associated with one component and explained the results on the basis of elements of two or more components such that affordability of health services can be related to both service costs (an affordability feature), and cost associated with travelling to the service, an accessibility issue in Penchansky and Thomas' terminology. In turn, the type of transportation available to a client (an accessibility feature) can be seen to also affect how clients would view appointment systems (an accommodation feature), with clients relying on connecting public transport modes or availability of family members to provide transportation possibly requiring a more flexible walk-in facility.

This does not mean to imply that use of Penchansky and Thomas' concept of access is inherently problematic, however. While determination of these five components was meant to clarify the processes incorporated under the 'enabling characteristics' umbrella, blending of the interactions involved means that these aspects cannot be considered in isolation. The benefit provided by using Penchansky and Thomas' five-factored 'concept of access' then, is that it provides a conceptual framework to locate the different influences which affect a person's means of obtaining health care services. It can be mapped onto the Andersen model without distorting the construct of enabling characteristics as it is merely a device for providing a more complete picture of the components of this construct.

Use of the wide variety of measures suggested by the five-factored 'concept of access' to reflect the construct of enabling characteristics within the Andersen model has previously received little attention. This study attempts to produce a more detailed representation of the enabling construct using measures implied by Penchansky and Thomas' framework.

1.4 Construct 3 - Need Characteristics

An individual may be predisposed to seek health care and may also be able to access health services, but it is unlikely that the person will actually consult a health care provider unless they perceive a reason to do so. Need characteristics, then, incorporate those features which make an individual think that use of health services is necessary. Need provides the "basic and direct stimulus for the use of health services when the appropriate levels of predisposing and enabling characteristics exist" (Wolinsky et al, 1983, p 327)

and has consistently been shown to be the single most important predictor of health care utilisation within the Andersen framework. The model distinguishes between professionally-evaluated needs, as in professionally diagnosed illnesses, and self-assessed needs, as in perceived health levels.

1.4.1 Professionally Evaluated Needs

Professionally evaluated needs have been assessed using identification of chronic health problems on the assumption that the initial diagnoses came from professional health providers and are not purely products of individual perceptions. It would appear that this variable is clearly distinguishable by a medical diagnosis, but Wolinsky et al (1989) have argued that, in the absence of medical evaluations, limitations in daily activities due to health reasons provide a proxy for professional diagnoses, and can be considered an objective means of assessment. It is asserted here, however, that self-reported limitations are based on individual perceptions and evaluations of the degree of restriction, and may be unrelated to any medical assessment. Therefore, limitations in daily activities and functions when based on self-assessment, should be considered indications of individually perceived needs and only functional assessments undertaken by professionals afforded the status of 'professionally evaluated needs'. Professionally diagnosed illnesses and conditions also fall into this category.

1.4.2 Individually Perceived Needs

Individually perceived needs have most commonly been measured by a self-reported global assessment of health status. This involves a single question about how an individual would rate their overall health. However, more specific variables are also considered as measures of individually perceived needs. Somatic symptoms have been shown to be powerful predictors of health care utilisation (Barsky, Wyshak & Klerman, 1986), and because the seriousness attached to somatic symptoms is a personal evaluation, these too can be used as indicators of self-assessed need. Similarly, life stresses affect perceptions of personal health and seriousness of somatic symptoms with those experiencing high stress levels rating their overall health as poorer (Mechanic, Cleary & Greenley, 1982; Tessler, & Mechanic, 1978) and reporting more disturbing physical symptoms (Barsky, 1979; Mechanic, 1979) than those who are not experiencing high life stress levels. Thus, subjective psychological distress has been found to increase medical care use (Barsky, 1979; Regier, Goldberg & Taube, 1979; Waxman, Carner & Blum, 1982) and has commonly been used as an indicator of mental health status as a need characteristic.

The association between *perceived* mental health status and health service utilisation amongst the elderly has been found to be less straightforward than this research would suggest, however, and may hint at reasons for poorer fit of the model when applied to the aged. Berkanovic and Hurwicz (1989) found no association between psychological distress and health care

utilisation by the elderly. While they note that much research has linked psychological distress to increased health care utilisation, they point out that many of those studies have been based on clinical populations where people are already receiving treatment. It is therefore unclear as to whether the distress was a precursor or a result of their illness and so makes it impossible to say that the psychological distress *caused* them to seek medical assistance. Further, amongst studies directed specifically at the elderly rather than the general population which did find some association, the variance accounted for by psychological distress is quite small - 3% in a study by Levkoff, Cleary and Wetle (1987); 2% in a study by Arling (1985). Nor did these studies examine whether the service utilisation was considered medically necessary. This means that while the studies show that, among the aged, the high attenders suffer from a small but significant increased level of psychological distress, it may well be that this is related to very warranted concerns about compromises to health status.

However, gaining information about whether treatment is seen as warranted from a health professional's point of view is also fraught with difficulties. If use of a wide range of health services is considered, extreme difficulties are encountered when attempting to measure professionally-assessed need for such treatments as aromatherapy, and other 'natural' therapies. Even within the more 'mainstream' health services, professional opinion is also determined to a large extent by the opinions of the individual doctor, dentist, chiropractor, nurse or psychologist and may not be shared by other treatment providers. A weekly visit to the psychologist may not be seen as providing any benefit to a patient by his or her general practitioner, but the person may

continue to see the psychologist on *that* professional's recommendation. Thus, little real benefit seems to be gained by consideration of whether or not a particular health professional regards treatment as warranted.

Instead, a clearer picture of the relationship between perceived mental health and health service utilisation may be gained by consideration of the conceptualisation of mental health within Andersen's model. Because mental health can be considered in the context of a need (i.e. *mental ill-health* which requires treatment) and as a function of the social condition of the individual (e.g. network of supports, quality of relationships with friends and family), different measures of mental health can be considered as either predisposing, enabling or need characteristics. For example, experiencing life stress does not mean that the individual *perceives a need* for medical treatment. Certainly, going through a divorce can be easily recognised as a life stress, but the immediate and generalisable effects of divorce relate to the individual's social supports, changes in living conditions and financial concerns. Less generalisable is the perception of a need to use health services directly related to the effects of divorce, with only a percentage of people who are in the throes of divorce believing they require medical or psychological assistance. Therefore, within the behavioural model, mental health must be represented across constructs, and necessarily uses measures to reflect mental health status, as well as indicators which *affect* mental health (e.g. experiencing stressful life events and social supports).

Other research, using the Mental Health Inventory (MHI) (Manning & Wells, 1992), point to different partial effects of psychological distress and psychological well-being on use of health services and presents them as

separate and distinct features. As expected, they found when either psychological distress or psychological well-being was used as the only measure of the mental health component of need characteristics, poorer ratings were associated with greater use of medical services. However, when they were both used as separate measures of mental health, Manning and Wells found that for a given level of psychological distress, subjects who sought treatment actually reported *better* psychological well-being. From these studies, Manning and Wells postulated that psychological distress and psychological well-being were different dimensions with different effects, and that a psychologically well person was able to identify when they were experiencing psychological distress and seek help appropriately. Combining psychological distress and psychological well-being to provide an overall 'mental health score' therefore, may dampen each others' effects on health service usage, with low psychological wellbeing *inhibiting* an individual from seeking treatment despite having high levels of psychological distress. Therefore, to avoid distorting the independent influence of psychological wellbeing and psychological distress, this study will view both factors independently as indicators of mental health status.

Measurement of the need construct, then, centres around mental and physical requirements, either professionally diagnosed or individually perceived. To a large extent, consideration of this construct together with that of health care utilisation looks specifically at the question of 'do people who require treatment get it?'. While need characteristics have consistently proven to be the most influential of the predictive variables, inclusion of functional limitations and restrictions in activities of daily living to reflect *physical needs*, as suggested by Wolinsky et al (1989), and

Wolinsky and Johnson (1991; 1992), and consideration of psychological wellness and psycholgical distress as individual measures of *mental needs*, as suggested by Manning and Wells (1992), may aid in the identification of the particular *types of need* which result in more or less usage of health care services. Again, few studies have incorporated such a comprehensive representation of the need construct. This study then, will use an expanded set of need characteristic indicators in order to distinguish differences in influence on health care utilisation between individual need indicators (both psychological and physical) when considering the special case of the elderly.

1.5 Construct 4 - Health Care Utilisation

The final component of the behavioural model is that which the model aims to predict - the actual use of health services. For his model, Andersen divided the construct of health care utilisation on the basis of discretionary and non-discretionary behaviour. Discretionary behaviour encompasses the accessing of health care due to individual choice. Deciding when an acute injury or illness is serious enough to warrant professional advice or management and health maintenance consultations, including yearly dental checkups, blood pressure and cervical smear screens, are considered discretionary behaviours. These behaviours are seen as strongly associated with personal values, education and income. Non-discretionary accessing of health care, on the other hand, is determined by health care provider preference and related more to a professional assessment of need, e.g. admission to hospital, or regular monitoring of a condition on the request of the provider.

Importantly, these aspects of health care utilisation are not considered to be distinct components but more as points on a continuum, with visits to the masseuse for a relaxing massage representing more discretionary behaviour, urgent admission to the coronary care unit representing more non-discretionary behaviour, and consulting the family doctor for treatment of an infection falling somewhere in the middle. In this instance, while the initial impetus to seek health care comes from the individual, follow-up care is likely to be determined by the doctor. Because discretionary usage is more a function of the individual, it is expected that predisposing and enabling characteristics would have greater importance when predicting this type of health care utilisation and less importance when predicting non-discretionary health care utilisation (Wolinsky et al, 1989). An example of this was provided by Strain (1991) when investigating the influence of health beliefs (a predisposing characteristic) on health utilisation practices of the elderly. She noted that the nature of the health problem may at times be so severe that the individual's trust in medical science becomes irrelevant to the need for treatment, whereas in the case of elective surgery, medical scepticism may have a marked bearing on the type and amount of treatment pursued. While Strain calls for distinctions to be made according to reasons for health service use, the concept of a continuum of discretion has resulted in some difficulty in measuring the health care utilisation construct as this requires inclusion of cognitive motivations within a behavioural framework.

However, while a continuum of discretion has been recognised in terms of *motivations* to use health care services, the types of health care services measured in previous studies have not considered a comprehensive range of

health care providers involved with more discretionary health care services. Those ignored include such professionals as optometrists, pharmacists, psychologists, naturopaths and homeopaths, and represent a large volume of health care services that may be used *instead* of consulting doctors, going to outpatient and accident and emergency departments. By including these health care professionals within the measurement of health care utilisation, the effects of both discretionary and non-discretionary health service usage can be considered. This makes distinction between reasons for health service use, as argued by Strain, unnecessary both in terms of obtaining an overall health care utilisation measure, and improving the predictability of the model.

Related, but not equal to, the concept of 'discretion' are preventative and restorative motivations for seeking health care services. While it has been argued that almost all health care use (other than hospital admission while unconscious or mentally unfit) has some degree of patient discretion associated with it, it is clear that seeking health care for preventative reasons (e.g. blood cholesterol checks) and seeking health care for treatment of existing symptoms or conditions, can produce quite different patterns of use within the *same* individual. The individual who monitors his/her health status by making prevention-motivated contacts with health care providers (a purely discretionary action), can be expected to avoid suffering at least some serious conditions requiring extensive medical treatment. Alternatively, the individual who has no contact with health providers until such a time as they have little alternative but to seek intensive treatment (a more non-discretionary action), may balance this seesaw of patterns of health service

use. While it is postulated that the differing effects actually moderate each other when considering overall health service usage, Wolinsky et al (1983) have suggested that neglecting to distinguish between preventative and restorative reasons for seeking health care services is a possible cause of ill fit of the behavioural model when applied to the elderly.

Mechanic (1979) identified further difficulties in the measurement of the health utilisation construct by noting that previous researchers viewed health care utilisation as simply a function of contacts with health providers. Mechanic argued that bed disability days and restrictions in activities were not indicators of need, as was generally accepted, but should be considered as measures of illness *behaviour* as these represent the individual's *response* to a perceived need. From this, Wolinsky et al (1983) reasoned that these illness behaviours were the *precursors* to the use of health care services in that they represented informal health management. This 'layperson' treatment would often be associated with consumption of non-prescription drugs, assistance, and referral and treatment advice from family and friends. In this way, Wolinsky et al (1983) distinguished between informal and formal means of health care utilisation.

1.5.1 Informal Health Care Utilisation

Informal health care utilisation has been measured, following Mechanic (1979) and Wolinsky et al (1983), by determining whether any bed-disability days, i.e. days spent in bed due illness or injury, were taken in the previous 12 months, and if so, how many.

Wolinsky and Johnson (1991, 1992) also questioned what home health services, e.g. meal delivery services, home help services, visiting nursing services, were accessed by elderly respondents. Cafferata (1987) too looked at bed disability days as a measure of informal use of health care services, but treated them not as precursors of formal health service use, but as substitutes for formal health service use. This study provided support for the 'substitution effect' where elderly persons who lived with others were found to be more likely to take to their beds sick (informal use) but less likely to consult their doctors (formal use), and highlights the need to distinguish between these two types of health care utilisation when focusing on the elderly.

1.5.2 Formal Health Care Utilisation

Formal health care utilisation has been most commonly assessed by looking at contact and volume measures of doctor and hospital utilisation during the previous 12 month period. Other studies have also considered contacts with accident and emergency services, outpatient services, pharmacists, and medical laboratories (Strain, 1991). Kandrack et al (1991) asked their respondents to indicate the number of different medications currently being taken, but it is unclear whether this was considered an indication of formal or informal health service use as no distinction was made between prescriptive and over-the-counter medications. Wolinsky and Johnson's (1992) longitudinal study included a contact measure of nursing home

placement and prospective measures of nursing home placement and death within the two-year window between the baseline and follow-up interviews. Mortality measures were seen as an appropriate proxy to the use of formal health services as the highest rate of health care utilisation has been shown to occur in the two years preceding death (Roos, Shapiro & Tate, 1989).

Based on Wolinsky and Johnson's (1991, 1992) conceptualisation of health care utilisation, consideration of formal and informal measures to determine whether their predictors differ is necessary. However, it is argued here that investigation into discretionary health service behaviours, requires consideration of services provided by an array of health professionals peripheral to, or completely separate to, medical services.

1.6 Summary and Research Goals

Wolinsky and Johnson's (1991) study surveyed over 5,000 elderly respondents from across the USA, and used what at the time were innovative indicators. A large scale study measuring indicators suggested as being important by subsequent research has not been attempted. Based on the findings of recent research and the suggested weaknesses in the application of the behavioural model listed in the previous section, the overall goal of this study is to:

Replicate Wolinsky and Johnson's (1991) study in a New Zealand context utilising expanded sets of indicators of predisposing,

enabling, need, psycho-social and health care utilisation constructs with measures specific to elderly populations.

This will allow assessment of the 'goodness of fit' of an extended behavioural model to the health care utilisation practices of New Zealand elderly and may provide the opportunity to suggest alternative indicator sets which increase the model's predictive ability.

Despite its widespread usage, studies specific to health care utilisation of the elderly using Andersen's model have consistently found evidence of 'poor fit'. Wolinsky et al (1989) noted that studies up to that time indicated that the amount of total variance explained by the model was relatively low ($R^2 < 0.25$) and was even less in North American studies of the elderly. While the expanded sets of measures of predisposing, enabling and need characteristics used by Wolinsky and Johnson (1991) have resulted in some increase in the total variance explained, the important point is that studies to date, centring on the variability in health service utilisation patterns of older persons, seldom account for more than 25% of the variance.

Another major criticism of Andersen's model when applied to the elderly is that need characteristics dominate as indicators of health care utilisation and the effects of predisposing and enabling characteristics have been shown to be mostly small ($R^2 < 0.05$). A theoretical model predicting that older people use health care services if they think they need to, does not appear to offer much insight into the precursors of health utilisation behaviours.

The ways in which this study aims to improve the predictive power of the behavioural model when focusing on older adults are:

A) Inclusion of measures which reflect psychosocial factors

The importance of including psychosocial factors within the behaviourlal model is highlighted by Cheng's (1992) study. This study focused on the relationships between physician utilisation by elderly females and health status, loneliness, stress and somatization. Cheng separated health status from the other factors, which she labelled 'psychosocial' factors. She measured health status by consideration of limitations in daily living activities and the number of chronic illnesses subjects had had in the previous 12 months. Psychosocial factors were measured by indices of undesirable life events, presence of symptoms perceived as 'bothersome', and degree of distress associated with perceived loneliness. Health status was found to account for approximately 30% of the variance in frequency of doctor visits, and psychosocial factors, in particular loneliness-distress, accounted for a further 13% - 14% of the total variance. This compares with the findings of studies not recognising similar psychosocial factors which were able to explain no more than 25% of the total variance.

Because psychosocial factors are considered to have more importance for the aged population (McKinlay, 1985; Wolinsky et al, 1983; Wolinsky et al, 1989; Cheng, 1992), it is reasonable to assume that inadequate representation or complete omission of such factors would have more extreme ramifications when dealing with the elderly than with the general population. Thus, in the present study, emphasis will be placed on inclusion of indicators which reflect the psychosocial context in which the participant

functions.

These indicators, generally considered within the domain of the predisposing construct, include the number of stressful life events experienced, whether the person lives alone or with others, and a gauge of social contacts. While specific indices for loneliness-distress have not been included, a psychological distress measure which taps into this area will be included as a need indicator. Therefore, while all of these measures are considered to represent psychosocial factors, they are not considered here to form a construct of their own, but rather are categorised across constructs outlined by Andersen. The influence of these various psychosocial measures over health care utilisation behaviours is expected to translate into increases in the total variance explained by the model.

B) Inclusion of more comprehensive sets of measures for predisposing, and enabling characteristics

The elderly experience more health problems than the general population and this increased influence of need characteristics may overwhelm any predictive power of the predisposing and enabling characteristics. It is suggested here that a more comprehensive and accurate representation of the predisposing and enabling constructs, as well as the inclusion of psychosocial factors, will go some way to more clearly demonstrate the effects of predisposing and enabling characteristics. Therefore, the present study will use expanded sets of indicators to capture these constructs. Along with other demographic indices, predisposing measures will include

consideration of health beliefs in terms of worry and locus of control.

Further, while Wolinsky et al (1983) found nutritional risk (as measured by the elderly respondents' knowledge of the four basic food groups) to be the most important predictor of the total number of physician visits, emergency room visits and number of hospital admissions, little evidence of further work into health risk behaviours as influences of health service usage exists. As a subsidiary goal, this study will include consideration of alcohol consumption in the elderly to indicate the influence of health risk behaviours on the predictiveness of the model.

The expanded set of indicators for enabling characteristics will include measures of the dimensions of access suggested by Penchansky and Thomas (1981), rather than relying only on interpretation of data related to health insurance and income. In New Zealand, where private health insurance costs are such that the majority of people cannot afford to join, and government subsidies, which are not all encompassing, are offered only to people with the very lowest income rates, health care costs are seen to be a substantial barrier to the use of health care services. This is particularly so in the case of the elderly and it is therefore expected that enabling characteristics will have more of an influence when the model is applied to a New Zealand population.

C) Inclusion of expanded sets of measures of mental and physical health as need characteristics

To investigate what type of need characteristics influence the use of formal and informal health care and what type of need characteristics influence the use of discretionary and non-discretionary health care services, measures of both physical and mental health will be used. Relatively few previous studies have considered both of these health domains in tandem.

D) Consideration of a broader array of health care professionals when investigating health care utilisation

Health care utilisation measures have concentrated on 'mainstream' health care providers, ignoring natural therapists such as masseuses, aromatherapists and naturopaths despite their increasing popularity. Similarly, other health care professionals such as physiotherapists, psychologists and chiropractors have been overlooked, with health care measures most commonly focusing on general practitioner contacts. The patterns of usage of these health care providers by the elderly remains unclear. This study then will recognise the services provided by health care providers previously neglected and include them as measures of the health care utilisation construct in an attempt to gain a more comprehensive representation of that construct. Further, following the lead of Kandrack et al (1991), a measure of medications being taken will also be considered as a gauge of health care utilisation. To make clear the distinction between formal and informal health care utilisation, only the use of *prescription* items (as a formal measure) will be investigated.

1.7 The Purpose of this Study

The importance of investigating the health care utilisation practices of the elderly is a critical consequence of a rapidly aging world. As increased demands for health care services place more strain on resources limited by financial support, efficient use of current resources, and perceptive strategies to meet expanding requirements become imperative. While Andersen's model represents the most widely used theoretical framework for research into this area, much of the work has been based on North American populations, including migrant populations.

This study is therefore unique in two ways; it incorporates measures found to be more informative in separate, recent studies, and it includes them in an investigation of the behaviours of a large sampling of people outside of the USA. This allows the stability of the model to be considered across cultures as well as afford the opportunity to use measures pertinent to a particular country's condition, for example government subsidies and accepted social activities. In particular, a New Zealand study allows examination of the health care practices of indigenous elderly from different ethnic backgrounds (Maori and Non-Maori) rather than investigating differences in migrant and non-migrant populations. Any differences in health care requirements which may exist between Non-Maori and Maori elderly cannot be extrapolated from research on migrant populations in the United States, and a study which considers the New Zealand condition is essential.

Currently, New Zealand faces what threatens to be a health care crisis, with long surgery waiting lists for public patients and prohibitive health insurance

costs. At the same time, discrimination on the basis of age for the right to treatment has become socially and legally unacceptable. These factors, together with an increasing percentage of elderly people, make planning for the health needs of the older adults very necessary. This study represents an important early step in addressing the future health care needs of elderly New Zealanders.

2. METHOD

2.1 Participants

Data from participants included in this study was accessed from a national study investigating frequency and impact of traumatic events, physical and mental health consequences of exposure to trauma, and patterns of health service utilisation. From each of the 150 census meshblocks sampled in 15 regions throughout New Zealand, eligible adults were contacted from randomly selected households and ten interviews were conducted in each meshblock. The survey, which was ethnically and geographically stratified, was designed to yield disproportionately large sub-samples of Maori and non-urban respondents. This approach was required to yield sufficient of these populations of interest to enable conclusions to be drawn about their experiences with a greater statistical reliability than would otherwise be the case if their representation in the sample was in proportion to their presence in the total population in the country. A geographic distribution of meshblocks is provided in Table 1. From the 3,562 attempted contacts, 42% were eligible, available and willing to participate. Of this group of respondents, 354

individuals were aged 60 years or over and the information gained from them has been incorporated in this study. The overall sample of 1500 respondents has been described in detail elsewhere (MacDonald, Flett & Long, in press).

Table 1: Geographic Distribution of Meshblocks

Region	Number of Meshblocks
Northland	16
Auckland	23
Waikato	19
Bay of Plenty	28
Gisborne	16
Hawkes Bay	7
Taranaki	5
Manawatu - Wanganui	8
Wellington	10
Nelson - Marlborough	2
West Coast	2
Canterbury	7
Otago	4
Southland	3

2.2 Procedure

Structured interviews were individually conducted by trained data collectors from the National Research Bureau (NRB) with each participant in their own home. Interview times generally ranged from 45 to 60 minutes. Responses were recorded by the interviewers on each interview outline and data was collected over a three month period. Participants were informed that their responses were anonymous and confidential, that they could skip or omit any question, and that they could withdraw from the study at any time. A

procedure was outlined whereby respondents could receive feedback of the results of the study.

2.3 Measures

Measures used from the structured interview schedules and incorporated in this study are as follows: (Response formats for all measures are summarised in Table 2, page 49)

2.3.1 Predisposing Characteristics

Thirteen measures of sociodemographic factors were used to accommodate such features as sex, age, marital status, ethnicity, educational qualifications, cohabitants and social contacts. Whether the participant lived in a rural or urban area was determined using categorisations employed by the New Zealand Department of Statistics. Educational qualifications were identified by selection of an appropriate description from an eight item scale as included in the 1986 New Zealand. Ethnicity was assessed by selecting one item on a ten item scale which the respondent determined best described them, this measure also originating from the 1986 New Zealand Census. As argued by Cafferata (1987), questions to determine whether an individual lived alone or with other/s and marital status were used to investigate social contacts.

Emulating items used by Nelson (1993), phone access, access to a car, the presence of living siblings, and telephone and physical contacts (including church attendance) made with family or friends

in the past 2 weeks, were also used to construct a comprehensive picture of social contacts. An actual social contact score was made by adding the types of actual contacts made from the three possible indicators of speaking on the telephone, getting together with family or friends and going to church.

A life events scale specific to this study was used which incorporated positive and negative life stressors found to be significant in previous research (Raphael, Lundin & Weisaeth,1989). Experience of any of the 20 life events included in the scale during the past 12 months was considered here to be a psychosocial factor within the predisposing construct, as the events listed (e.g. death of a partner or spouse, retirement, moving house, major financial difficulties or improvements) cannot be removed from their social context and in this way were seen to be more a reflection of an individual's social situation rather than of their perception of need. This is in contrast to Jewett et al's (1992) approach, as life events (measuring life stress) were seen in their study to represent a need characteristic.

Alcohol consumption, as a health risk behaviour, was also included as a predisposing factor. A single question asking "Do you ever drink alcohol?" was used to offer some insight into the influence of health risk behaviour. Problems associated with the definition and measurement of drinking behaviour are well documented in the research literature (e.g. Casswell, 1980) and therefore a detailed analysis of drinking behaviour was considered beyond the scope of

the present study.

The two attitudinal measures of health beliefs used in this study were based on items used by Wolinsky and Johnson (1991) and pertained to the degree of worry overall health over the past 12 months had caused and the amount of control they perceived they had over their health. Each was assessed using single item questions.

2.3.2 Enabling Characteristics -

Affordability issues were addressed by reviewing the impact of doctors' fees (whether costs prevent seeking medical advice even when it is perceived as necessary) as used by Gribben (1992), having or not having private health insurance (Wolinsky and Johnson, 1991;1992), having or not having a community services card, and personal income. Emulating Eve and Friedsam (1980), income was measured both objectively (yearly income before tax), and subjectively, (using a four point satisfaction with overall standard of living scale, and a four point ability to manage on current income scale).

Acceptability factors were measured by looking at whether the individual had a regular doctor, following Wolinsky and Coe (1984), how long the participant had been seeing this doctor, and whether the doctor was male or female. This can be used to determine if there is a preference for same sex physician selection.

Accessibility was assessed by consideration of the usual mode of

transport taken to get to the doctor's surgery, similar to the method employed by Gribben (1992). Use of the phone and personal transport were not included as measures of accessibility, but treated as measures of predisposing characteristics.

Accommodation features were considered only on the basis of how long the participant usually had to wait in the doctor's waiting room before being seen by the doctor, with the response being recorded in minutes.

2.3.3 Need Characteristics -

Ten variables were used to represent need characteristics. Individual perceptions were reflected in a single four point item of self-rated health in a similar vein to that of Wolinsky and Johnson (1991) and Gribben (1992). Specifically, respondents were asked to rate their current overall health as excellent, good, not so good or poor.

Development of a scale based on the Pennebaker Inventory of Limbic Languidness (PILL), (Pennebaker, 1982) to identify experience of somatic symptoms was undertaken for use in this study. From a list of 54 common physical symptoms and sensations used in the PILL, 28 physical symptoms and complaints were indexed (e.g. leg cramps, muscle or joint pain, headaches), with respondents indicating experience of these symptoms on a five point scale of 'bother' (not at all, a little, moderately, quite a bit, extremely). Thus, scores provided on this index provided a composite reflection of the number and

severity of physical symptoms experienced by the respondent.

Mental health was assessed using the Mental Health Inventory (Veit & Ware, 1983). Consisting of a list of 38 items covering psychological and emotional states, this inventory provides subscores for psychological wellbeing and psychological distress, and these dimensions were considered as separate variables within this study. Both dimensions have been found by Veit and Ware to have high internal consistency measures and high one-year stability. Respondents are asked to indicate on a seven point response scale how often they had experienced each of the 38 listed conditions (e.g. able to relax without difficulty, restless, fidgety or impatient, low or very low spirits, felt loved and wanted, in firm control of behaviour, thoughts, emotions and feelings) during the past month.

Limitations in daily living were assessed using a 12 item list of activities used by Wolinsky and Johnson (1991) and originally developed from the Activities of Daily Living (ADL) scale originally outlined by Katz, Ford, Moskowitz, Jackson & Jaffee (1963), and the Instrumental Activities of Daily Living (IADL) scale introduced by the Duke University Center for the Study of Aging and Human Development (1978). These items provide scores on three dimensions - *basic activities*, consisting of five items related to personal care, including bathing, dressing, getting out of bed, walking and toileting; *household activities*, consisting of four items relating to meal preparation, shopping, light housework and heavy housework; and *advanced activities*, consisting of three items relating to managing

money, using the telephone and eating. Each of these three dimensions of activities of daily living were considered as separate variables. Participants were asked to indicate which, if any, of these daily activities they had trouble with because of their health. Because this was seen as a self-assessment, limitations in daily living were not considered as proxies for professional evaluations as Wolinsky and Coe (1984), Wolinsky et al (1989), and Wolinsky and Johnson (1992), have previously argued.

Likewise, self-rated functional limitations were used to indicate individually perceived needs, and the same scales as those used by Wolinsky and Johnson (1991) were used here. Wolinsky and Johnson developed their scales for functional limitations from Nagi's (1976) disability scale. Two dimensions of functional limitations are measured - *lower body limitations*, consisting of five items including walking half a kilometre, walking up ten steps without rest, standing or being on your feet for two hours, stooping, crouching or kneeling and lifting or carrying ten kilograms; and *upper body limitations*, consisting of four items including sitting for two hours, reaching up over your head, reaching out as if to shake hands and using fingers to grasp objects. These two dimensions were considered as separate variables. Respondents were asked to indicate whether they had difficulty in doing any of these things.

Professionally evaluated needs were measured by the number of common chronic health problems on a 17 item list (e.g. cancer, diabetes, epilepsy, hearing impairment or loss, arthritis or rheumatism)

experienced by respondents for a period of three months or longer. This list was developed using a checklist of serious medical conditions (Belloc, Breslow & Hochstim, 1971) in association with common chronic health conditions identified in the 1992-93 Household Health Survey (Statistics New Zealand & Ministry of Health, 1993). As these conditions and ailments would initially have needed to be identified on the basis of medical diagnoses, these were considered to more accurately reflect professionally evaluated needs than items which did not require medical assessment.

2.3.4 Health Care Utilisation

As used previously by Wolinsky and Johnson (1991), informal health care utilisation was measured using the number of days spent in bed due illness over the preceding 12 months and the number of visits to a doctor in the preceding 12 months were used to assess formal health care utilisation. However, as an augmentation in the measurement of health care services used by older adults, participants were also asked how many prescription items were bought in the previous 12 months, based on suggestions by Kandrack et al (1991), and which of a list of 11 health professionals, (including optician or optometrist, chiropractor, psychologist, medical specialist other than GP, dentist or dental nurse, physiotherapist, psychiatrist, occupational therapist, counsellor, social worker, and naturopath or homeopath) they had visited in the last 12 months, based on arguments provided by Strain (1991).

2.4 Analysis

Before undertaking hierarchical multiple regression analyses to determine the nature of the relationship between predisposing, enabling and need characteristics with health care utilisation practices, screening of data was necessary. Log transformations were applied to the dependent variables measuring visits to the doctor, and number of other health professionals seen. It was also necessary to reflect the variable measuring days spent in bed due sickness because of its extreme skewness. Even so, this variable remained significantly skewed after transformation.

One case with a high Z score on days spent sick in bed was identified as a univariate outlier and was excluded from further analysis. On investigation of Mahalanobis distance, no multivariate outliers were identified using a conventional but conservative probability level ($p < 0.001$) as suggested by Tabachnick and Fidell (1989).

Investigations of the relationships between variables were undertaken using correlation coefficients (Pearson r's) and t-tests. Following Snedecor and Cochrane (1980), when a t-test was performed, sample variances for each comparison made were assessed using an F test in order to determine whether they were or were not equal. When the probability of F was found to be > .05, the sample variances were considered equal and t statistics based on pooled variance estimates were used. Alternatively, when the probability of F was < .05, equal variances were not assumed and the t statistics based on separate variance estimates were used.

Hierarchical multiple regressions were then used to examine the model fit for

each of the four dependent variables, following the analysis procedures of Wolinsky and Johnson (1991, 1992). However, in their 1991 and 1992 studies, Wolinsky and Johnson chose to enter the least important independent variables (predisposing, then enabling variables) before what previous research had found to be the more important independent variables (need variables). In this way, need characteristics were then assessed on the basis of what they contributed over and above predisposing and enabling characteristics. In this study of elderly participants, it is argued that more focus should be placed on predisposing and enabling characteristics and that introducing need variables in the first entry allows a clearer view of the amount of variance explained solely by the predisposing and enabling variables once the overriding influences of need characteristics have been accounted for. Accordingly, need variables were entered on the first step and predisposing and enabling variables entered on the second step. In this way, the question of whether predisposing, and enabling characteristics significantly add to the prediction of health care utilisation once need characteristics are controlled for, can be answered.

3. RESULTS

The results of this study are presented in the following format:

1. Descriptive statistics which present participants in this study in terms of their predisposing, enabling and need characteristics and their health care utilisation behaviours are provided in order to gain some understanding of the qualities and general practices of the group of people involved in this study.

2. The behavioural model's predictiveness will then be considered. Findings of each of the four hierarchical multiple regression analyses undertaken are outlined, viewing firstly the results associated with the three measures of formal health care utilisation (number of visits to the GP in the previous 12 months, number of prescribed items bought in the last 12 months and number of health professionals, other than a GP, seen in the previous 12 months), followed by the results associated with the informal health care utilisation measure of number of days spent in bed due illness in the past 12 months.

3. Further investigative analyses suggested by the outcomes of the hierarchical multiple regression analyses will then be described and their results presented.

3.1 Descriptive Statistics

A broad overview of the participants as described by the measures used in this study can be gained by viewing the means, standard deviations and coding algorithms for all variables used in the analyses. This information is presented in Table 2.

Table 2: Means, Standard Deviations and Coding Algorithms for Variables

(after Wolinsky and Johnson, 1991)

	Mean	*SD*	*Coding Algorithm*
Predisposing Characteristics			
Age	69.90	7.24	Actual age in years
Gender	1.56	.50	1 = male, 2 = female
Ethnicity	.19	.39	0 = European, 1 = Maori
Area	1.53	.50	1 = urban, 2 = rural
Lives Alone	1.63	.48	1 = yes, 2 = no
Qualifications	2.20	1.73	7 item scale (1 - 7) 1 = No School quals, 2 = School Cert, 3 = 6th form / Uni. Entrance, 4 = Bursary/Scholarship, 5 = Trade/Prof. Quals, 6 = Uni degree, 7 = Postgrad.
Telephone	.92	.27	1 = yes. 2 = no
Vehicle	.83	.37	1 = yes, 2 = no
Life events	1.61	1.39	Actual no. of events experienced
Social Contacts	2.03	.74	Actual no. of contacts (0 - 3)
Drink Alcohol	1.36	.48	1 = yes, 2 = no
Health worries	2.85	.95	4 item scale (1 - 4) 1 = great deal, 2 = some, 3 = hardly any, 4 = none
Health control	1.79	.84	4 item scale (1 - 4) 1 = great deal, 2 = some, 3 = very little, 4 = none
Enabling Characteristics			
GP waiting times	18.40	13.67	Actual no. of minutes
GP fees limit access	1.27	.67	4 item scale (1 - 4) 1 = not at all, 2 = occasionally, 3 = some of the time, 4 = often
Satisfaction in Standard of Living	3.18	.75	4 item scale (1 - 4) 1 = very dissatisfied, 4 = very satisfied
Adequacy of Income	2.55	.74	4 item scale (1 - 4) 1 = can't manage, 2 = just enough, 3 = little over, 4 = always extra
Income	13,697.17	9,687.31	Actual annual income ($NZD)
Time Been with Same GP	4.16	1.22	5 item scale (1 - 5) 1 = 0-3 mths, 2 = 4-12 mths, 3 = 1-2 yrs, 4 = 3-5 yrs, 5 = 5+ yrs
Sex of GP	1.10	.31	1 = male, 2 = female
Private health insurance	1.77	.42	1 = yes, 2 = no
Community Services Card	1.30	.46	1 = yes, 2 = no

Table 2 continued over...

Table 2 continued...

	Mean	*SD*	*Coding Algorithm*
Need Characteristics			
Self-rated health	1.26	.44	1 = positive, 2 = negative
Psychological Distress	47.61	19.62	Score from Mental Health Inventory (Min - 24, Max - 112)
Psychological Wellbeing	79.58	13.70	Score from Mental Health Inventory (Min - 24, Max - 98)
Basic ADL's	.42	.83	6 item scale (0 - 5) - Sum of Basic ADL's
Household ADL's	.43	.88	5 item scale (0 - 4) - Sum of Household ADL's
Advanced ADL's	.07	.32	4 item scale (0 - 3) - Sum of Advanced ADL's
Lower body limitations	1.73	1.79	6 item scale (0 - 5) - Sum of lower body limitations
Upper body limitations	.49	.84	5 item scale (0 - 4) - Sum of upper body limitations
Chronic Health Conditions	2.62	1.88	No. of chronic health conditions, (Min -0, Max - 10)
Physical Symptoms	38.80	9.35	Composite score of number and severity, (Min - 28, Max - 91)
Health Care Utilisation			
Days in bed sick in 12/12	.24	.41	Actual no. of days (truncated at 60)
GP visits in 12/12	4.98	5.94	Actual no. of visits (including 0)
Prescriptives	3.01	1.44	5 item scale (1 - 5) 1 = none, 2 = 1-4, 3 = 5-9, 4 = 10-14, 5 = 15+
Other health professionals	1.15	1.20	Actual no. of different types of professionals consulted

3.1.1 Predisposing characteristics described statistically

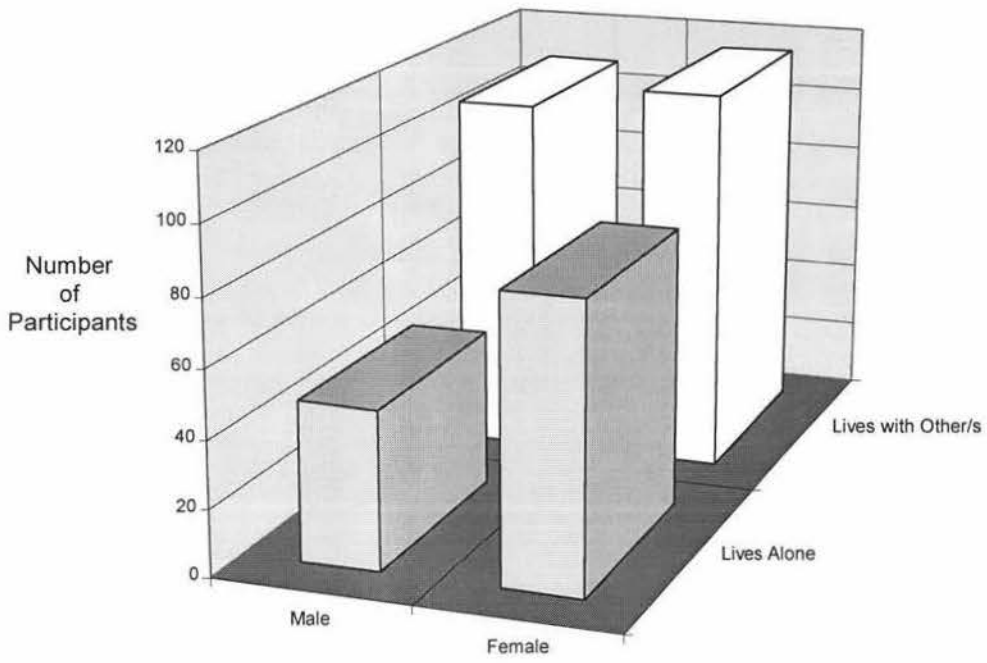
Participants in the research consisted of 155 males and 199 females all of whom were aged 60 years or over, with a mean age of 69.9 (SD = 7.24). Table 3 presents the age spread of the male and female participants. From this it can be seen that 54.8% of the total participants were aged from 60 to 69 years, 31.6% were aged between 70 to 79 years, 13% were aged from 80 to 89 years, and only 0.6% (i.e. two participants, both women) were aged from 90 to 99years.

Table 3: Age Ranges for Male and Female participants

			Age in Years				
			60 - 69	70 - 79	80 - 89	90 - 99	TOTAL
Gender	Male	Count	77	53	25	0	155
		%	49.7	34.2	16.1	0	100
	Female	Count	117	59	21	2	199
		%	58.8	29.6	10.6	1.0	100
TOTAL		Count	194	112	46	2	354
		%	54.8	31.6	13.0	0.6	100

An even geographical spread of participants was evidenced by 47.2% living in urban areas, and 52.8% living in rural areas. Most of the participants lived with others (63%), but of those who lived alone, significantly more (64.1%) were women, χ^2 (1, $\underline{N}$ = 354) = 4.92, $p < .05$. A bar graph detailing this spread is presented in Figure 2. Only two participants who indicated they were married also indicated that they lived alone. While it is expected that those who were married were living with their spouses, 34 of those not married were also living with others.

Figure 2: Gender Distribution of Participants Living Alone or Cohabiting with Others



Of the 354 respondents, 66 were Maori, 278 of European descent, 10 were from other ethnic origins. Because these 10 people represented over six other different ethnic groups, they could not be considered to represent a normal distribution for their ethnic groups and were therefore filtered from a crosstabulation which considered the highest educational qualification gained by ethnicity. A further six respondents did not provide information about their highest qualification, and also could not be included, leaving a group of 338. From Table 4 it can be seen that 52.1% of the participants had no school qualifications, with 76.6% of the Maori population and 46.4% of the European New Zealanders being represented in this group. One obvious area of difference is that none of the Maori participants gained any university

or overseas qualifications.

Table 4: Crosstabulation of Ethnicity by Highest Educational Qualifications

		HIGHEST QUALIFICATION								
		No School Qualifi-cation	School Cert.	6th Form Cert. or UE pass	University Bursary/ S'ship	Trade/Prof. Cert / Diploma	Uni Degree/ Diploma	Uni Post-graduate	Other (e.g. overseas quals)	**Total**
European Group	Count	127	52	17	1	43	8	8	18	274
	% of European Group	46.4%	19.0%	6.2%	.4%	15.7%	2.9%	2.9%	6.6%	100.0%
Maori Group	Count	49	6	4	1	4	0	0	0	64
	% of European Group	76.6%	9.4%	6.3%	1.6%	6.3%	.0%	.0%	.0%	100.0%
Total	Count	176	58	21	2	47	8	8	18	338
	% of Total Participants	52.1%	17.2%	6.2%	.6%	13.9%	2.4%	2.4%	5.3%	100.0%

A representation of the types of social contacts for this group of elderly people is presented in graph form in Figure 3, and shows that the vast majority have a phone, have access to a vehicle and have living siblings and/or children, suggesting high potential for social activities. Measures of *actual* social contacts in the previous two weeks (having had a telephone conversation, meeting with family or friends, and church attendance) support the expectation that people take advantage of features which improve their social accessibility resulting in most having social contacts, although lower rates of church attendance are noted. When actual social contact measures are combined, the lower incidence of church attendance contributes to 53.4% of participants having two of the three types of social contacts

considered (see Table 5). The internal consistency of this composite variable was confirmed by consideration of Kuder-Richardson -20 (KR-20) reliability, with the social contact variable providing a standardised reliability of 0.71. Importantly, 97.2% of participants have had at least one of the three social contacts in the previous two week period and on chi-square analysis, women have significantly more social contacts than men, χ^2 (3, $\underline{N}$ = 354) = 11.56, $p < .01$.

Figure 3: Social Indicators - Potential and Actual

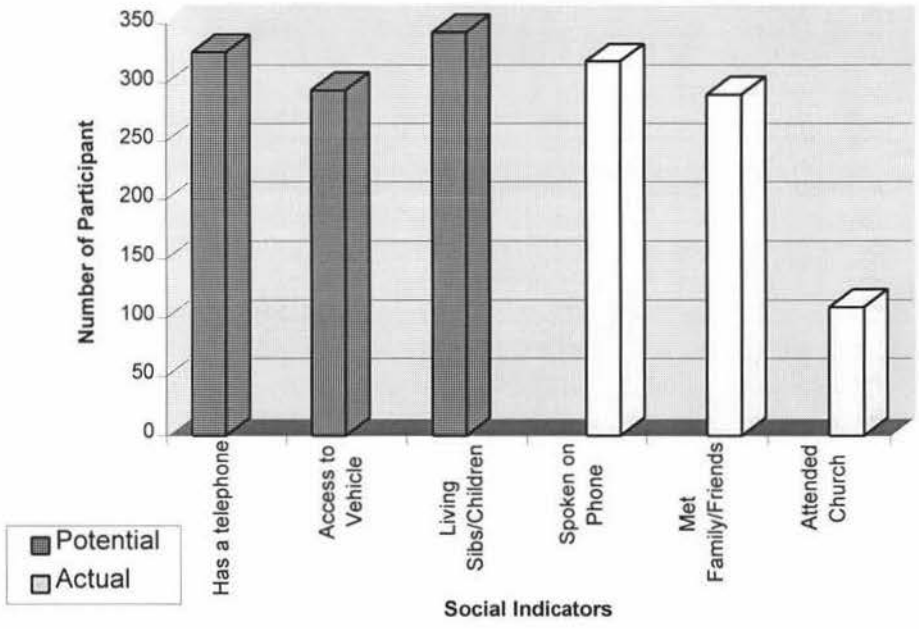


Table 5: Scores of Types of 'Actual' Social Contacts

Number of Social Contacts	Frequency	Percentage
None	10	2.8
One	62	17.5
Two	189	53.4
Three	93	26.3
Total	354	100.0

Of the 353 persons who chose to indicate whether they drank alcohol or not, 226 (36%) described themselves as non-drinkers. This represented 29.9% of the male sample, 40.7% of the female sample, 32.1% of the European sample and 50% of the Maori sample.

Inspection of the number and types of life events experienced by this group of respondents during the preceding 12 months showed that family health concerns, problems with their own health, death of a family member and retirement were the most commonly experienced. These results are presented in graph form in Figure 4. When the sum of life events were scored for each person, the highest number of life events experienced for any one respondent was 7, with 90% experiencing 3 or less of the possible 20 events. Table 6 presents the distribution of scores of life events in detail.

Figure 4: Frequency of life events

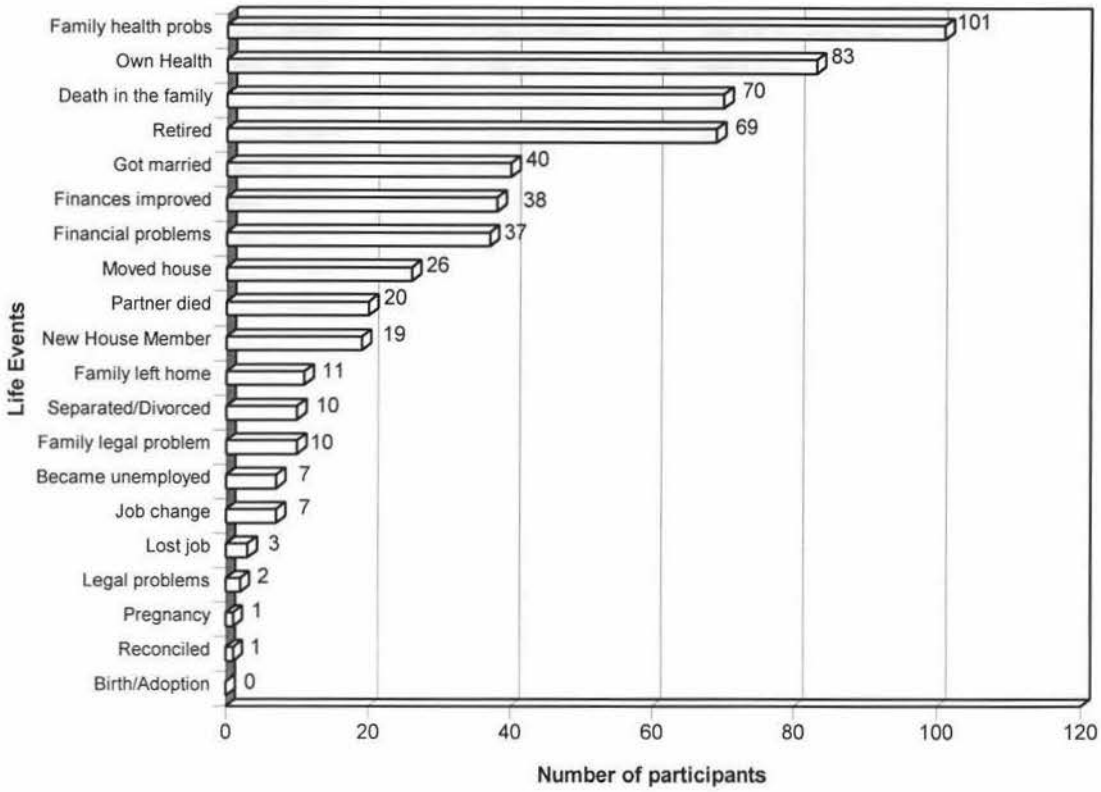


Table 6: Number of Life Events Experienced by Participants

Number of Life Events	Number of Participants	Percent
0	87	24.6
1	101	28.5
2	80	22.6
3	52	14.7
4	23	6.5
5	7	2.0
6	2	0.6
7	2	0.6
Total	354	100.0

The number of life events experienced represents a continuous variable, and to highlight important associations amongst all of the continuous variables used in this study, intercorrelations based on Pearson's r were investigated. Table 7 presents the correlation coefficients for these variables, with degree of significance indicated. From this table, it is interesting to note that experiencing more life events is associated with increased psychological distress ($p < .01$) and a greater degree of worry related to health ($p < .01$).

Participants generally felt they had some degree of control over their future health, with only 16% indicating they believed they had very little or no control, while 60% have experienced little if any worry related to their health. Frequency distributions are presented in Tables 8 and 9. As could be expected, worry about health and control over health are negatively correlated, $r = -.183$, $p < .01$. Significantly, a high degree of worry about health is associated with increased visits to the GP, $r = -.418$, $p < .01$, more days spent in bed due to illness, $r = -.223$, $p < .01$, seeing a greater variety of health professionals, $r = -.223$, $p < .01$, and taking more prescription medications, $r = -.174$, $p < .01$, and is the only variable that correlates significantly to the four health care utilisation variables used in this study. On the other hand, perceptions of greater control over their own health is correlated with seeing less different types of health professionals, $r = .108$, $p < .05$, and taking less prescribed medications, $r = .155$, $p < .01$. to

Table 7: Intercorrelations between Continuous Variables

	Age in Years	Social contacts	Life events	Health control	Health worry	Annual income	Adequacy of income	Psych. wellbeing	Psych. distress	Physical symptoms	Chronic health conditions	Basic ADL's	Advanced ADL's	Household ADL's	Lower Body limits.	Upper body limits.	GP visits	Days in bed sick	Other health profs. Seen	Prescr. items
Age in years	1.000																			
Social contacts	-.032	1.000																		
Life events	-.204**	-.046	1.000																	
Health control	.067	.085	-.027	1.000																
Health worry	-.026	.068	-.163**	-.183**	1.000															
Annual income	-.066	.160**	-.064	-.065	.051	1.000														
Adequacy of income	.247**	.170**	-.180**	-.067	.063	.352**	1.000													
Psych. Wellbeing	.030	.088	-.103	-.203**	.283**	.016	.074	1.000												
Psych. Distress	-.086	-.033	.172**	.143**	-.418**	-.034	-.127*	-.670**	1.000											
Physical symptoms	.020	-.045	.798	.128*	-.395**	-.132*	-.127*	-.284**	.463**	1.000										
Chronic health cond.	.144**	-.006	.075	.151**	-.262**	-.168**	-.075	-.122*	.199**	.500**	1.000									
Basic ADL's	.091	-.063	.031	.209**	-.403**	-.037	.023	-.088	.125*	.251**	.204**	1.000								
Advanced ADL's	.078	-.105*	-.012	.034	-.113*	-.035	-.005	-.016	.072	.157**	.065	.267**	1.000							
Household ADL's	.095	-.107*	.030	.258**	-.359**	-.049	.037	-.094	.194**	.307**	.206**	.661**	.261**	1.000						
Lower body limits.	.184**	-.084	.023	.203**	-.439**	-.158*	-.060	-.185**	.213**	.383**	.344**	.638**	.184**	.589**	1.000					
Upper body limits	.046	-.038	.032	.169**	-.334**	-.059	.042	-.130*	.250**	.363**	.268**	.506**	.182**	.510**	.498**	1.000				
GP visits	.114*	-.079	.068	.090	-.418**	-.042	-.039	-.148**	.183**	.367**	.408**	.218**	-.043	.256**	.403**	.234**	1.000			
Days in bed sick	.070	-.031	.016	-.025	.192**	-.026	.064	.064	-.149**	-.171**	-.139**	-.080	-.006	-.121*	-.113*	-.024	-.170**	1.000		
Other health profs. Seen	.027	.142**	.023	.108*	-.223**	.167**	.110*	-.050	.098	.49**	.053	.217**	-.065	.194**	.169**	.156**	.234**	-.138*	1.000	
Prescription items	.087	-.033	.033	.155**	-.397**	-.116	-.033	-.174**	.226**	.369**	.419**	.304**	.060	.300**	.453**	.226**	.641**	-.132*	.195**	1.000

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 8: Frequency Distribution of Degrees of Perceived Control Over Health

Degree of Control over Health	Frequency	Percent
Great deal	146	42.3
Some	145	42.0
Very little	35	10.1
None	19	5.5
Total	345	100.0

Table 9: Frequency Distribution of Degrees of Health Worry

Degree of Worry Over Health	Frequency	Percent
Great deal	25	7.1
Some	114	32.6
Hardly any	100	28.6
None	111	31.7
Total	350	100.0

3.1.2 Enabling characteristics described statistically

From Table 2, the mean waiting time to see the GP for this group of respondents is 18 minutes (SD = 13.67). Most participants (83.5%) indicated that their doctors' fees had never stopped them from consulting the doctor when they felt they needed to. Only 23.5%, however, had health insurance, with 70% having a community services card, an obvious reflection of their financial position as an elderly group. Despite having a mean annual income of $13,697.17 (SD = 9,687.31), participants were generally satisfied with their

standard of living (M = 3.18, SD = 0.75) and found their income adequate (M = 2.55, SD = 0.74) (refer Table 2). Of interest is the finding that greater age is positively correlated with viewing income as adequate, $r = .247$, $p < .01$, and this probably reflects a downturn in material requirements with advancing age.

While 93.8% of the elderly sample had a regular doctor, and 61% had been to the same doctor for 5 or more years, it is impossible to establish a relationship between the sex of the patient and the sex of the doctor as 90.7% of the doctors seen by the participants in this study were male. As Tabachnick and Fidell (1989) suggest that dichotomous variables entered in a multiple regression require a 10/90% split, and having a regular doctor does not conform to this requirement, it was not included in further analysis. While sex of the doctor is also borderline in this respect, it was considered an acceptable variable and maintained in the multiple regression analysis.

Modes of transport used to get to the doctor are outlined in Table 10, with private vehicles being used by 79% of this elderly group. At 15.7%, walking to the doctor is the next most common way of getting to see the GP, and may reflect ease of access, although given the low mean income, is likely to indicate an inability to afford another means of transport.

Table 10: Modes of Transportation Used to Visit Doctor

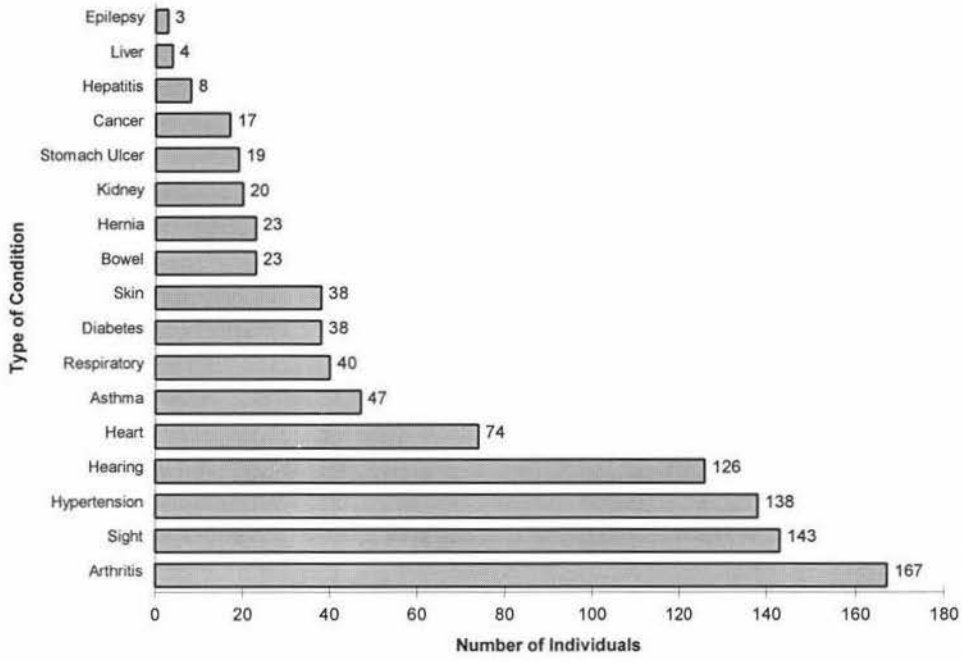
Mode of Transportation	No. of Participants	Percent
Private Vehicle	277	79.1
Walk	55	15.7
Bus	6	1.7
Taxi	5	1.4
Bike	2	0.6
Courtesy Vehicle	2	0.6
Motorbike, Scooter	2	0.6
Other	1	0.3
Total	**350**	**100.0**
Missing	4	

3.1.3 Need characteristics described statistically

Overwhelmingly, this group of participants rated their health as good (54.5%) or excellent (19.5%) and only 5.4% describing their health as poor. As argued by Wolinsky and Arnold (1992), this variable was dichotomised by relabelling responses as either positive or negative perceptions, resulting in 26% rating their health negatively.

A frequency distribution of the different types of chronic conditions suffered by the participants in this study shows that arthritis, hearing and sight impairments, and hypertension are the most common. Figure 5 shows the frequency distributions in graph form. From a list of 17 conditions, the mean of total chronic conditions suffered was 2.62, (SD = 1.88), with a range of 10. Most participants (73.4%) suffered from two to four conditions.

Figure 5: Frequency Distribution of Types of Chronic Health Conditions

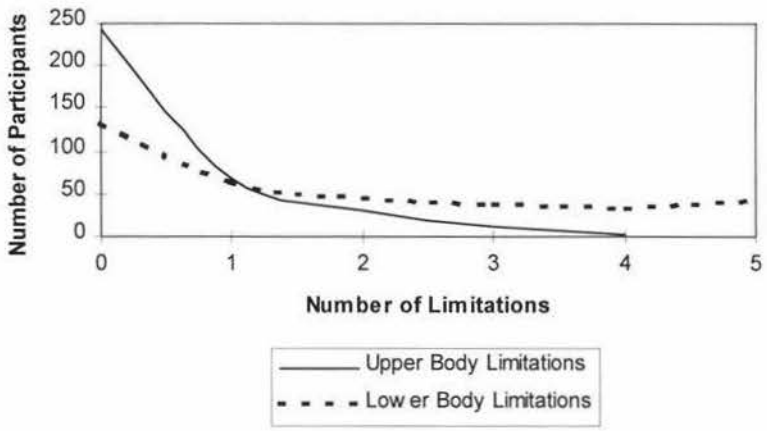


With a score range of 28 - 91, a single rating representing both number and severity of physical symptoms suggested generally lower scores (M = 38.8, SD = 9.35), but physical symptom ratings were significantly correlated to all of the other continuous need variables and all health care utilisation variables. Interestingly, on t-test analysis, Maoris have significantly higher scores for physical symptoms (M = 42.06, SD = 12.15) than those of European descent (M = 38.0, SD = 8.51), t (79.4) = -2.56, $p < .05$.

In relation to limitations in body functioning, 68.4% of participants indicated they had none of the four upper body limitations presented,

while 37.5% indicated they did not experience any of the five lower body limitations listed. The most commonly reported functional limitations were stooping, crouching or kneeling (43.2%) and standing on their feet for two or more hours (41.2%), and are both indices of lower body limitations. Figure 6 outlines the frequency distributions of the number of body limitations reported, divided into upper and lower body limitations.

Figure 6: Frequency Distribution of Body Function Limitations

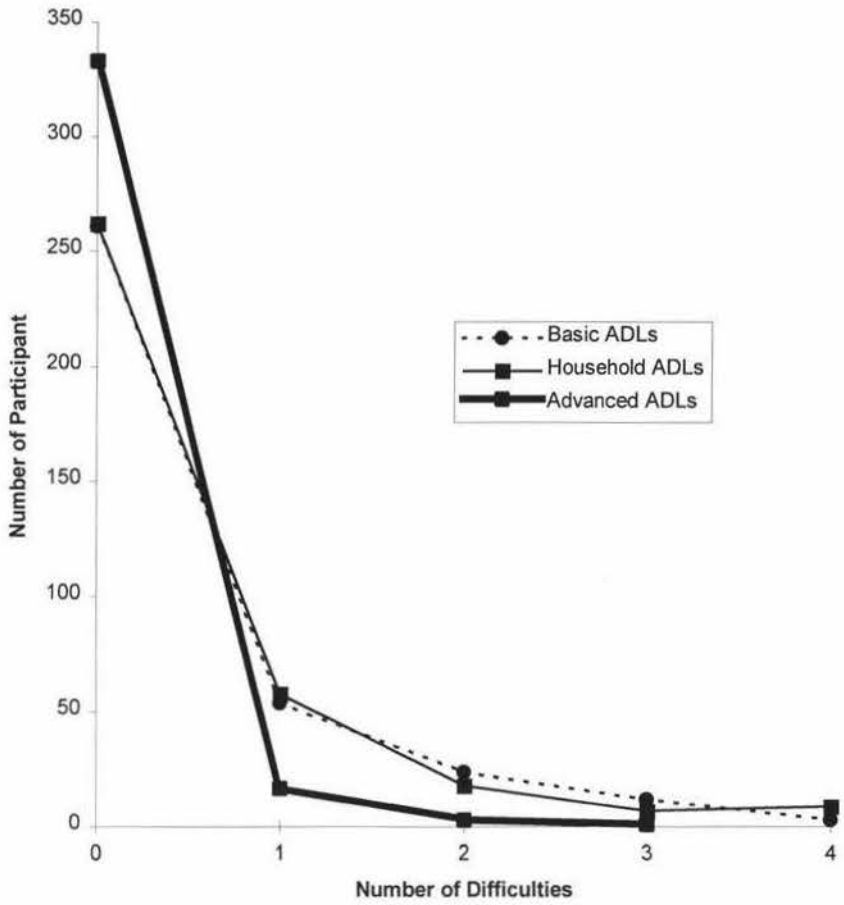


Generally, participants also reported a similar lack of difficulty associated with performing activities of daily living, with 73.7% experiencing no restrictions in basic activities, 94.1% problem free in relation to cognitive activities, and 74% not limited by household activities. Figure 7 presents frequency distributions for the number of

difficulties associated with activities of daily living, separated into basic, cognitive and household groupings. Notably, the number of limitations in basic and household activities follow a very similar pattern. The most commonly reported areas of difficulty were walking (22%) and heavy housework (24%).

Not surprisingly, high correlations were noted between many of the need and health care utilisation variables and again the correlation coefficients can be examined in Table 7. The strongest correlation noted exists between difficulties with basic daily activities and difficulties with household activities, $r = .661$, $p < .05$, lower body function limitations, $r = .638$, $p < .05$, and upper body function limitations, $r = .506$, $p < .05$. It is reasonable then that difficulties with household-related daily activities are also positively correlated to lower body limitations, $r = .589$, $p < .05$. Upper and lower body functional limitations provided a KR-20 reliability of 0.89, and basic, household and cognitive daily activities provided a KR-20 reliability of 0.84, confirming their internal consistency.

Figure 7: Frequency Distributions of Difficulties with Activities of Daily Living



3.1.4 Health care utilisation measures described statistically

Of the 344 people who indicated the number of visits to the GP they had made in the preceding 12 months, 81.4% had been to the doctor seven times or less and 12.2% of the total had not been to the doctor at all. The maximum number of visits was associated with a single respondent who saw the GP weekly (i.e. 52 times over the previous year). The number of prescription items obtained over the preceding 12 months is more evenly distributed, however, with more respondents (28.2%) buying one to four prescribed items for their personal use than

in any other range. Patterns of use of prescribed medications are presented in more detail in Table 11.

Table 11: Frequency Distributions of the Number of Prescription Items

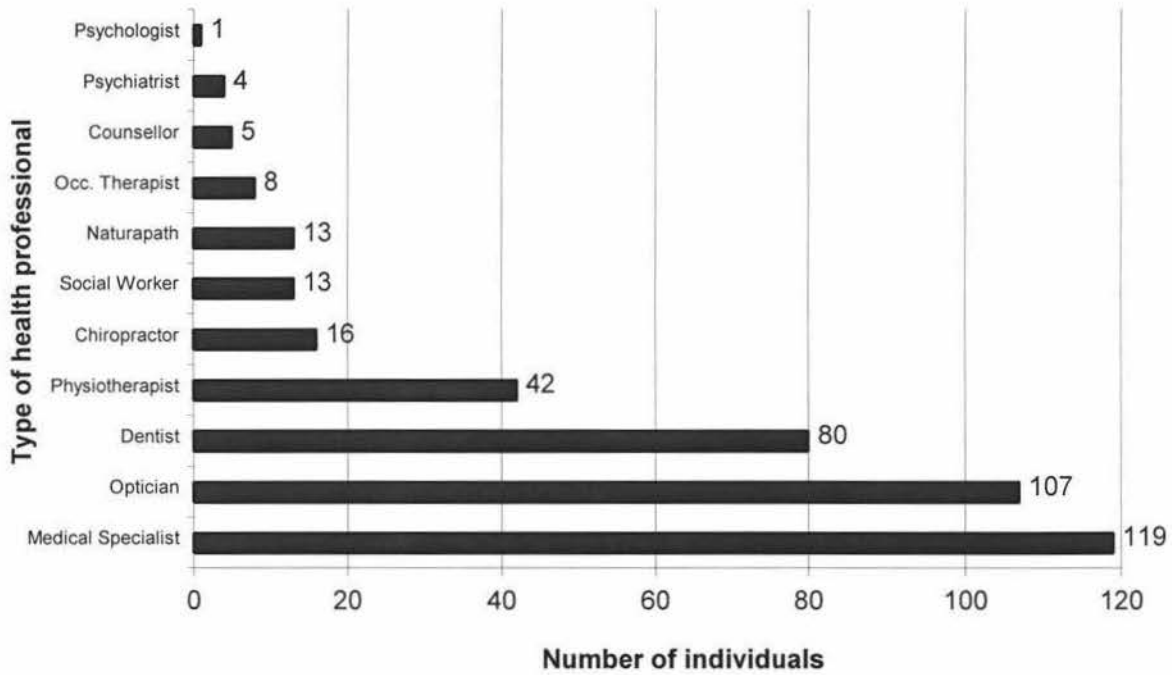
No. of Prescribed Items Obtained	No. of Participants	Percent
None	58	1606
1 - 4	100	28.7
5 - 9	56	16.0
10 - 14	50	14.3
15+	85	24.4
Total	349	100.0
Missing	5	

The most commonly consulted 'other health care professionals' seen by the participants of this study proved to be medical specialists, with other high scorers being opticians and dentists. Figure 8 presents the distribution of other health care professionals consulted. Frequency distributions of visits to these other health professionals show that 37% saw no other health professionals ($\underline{M}$ = 1.15, $\underline{SD}$ = 1.19), with the maximum number of other types of health professional of 6 being consulted by one individual.

Not unexpectedly, the four health care utilisation variables used in this study were significantly correlated with each other, with positive

relationships in all except days spent in bed sick and number of prescription items taken, and days spent in bed sick and the number of GP visits. One possible interpretation of this finding is that those who 'treat' themselves by spending days in bed, do so instead of consulting their doctor or taking prescribed medications.

Figure 8: Number of Individuals Consulting With Other Health Care Professionals



3.2 Hierarchical Regression Analyses

Four hierarchical regression analyses, one for each of the health care utilisation measures considered to be dependent variables in this study, were used to establish the predictiveness of the behavioural model. The results of

these analyses are presented below.

3.2.1 Visits to the Doctor

Using a two step hierarchical analysis, the contribution of predisposing and enabling characteristics towards explaining the number of visits to the doctor was estimated after controlling for need characteristics. In all, 32 variables were entered in two blocks, with 11 measuring need characteristics entered in step one, and 21 measuring predisposing and enabling characteristics entered in step two. Results including the standardised beta coefficients for each variable within the blocks, the total variance explained by each step of the equation (R^2 and adjusted R^2), and the unique variance provided by each block of variables when previous blocks have been controlled for (R^2 change) are presented in Table 12. R was significantly different from zero at the end of the first step, F (11, 332) = 12.24, $p < .0001$, and a further significant R^2 change was found at the end of the second step, F (32, 311) = 2.19, $p < .01$.

Need characteristics entered in at step one accounted for 26% (adjusted R^2) of the variance in the number of visits to the doctor. When predisposing and enabling characteristics were entered in at step two, a further 6% of variance was explained.

The influence of individual variables throughout each step of the regression analysis can be followed by investigation of the beta coefficients. From Table 12, it can be seen that the need variables of lower body limitations, advanced ADL's and chronic health

conditions remained highly significant ($p < .001$) during both steps, while self-rated health was significant only up until entering block two variables. This suggests that the influence of self-rated health is in part mediated through the predisposing and enabling variables entered in step two, and that as well as directly affecting the number of visits made to a GP, a poorer self-perception of health contributes to an increased number of visits to the doctor partially through the relationship self-rated health has with predisposing and enabling characteristics. Of the block two variables, significant contributors to the total explained variance were the predisposing variables of ethnicity ($p < .05$) and health worry ($p < .001$). In this way, elderly persons of European descent and those who have been more worried by their overall health status are seen to have visited their GP's more than their counterparts, when controlling for need characteristics. More lower body limitations and chronic health conditions also predict higher GP contact rates, but interestingly having less problems with advanced daily activities contributes to increased GP visits. As advanced daily activities reflect an ability to manage money, use the telephone and eat without difficulty, this finding suggests that those who do not have problems in these areas are more able to access a doctor or are more cognisant of their own health needs.

Table 12: Hierarchical multiple regression of Need Characteristics, and Predisposing and Enabling Characteristics on number of visits to the doctor, showing standardised regression coefficients, R, R^2 and adjusted R^2 for all participants (N = 354).

	Steps	
Predictors	**1**	**2**
Need Characteristics		
Upper body limitations	-.001	-.006
Lower body limitations	.228***	.181**
Advanced ADL's	-.156***	-.161***
Basic ADL's	-.043	-.066
Household ADL's	.004	-.033
Physical Symptoms	.085	.101
Chronic Health Conditions	.228***	.240***
Self-Rated Health	.193***	.118
Life Events	.033	.043
Psychological Wellbeing	-.019	-.028
Psychological Distress	.012	-.056
Predisposing Characteristics		
Age		.046
Gender		.056
Ethnicity		-.108*
Urban/Rural		.004
Qualifications		-.037
Phone		.060
Drink Alcohol		-.028
Lives Alone		.051
Social Contacts		-.037
Access to vehicle		-.063
Health Control		-.000
Health Worry		-.234***
Enabling Characteristics		
Annual Income		.084
Adequacy of Income		-.004
Satisfaction with Standard of Living		-.013
Health Insurance		-.007
Community Services Card		-.103
Sex of GP		.025
Length of time with same GP		-.065
Waiting time		-.043
GP fees		-.071
R	.54***	.62***
Total R^2	.29	.38
Adjusted R^2	.26	.32
R^2 change		.09**

*p < .05, **p < .01, ***p < .001

3.2.2 Other Health Professionals

A hierarchical regression analysis was also used to assess the influence of the same two blocks of variables on the number of health professionals, other than GP's, seen by the sample group. The blocks of variables were entered in the same order, with need variables entered in the first step, and predisposing and enabling variables in the second step. Results are presented in Table 13. With the number of other health professionals seen as the dependent variable, R was found to be significantly different from zero following both steps, with need variables accounting for 4% of the total variance (adjusted R^2) at step one, $F(11,332) = 2.46$, $p < .01$, and total variance explained increasing to 17% (adjusted R^2) when predisposing and enabling factors were entered on the second step, $F(32, 311) = 3.43$, $p < .0001$. The predisposing and enabling variables accounted for 17% unique variance in the number of other health professionals seen, when controlling for need characteristics.

Examination of the beta coefficients indicated only one significant variable, that of basic ADL's, ($p < .01$), when the need characteristics were entered in at step one. When predisposing and enabling variables were entered on step two, however, basic ADL's no longer predicted contact with other health professionals, indicating a mediating effect whereby the influence of basic ADL's partially operates through the effects of the predisposing and enabling variables. At step two, the predisposing variables of having a phone, drinking alcohol, educational qualifications, ethnicity and health

worries prove to be significant predictors. and amongst the need variables, physical symptoms becomes significant. This indicates that one or more of the block two variables acted as a suppressor variable. Suppression effects have generally been explained in terms of different aspects of variance (Smith, Ager & Williams, 1992). Both valid variance which is shared with the criterion, and error, which is the variance that is independent of the criterion, contribute to overall variance of a predictor. A predictor can therefore influence the regression equation by explaining either valid variance, or by accounting for the error associated with variable entered previously, allowing the direct contribution of the first variable to be recognised. In this case, by suppressing error associated with variance, one or more of the block two variables allow recognition of direct influence the number of physical symptoms has on the number of other health professionals seen.

Thus, having a phone, being someone who drinks alcohol, having higher education qualifications, being of European descent, experiencing more concerns regarding health status and suffering from severe and/or numerous physical symptoms predict contact with higher numbers of different sorts of health care professionals (other than GP's). Again, predisposing variables are seen to add substantially to the to the total variance explained, with ethnicity and health worry being significant contributors. Both are also significantly correlated with the number of other health care professionals on bivariate analysis.

Table 13: Hierarchical multiple regression of Need Characteristics, and Predisposing and Enabling Characteristics on number of other health professionals seen, showing standardised regression coefficients, R, R^2 and adjusted R^2 for all participants (N = 354).

	Steps	
Predictors	**1**	**2**
Need Characteristics		
Upper body limitations	.013	.019
Lower body limitations	.025	.048
Advanced ADL's	-.028	.008
Basic ADL's	.198*	.149
Household ADL's	.028	.002
Physical Symptoms	.120	.180**
Chronic Health Conditions	-.027	-.034
Self-Rated Health	-.053	-.074
Life Events	-.025	-.020
Psychological Wellbeing	-.001	-.038
Psychological Distress	.024	-.024
Predisposing Characteristics		
Age		-.035
Gender		.024
Ethnicity		-.132*
Urban/Rural		-.055
Qualifications		.112*
Phone		.111*
Drink Alcohol		-.150**
Lives Alone		-.028
Social Contacts		.101
Access to vehicle		-.007
Health Control		.056
Health Worry		-.164*
Enabling Characteristics		
Annual Income		.094
Adequacy of Income		.056
Satisfaction with Standard of Living		.010
Health Insurance		-.097
Community Services Card		-.114
Sex of GP		.026
Length of time with same GP		-.052
Waiting time		-.004
GP fees		-.015
R	.27**	.50***
Total R^2	.08	.25
Adjusted R^2	.04	.17
R^2 change		.17***

*p < .05, **p < .01, ***p < .001

3.2.3 Prescription Items

A two step, hierarchical multiple regression was again undertaken, using the same 32 independent variables and a dependent variable of the number of prescription items obtained from the chemist in the previous 12 month period. Both steps produced an R value that was significantly different from zero. Need variables entered at step one explained 32% of variance (adjusted R^2) in the number of prescription items obtained, $F(11, 332)$, $p < .0001$. After entering predisposing and enabling variables at step two, the amount of explained variance was increased to 35% (adjusted R^2), $F(32, 311) = 6.70$, $p < .0001$. This increase in explained variance was also significant, $F(32,343) = 1.71$, $p < .05$, and represents a unique variance of 7% contributed by the predisposing and enabling variables, after controlling for need variables. These findings, plus beta coefficients for each variable at both steps, are summarised in Table 14.

At step one, significant variables proved to be chronic health conditions, self-rated health and lower body limitations. A greater number of lower body limitations and chronic health conditions and negative self-perception of health status was associated with more prescription items being purchased from the chemist. These variables remained significant when predisposing and enabling variables were entered at step two. Of the block two variables, ethnicity, health worry and health insurance were significant when need variables were controlled for. While significant relationships

Table 14: Hierarchical multiple regression of Need Characteristics, and Predisposing and Enabling Characteristics on number of prescription items used, showing standardised regression coefficients, R, R^2 and adjusted R^2 for all participants (N = 354).

	Steps	
Predictors	**1**	**2**
Need Characteristics		
Upper body limitations	-.093	-.105
Lower body limitations	.263***	.256***
Advanced ADL's	-.054	-.045
Basic ADL's	.060	-.004
Household ADL's	.032	-.037
Physical Symptoms	.048	.073
Chronic Health Conditions	.233***	.235***
Self-Rated Health	.238***	.189**
Life Events	-.017	-.026
Psychological Wellbeing	.003	-.016
Psychological Distress	.100	.042
Predisposing Characteristics		
Age		-.037
Gender		.032
Ethnicity		-.149**
Urban/Rural		-.048
Qualifications		-.001
Phone		.065
Drink Alcohol		.049
Lives Alone		.036
Social Contacts		.020
Access to vehicle		.003
Health Control		.030
Health Worry		-.157**
Enabling Characteristics		
Annual Income		-.009
Adequacy of Income		.009
Satisfaction with Standard of Living		.049
Health Insurance		.103*
Community Services Card		-.062
Sex of GP		.009
Length of time with same GP		-.029
Waiting time		-.090
GP fees		-.016
R	.58***	.64***
Total R^2	.34	.41
Adjusted R^2	.32	.35
R^2 change		.07*

*p < .05, **p < .01, ***p < .001

were also indicated in bivariate analysis between psychological wellbeing, psychological distress, health control, and having a community services card with the number of prescription items purchased, no influence from these variables was indicated on regression analysis once the effects of other variables were controlled. Once again, being of European descent and having higher levels of worry regarding health status were found to be the significant predisposing predictors, but this time an enabling variable (having health insurance) was also found to significantly contribute to the dependent variable.

3.2.4 Days in Bed Sick

Of the four health care utilisation measures used as dependent variables within the multiple regression analyses, the number of days spent in bed because of ill-health in the previous 12 month period represents the only informal health care utilisation variable investigated in this study. A similar format of a two-step hierarchical multiple regression analysis was employed, with the same independent variables entered in each step as before. R was significantly different from zero at the end of each step, with 7% of total variance in the number of days spent in bed explained by the need variables on step one, F (11,332) = 3.22, $p < .001$, and 10% of the total variance explained when predisposing and enabling variables were included at step two, $F(32, 311) = 2.15$, $p < .001$. In this instance, however, the *change* in R^2 was not significant at step two,

indicating that block two variables did not improve the fit of the model. These findings are summarised in Table 15, along with the beta coefficients for each of the variables on both steps.

Inspection of the beta coefficients to observe the effects of individual independent variables on the dependent variables at their entry point indicate that self-rated health and psychological distress were the significant need variables at step one. When predisposing and enabling variables were added at step two, self-rated health remained significant, but psychological distress did not, its influence being mediated through the inclusion of the block two variables. Thus, any influence that psychological distress has on days spent in bed sick operates only via a relationship with the predisposing and enabling variables. At step two, other significant variables were perceived limitations to access imposed by GP fees, whether or not the participant lived alone, and the sex of the GP. The significance of the latter variable, however, should be viewed with some prudence, as its inclusion in the multiple regression was tentative due to its borderline dichotomous split at 10/90%. As almost 91% of the GP's seen are male, the influence of the relatively small sampling of participants seeing female doctors may not allow a reliable interpretation of results. A cautious approach to a relationship between the sex of the doctor and the number of days spent in bed ill must therefore be taken.

Table 15: Hierarchical multiple regression of Need Characteristics, and Predisposing and Enabling Characteristics on number of days spent in bed because of illness, showing standardised regression coefficients, R, R^2 and adjusted R^2 for all participants (N = 354).

	Steps	
Predictors	**1**	**2**
Need Characteristics		
Upper body limitations	.126	.128
Lower body limitations	-.023	-.042
Advanced ADL's	.003	-.004
Basic ADL's	-.062	-.016
Household ADL's	-.058	-.066
Physical Symptoms	-.053	-.059
Chronic Health Conditions	-.065	-.052
Self-Rated Health	-.139*	-.145*
Life Events	.039	.085
Psychological Wellbeing	-.071	-.036
Psychological Distress	-.192*	-.084
Predisposing Characteristics		
Age		.002
Gender		-.010
Ethnicity		-.013
Urban/Rural		.087
Qualifications		.095
Phone		.028
Drink Alcohol		.105
Lives Alone		-.141*
Social Contacts		-.088
Access to vehicle		-.061
Health Control		.028
Health Worry		.117
Enabling Characteristics		
Annual Income		-.045
Adequacy of Income		-.001
Satisfaction with Standard of Living		.057
Health Insurance		.021
Community Services Card		.015
Sex of GP		-.130*
Length of time with same GP		-.006
Waiting time		.029
GP fees		-.137*
R	.31***	.43***
Total R^2	.10	.18
Adjusted R^2	.07	.10
R^2 change		.09**

*p < .05, **p < .01, ***p < .001

Given that the change in R^2 was not significant, the significance of the variables at step two should not be overinterpreted. A negative self-perception of health, having access to the GP limited by fees, and living with others, appears to predict an increase in days spent in bed sick. The association between seeing a female doctor and spending more days in bed sick is nebulous at best.

Interestingly, this informal health care utilisation variable is the only independent variable considered in this study that has not been found to be predicted by ethnicity and health worry. Further, it is the only dependent variable which can be predicted by whether a person lives alone or with others.

3.2.5 Contrasting the results of the hierarchical regression analyses

A detailed inspection of the significant predictor variables for each of the four health care utilisation measures highlights areas worthy of further investigation. A summary of the significant variables for each of the four health care utilisation measures is presented in Table 16. Inspection of this table shows that all of the three formal health care utilisation variables are significantly influenced by the predisposing characteristics of ethnicity and health worry, with Maoris consistently being lower users than non-Maoris, and people who have been worried about their health consistently being higher users than those not experiencing any concerns.

Visits to the doctor and prescribed medications share very similar

Table 16: Summary of significant variables for each of the measures of health care utilisation on steps 1 and 2 of the hierarchical multiple regressions.

	STEP 1	STEP 2
Visits to the Doctor		
Need	Advanced ADL's Chronic Health Conditions Lower body limitations Self Rated Health	Advanced ADL's Chronic Health Conditions Lower body limitations
Predisposing		Ethnicity Health Worry
Enabling		
No. of Other Health Professionals Seen		
Need	Basic ADL's	Physical Symptoms
Predisposing		Phone Drink Alcohol Qualifications Ethnicity Health Worry
Enabling		
Prescribed Medications		
Need	Chronic Health Conditions Self Rated Health Lower body limitations	Chronic Health Conditions Self Rated Health Lower body limitations
Predisposing		Ethnicity Health Worry
Enabling		**Health Insurance**
Days in Bed Sick		
Need	Self Rated Health Psychological Distress	Self Rated Health
Predisposing		Lives Alone
Enabling		**Sex of GP** **GP fees**

predictors, generally consisting of variables associated with physical health and ethnicity and health worry. Interestingly, more negative perceptions of own health predict increased consumption of prescribed medications but not the number of visits to the doctor, suggesting that this group of people consulted their GP for reasons other than curative treatment. Also, having health insurance predicts increased use of prescribed medications, implying that financial considerations affect modes of treatment and that costs limit medications taken. It is possible that those who require many medications take out health insurance in an attempt to have their high medication costs subsidised.

While having predictor variables which follow a similar pattern to the other formal health care utilisation measures (a physical health related variable and ethnicity and health worry), the number of other health professionals seen is predicted mainly by predisposing characteristics.

Days in bed sick, as the only informal health care utilisation measure, exhibits a unique pattern of predisposing variables and is the only dependent variable not predicted by ethnicity and health worry. The association between having a female doctor and spending more days in bed sick is considered suspect, but being limited by costs in seeing a GP suggests that those who can't afford the doctor simply stay in bed as a form of self treatment. That people living alone do not spend as many days in bed sick makes intuitive good sense, as there is no-one else available to perform basic activities and supports the findings of Cafferata (1987). Of more interest is the finding that a poor

perception of health, but no other physical or mental health indicators, is related to more days spent in bed sick. This suggests that a perception of illness, rather than actual mental and physical symptoms, influence whether people spend days in bed ill. However, given the non-significant change in R^2, all of the predictors at step two are suspect, and the findings related to this measurement of health care utilisation must be considered in this context.

The overwhelming finding when contrasting the significant variables for the various health care utilisation measures, however, remains the consistency of ethnicity and health worries as predictors of formal health care utilisation. To explore the reasons for their influence within the behavioural model, further investigative analyses were undertaken.

3.3 Further Investigative Statistical Analyses

In North American studies, differences in health utilisation behaviours between black and white populations have been evident, and health worry has previously been found to be associated with the number of GP visits (Wolinsky and Johnson, 1991). The consistency of predictiveness of these variables within this study suggested a need to analyse their relationships with other variables in greater depth. Results of these investigations are presented below.

3.3.1 Ethnicity

An in-depth look at why there may be differences in the use of health care services by Maoris and non-Maoris is beyond the scope of this

study and only superficial comparisons can be made by consideration of demographic variables.

On chi-square analysis, significantly more Maoris were found to live rurally, $\chi^2(1, N = 344) = 8.03, p < .01$. Europeans reported higher self-ratings of health, $\chi^2(1, N = 344) = 9.19, p < .01$, and more Europeans drank alcohol, $\chi^2(1, N = 343) = 7.43, p < .01$, had a phone, $\chi^2(1, N = 344) = 10.71, p < .001$, had access to a vehicle, $\chi^2(1, N = 344) = 6.77, p < .01$, and had health insurance, $\chi^2(1, N = 343) = 8.62, p < .01$, than their Maori counterparts. T-tests indicated that Europeans also had significantly higher educational qualifications, t (156.27) = 4.74, $p <$ .001, and higher annual incomes, t (143.81) = 4.12, $p < .001$. With Europeans having a mean age of 70.4 years and Maoris of 68.4 years, the difference in ages just reached significance at the .05 level, t (342) = 1.97.

These Maori-European demographic differences are difficult to interpret, but may suggest that living in the country, not having a telephone, car or health insurance, and having a very low income significantly influence health care utilisation, rather than there being a direct relationship between ethnicity and health care utilisation.

Differences in need variables for Maoris and non-Maoris were also assessed using t-tests. No significant differences were found in difficulties with activities of daily living, functional limitations or psychological wellbeing and distress, but Maoris were found to have rated significantly higher physical symptoms scores, t (79.41) = -.256,

$p < .05$. This suggests the lower use of health care services by Maoris is not due to them simply being healthier than non-Maoris. However, specific reasons for ethnic differences in health utilisation in this study remain obscure.

3.3.2 Health worry

In order to describe who the people are who reported higher degrees of concern about their health, t-tests and chi-square analyses were undertaken. From these, 'worriers' experienced significantly greater numbers of life events, t (348) = -2.12, $p < .05$, had lower educational qualifications, t (290) = 2.12, $p < .05$, and not surprisingly, rated their own health worse, t (354) = 71.11, $p < .001$, than their 'non-worrying' counterparts. Importantly, 'worriers' were not distinguishable by gender, ethnicity, age, whether or not they lived alone, or by the number of social contacts they had. They were, however, notable by their higher ratings on all need characteristics, other than psychological wellbeing where they rated significantly lower than the 'non-worriers'. These findings are summarised in Table 17, which indicates means and standard deviations for 'worriers' and non-worriers' on the need characteristics, and the level of significance in differences between these two groups. It should be noted that in all cases, bar that of difficulties with advanced ADL's, a significant difference exists.

While these findings indicate that people who have worried more about their health generally do so because of their poorer physical and

mental health status, further analyses were undertaken to clarify the relationship between health worry and health status and the joint effects these variables have on health care utilisation. In this way, consideration could be given to the question of whether a high level of health worry amongst these elderly participants influenced the use of health services, irrespective of their health status.

Table 17: Comparison of the ratings on Need Characteristics between participants who have been worried about their health and participants who have not been worried about their health.

		Mean	SD	Level of Significance
Chronic Health Conditions	Not worried	2.23	1.74	.001
	Worried	3.17	1.92	
Basic ADL's	Not worried	0.18	0.51	.001
	Worried	0.79	1.07	
Advanced ADL's	Not worried	0.05	0.21	Not significant
	Worried	0.12	0.44	
Household ADL's	Not worried	0.18	0.52	.001
	Worried	0.80	1.15	
Lower Body Limitations	Not worried	1.15	1.50	.001
	Worried	2.63	1.82	
Upper Body Limitations	Not worried	0.27	0.59	.001
	Worried	0.83	1.04	
Physical Symptoms	Not worried	36.18	6.84	.001
	Worried	42.76	11.15	
Psychological Distress	Not worried	42.44	17.30	.001
	Worried	55.41	20.49	
Psychological Wellbeing	Not worried	82.73	13.57	.001
	Worried	76.05	13.23	

In this instance, health status was defined by self-rated health scores, so that individual perceptions of health status were considered rather than the number of symptoms, with 'wellness' and 'illness' being identified by either a positive or negative perception of their own health status. After also dichotomising the health worries variable so that 'worriers' were identified as individuals who had experienced a great deal or some worry related to their health in the previous 12 months, and 'non-worriers' were identified as those who had experienced hardly any or no worries at all, a crosstabulation was performed to identify the groups of 'worried well', 'worried ill', 'non-worried ill' and 'non-worried well'. Frequency distributions for these groups are provided in Table 18. While the 'non-worried ill' group contains the fewest people (6%), and 'non-worried well' contains the most (54.3%), it is interesting to note that both of the 'worried' groups contain similar numbers of people who rate their health positively (20%), and of people who rate their health negatively (20%).

Table 18: Frequency Distributions of Groups Determined by Degree of Health Worry and Self-Rated Health

Group	No. of Participants	Percent
Worried well	69	19.7
Worried ill	70	20.0
Non-worried ill	21	6.0
Non-worried well	190	54.3
Total	350	100.0

Oneway analyses of variance using the four worry/health groups were then conducted on each of the four measures of health care utilisation used in the regression analyses. F tests on each of these analyses indicated that significant differences existed between the groups for all measures of health care utilisation, significant at .001 for prescription items, $F(3, 344) = 32.73$, and for number of GP visits, $F(3, 340) = 28.87$, and at .01 for days spent in bed sick, $F(3, 343) = 4.65$, and for the number of other health professionals seen, $F(3, 349) = 3.88$. In all analyses, Scheffe's test, a conservative *a posteriori* test of between groups differences (Scheffe, 1953), was used to make further between groups comparisons. The results of each of these analyses are presented below:

A) Visits to the GP:

The number of visits to the GP was significantly less for the 'non-worried well' group than for all of the other three groups. The 'worried well' group also made significantly less visits to the doctor than the 'worried ill' group. While this is not unexpected, it is of particular interest that no significant difference in doctor visit rates exists between the 'non-worried ill' and the 'worried well', and that while people may rate their health poorly, if their health has not caused them much concern in the previous year, they see the doctor no more than people who consider themselves generally well, but have had concerns about their health in the previous year. This suggests that health worry influences whether a doctor is accessed or not over and

above health status.

B) Prescription Items:

The 'non-worried well' group bought significantly less prescription items for their individual use in the previous year than the other three groups, and amongst the 'worriers', those who were well bought significantly less prescription items from those who were ill. Again, the finding of interest is more related to where significant differences were *not* found, as the 'worried well' group showed similar rates of prescription item use as people who reported a low health rating but indicated little worry regarding their health.

C) Number of Other Health Professionals Seen:

The only significant difference between the four groups was found between the 'worried well' group, who accessed significantly more health professionals (not including GP's), than the 'non-worried well' group. This finding indicates that even though considering themselves well, those whose health over the past 12 months has caused them some anxiety are more inclined to consult a wide variety of health professionals. While this hints at health maintenance behaviour, such that dentists, naturopaths, physiotherapists etc, are consulted to avoid a decline in health status, this may also reflect a treatment seeking approach where numerous health professionals from assorted backgrounds are consulted in order to manage a problem not identified by other health professionals.

D) Days in Bed Sick:

Those who rate their health poorly and have been worried by their health in the previous year spend significantly more significantly more days in bed due illness than those who have had no health worries and perceive themselves as generally well. While this finding is unremarkable, of more consequence is that the 'worried well' group do not spend a significantly different number of days in bed because of sickness than do the 'non-worried ill' group. Again, this suggests that when people spend days in bed sick it may be a function of both worry and sickness rather than as a direct response to the presence of physical or mental symptoms.

4. DISCUSSION

This study has attempted to provide further insight into the health behaviours of older adult New Zealanders by testing Andersen's behavioural model using extended sets of indicators of predisposing, enabling, need, and health care utilisation constructs. The way in which the findings of this study address this goal are presented below:

4.1 The Findings: A Macro View

One of the major differences in approach of the current study is the way in which health care services have been conceptualised, resulting in measures of health care behaviour which encompass other means of representing formal health care. While commonly accepted standards of measures of health care utilisation have been used, with informal health care utilisation considered on the basis of the number of days spent in bed due illness and formal health care utilisation examined using the number of visits to the GP, the inclusion of the number of prescription items used and the number of other health professionals (other than a GP) deviates from the traditional measures of health care utilisation and allows a more holistic view of health behaviours of the older adults.

Nevertheless, these measures, excluding prescription items, were skewed as in other studies, with a large number of participants using none, or very few, of the health care modes. While transformations, to a large extent can alleviate this problem, the consistent identification of skewed measures suggests that this model may only be applicable to moderate users of health care services, a point noted by Wolinsky and Johnson (1991).

The definition and measurement of health care utilisation remains a vexing issue. The number of prescription items used in the preceding 12 months was found to be normally distributed in this research and thus, other health care utilisation measures of this type which have not previously been considered, may be more useful in understanding those who are low users of traditionally-defined health care services. The profile of utilisation of other

health professionals (summarised in Figure 8) suggests that this broader based definition of health care and services may have some utility in future research with the elderly.

The second major difference in approach in the current study lies in the prediction of health care utilisation, with extended sets of predisposing, enabling and need indicators used. This study has generally been able to explain more of the total variance in the health care utilisation of older adults than previous studies. Substantial improvement is noted when comparing the predictiveness for the number of GP visits, with this study explaining 38% of the total variance and Wolinsky and Johnson's (1991) study explaining only 17%. This more than doubling of total variance explained represents a far greater 'fit' of Andersen's model when applied to the elderly and is comparable to Cheng's (1992) results where 44% of the total variance was accounted for using a very small indicator set of five variables.

While Wolinsky and Johnson found eight significant predictor variables for number of visits to the GP, only five were identified in this study, with health worries and lower body limitations being common predictors in each. Interestingly, the 1991 study indicated that women made more visits to the GP, while this study found no gender differences but identified ethnicity as a predictor, with those of European extraction making more visits.

While Wolinsky and Johnson were able to explain 25% of the total variance in the number of days spent in bed due illness, this study explained only 18% of the total variance for this health care utilisation measure. It should be emphasised, however, that in the present research the significant skewness

of the variable measuring days in bed sick (even following transformation) does not allow for an optimal fit using the linear regression analysis employed in the present study.

Despite this, the differences in the number and type of significant predictors for days spent in bed sick for the 1991 study and the present study are noteworthy. Wolinsky and Johnson's study identified ten significant predictors and the present study four, sharing only self-rated health as a common predictive variable. While four of the ten significant predictors in the 1991 study were need characteristics, only one need variable, self-rated health, was found to predict the number of days spent in bed sick in this study. The likely mediator for the effects of psychological distress on the number of days spent in bed because of illness is whether or not the individual lives alone. In this way, living alone may account for experiencing increased psychological distress, as there is noone immediately available to share concerns with or gain support from. This appears to offer further support for the measurement of 'loneliness-distress' in the prediction of health care utilisation of older adults, as argued by Cheng (1992).

Confirmation of overall improvement in the 'goodness of fit' of the model in relation to the health care utilisation behaviours of the elderly participants in this study, is provided by consideration of the total variance explained in the number of prescription items bought for personal use. Here, 41% (35% adjusted R^2) of the total variance was accounted for, a further improvement on total variance explained in visits to the GP. It is suggested that to a large extent, the number of prescription items taken can be considered an extension of health care utilisation as measured by GP visits, as the initial

prescription, of course, must be obtained from the GP. However, each prescription may provide months' worth of treatment. As it is expected that elderly people have more conditions (e.g. arthritis, hypertension) which are generally treated by prescribed medications rather than persistent medical consultations, consideration of alternative measures of health care utilisation can be seen to improve the fit of the model in relation to the elderly.

The number of other health professionals seen is another example of an alternative health care measure, and while 25% of variance accounted for in this study is unexceptional, this may relate more to the ubiquitous nature of this variable. Although the *number* of other health care professionals was considered, the actual number of *contacts* were not, so that while someone may have seen only one other health care professional (e.g. a naturopath), the fact that they may have seen them once a week for the previous 12 months was ignored. Despite this shortcoming, the total variance explained in the number of other health care professionals seen is equivalent to the highest R^2 value obtained by Wolinsky and Johnson in 1991, and this suggests that the health care utilisation measures more commonly used in previous studies do not fully represent all treatment mediums used by the elderly.

The suppression effect noted on the number of physical symptoms experienced in relation the number of other health care professionals seen has not been investigated further as "the lack of a commonly-agreed upon definition, as well as the lack of a test to determine whether or not a suppressor effect is significant, has limited the value of the concept as an aid to the interpretation of regression results" (Smith et al, 1992, p 17). However,

more consideration has been given to the mediation effect on the variable measuring difficulties with basic activities of daily living. While the actual mediator variable/s remain unidentified, one possible contender for this title is that of worry related to health status, such that anxieties about personal health may originate from having difficulties with basic activities of daily living. Alternatively, once the influence of physical symptoms became obvious in step two, it may be that difficulties with basic activities of daily living are accounted for by the functional restrictions associated with having physical symptoms.

Not only does this study show an increased robustness in the overall model, but significant effects over and above those related to need were identified, and this, in particular, is in contrast with Wolinsky and Johnson's 1991 findings. This may be due in part to the alternative health care utilisation measures used, which incorporate more discretionary behaviours, but also appears to be related to the inclusion of expanded indicator sets. Sixteen variables over and above those used by Wolinsky and Johnson were used in this study, consisting of four extra predisposing variables (lives in rural/suburban area, actual social contacts, drinks alcohol, life events), eight extra enabling variables (GP waiting times, GP access limited by costs, satisfaction in standard of living, adequacy of income, annual income, time been with same GP, sex of GP, having a community services card), and four extra need variables (psychological distress, psychological wellbeing, chronic health conditions, physical symptoms). Of these indicator variables, four (physical symptoms, drinks alcohol, sex of GP and GP access limited by costs) were found to be significant predictors of one health care utilisation

measure, and one (chronic health conditions) was found to be a significant predictor of two health care utilisation measures. While the influence of these extra indicators have obviously lent to the predictive power of the model, it is important to note that they include predisposing and enabling characteristics, and not just need characteristics.

One of the two consistent predictors of formal health care utilisation was found to be worry about personal health during the previous 12 months. It is a particular point of interest that in this group of older adults, there are as many people who have been anxious about their health even while describing their health as excellent or good, as there are people in good health who have not been concerned about their health. Why such a significant number of elderly New Zealanders should be seemingly unnecessarily worried about their health remains unclear, but may be an indication that the elderly worry more about the *implications* of having health problems. It is suggested here that this finding is likely to be related to a lack in communication between physician and patient, with older adults continuing to be concerned about their health even after they are not considered to require further medical management.

What is evident from the results of this study is that while the non-worried well use significantly less health care services than any other group, the worried well group use similar amounts of health services as do those who have been worried about their health and rate their health as not so good or poor. Even more surprisingly the worried well and the worried ill use a similar, and sometimes greater, number of formal health care services to the non-worried ill. Therefore, to a large extent, it is the worry related to health that dominates

need as a determinant of health care utilisation behaviours. This suggests that if *unsubstantiated* concerns of elderly people regarding their personal health can be allayed, they may use less health care services, and that the way health professionals communicate with older clients is of utmost importance.

'Shopping around' for other health professionals appears to be associated with the 'worried well' group, whether in a bid to allay their concerns by gaining reports which confirm their wellness from various sources, or in order to find some reason for their concerns. While this suggests attention seeking behaviour, another possible interpretation is that because of their concerns, many elderly are prepared to try various forms of health services in order to *maintain* their current good health. Further, higher educational qualifications are also associated with a greater variety of health care professionals seen, and this may reflect a greater awareness of the various options available both in terms of treatment and health maintenance.

The other consistent predictor of formal health care utilisation is ethnicity. While it is noted that Maoris make fewer visits to the GP, take less prescription items and see less of a range of health care professionals than non-Maoris, only very tentative reasons for this finding are offered due to the limitations of this research. One possible contributing factor to this is that this Maori sample, generally not having health insurance and having less income, look for other, cheaper forms of treatment, such as traditional treatment administered by either their extended family or from within their 'whanau'. Alternatively, Maoris may be intimidated by the clinical approach of Western-style practitioners and less inclined to seek medical attention. Instead they

may prefer to be administered to by their families, avoiding medical treatment if at all possible. This may translate into the decreased rates of formal health care utilisation found in the present study. Another possibility is that the Maori population is simply much healthier and doesn't need to access health services as much as the non-Maori group. However, as Maoris were found to have significantly higher scores on physical symptoms, this explanation appears unlikely, and while the non-Maori group is slightly older than the Maori group, the two year difference in means is hardly large enough to suggest an age-related reason for a difference in required health services.

A detailed analysis of these ethnic differences is beyond the scope of the present research. The findings highlight the importance of future research which attempts to understand Maori experience of health and health services while at the same time acknowledging the "diverse realities of Maori people" (Durie, 1994, p 131).

Interestingly, this ethnic difference in the accessing of GP's was also reported by Wolinsky et al (1989) when white Americans were found to visit the GP significantly more than black Americans. They also found that "the volume of physician utilisation among minority elderly is both more predictable, in general, and more predictively dependent, in particular, on their need for health care than it is for their Anglo counterparts" (p 427) and suggested that this was related to health utilisation by older black Americans being constrained by a lack of options which are available to white Americans. However, investigation of this explanation of the ethnic differences found in health utilisation behaviours is beyond the scope of this study.

While health worry and ethnicity were found to be predictors of the number of visits made to the doctor, the number of prescription items taken, and the number of other health professionals seen, they were not predictive of informal health care utilisation measured by the number of days spent in bed sick. The unique set of significant indicators for the number of days spent in bed compared to those associated with the use of more formal health care services suggests that the decision to stay in bed is not based on physical needs or limitations, but is more a function of economics, living conditions and self-perceptions of health. This indicates a very different mechanism related to the use of formal health care services, predictors of which were found to consist of at least one physical need indicator, and ethnicity and health worry.

4.2 The Findings: A Micro View

The increased R^2 values found in this study are contrary to the expectations of Wolinsky and Johnson who concluded in their 1991 study that "substantial improvements in R^2 will not likely result from further refinement or proliferation of the traditional measures of the predisposing, enabling, and need characteristics" (p S354). While it remains unclear as to *how much* of the improvement in prediction of health care utilisation is related to the different measures of health care utilisation and how much is related to the expanded indicator sets of predisposing, enabling and need characteristics, the *reasons* for this improvement may best be discussed by focusing on the indicators unique to this study.

A) Psycho-social indicators

Despite the large increases seen in the predictive power of the Andersen model in this study, the measures of psycho-social factors argued for so vociferously for (number of stressful life events, number and type of social contacts, whether or not they lived alone, and psychological distress and wellbeing) were generally not found to be prominent predictors of health care use. The number of actual social contacts and the number of life events experienced were not found to be significant predictors of any of the four health care utilisation measures used. Any influence of psychological distress (categorised as a need characteristic) on the number of days spent in bed due illness, is suggested by the findings to be the source of a mediation effect, and possibly operating only through the effects of living alone, (the only psycho-social measure found to be a significant predictor), and having access to the GP limited by costs. Therefore, while psychological distress tends to encourage people to stay in bed if they are ill, this may be overshadowed by the need to get out of bed and attend to necessary activities if they live on their own, and by the decision of whether or not they can afford to go the doctor.

Some reservation is expressed regarding the usefulness of the actual social contact variable as used in this study. The considerably lower instances of church attendance as compared with the other two actual social contact measures of meeting with friends, family, and talking on the phone, suggest that this activity may not be commonly shared by the elderly New Zealand population. Other activities, e.g. going to

'bingo', may better represent the social activities of this group, and a more accurate reflection of social contact may be gained by having participants identify activities spent in the company of other people rather than identifying social contacts from a list of specific activities *assumed* by the researcher to be relevant.

Other researchers have expressed reservations about measuring the *quantity* of social contact as a reflection of social supports. Maxwell, Flett and Colhoun (1989; 1990) argue that *quality* of social contacts is a better predictor of health outcomes. It may be then that future research would benefit from focusing on measures which reflect social contacts in terms of their quality rather than quantity.

The reasons for the lack of predictiveness associated with the psycho-social measures incorporated in this study remain unclear, however, and is in contrast to previous findings. Wolinsky and Johnson (1991) found non-kin supports to be a significant predictor of the number of days spent in bed because of illness and contact with the doctor, although kin supports were predictive only of home health services. One possible explanation for the discrepancy in the findings of this study and previous research is that measures used here were simply not sensitive enough to provide a clear representation of the psychosocial context in which the individual functioned.

B) Health Risk Behaviours

While this variable was a significant predictor for the number of other health professional seen, the reasons for this association remain obscure. Whether or not a person drinks alcohol is in no way indicative of the amount consumed, nor suggestive of the possible risk to health in each particular instance. Further, many other health risk behaviours were ignored in this study, such as poor nutrition, lack of exercise and smoking, which taken together to gain a health risk score, may more clearly identify those who put their own health at risk by their activities. Intuitively, the benefit of having a single measurement to indicate health risk behaviours as used in the present study, appears to be, if anything, minimal, and despite it being found significant for the number of other health professionals seen, this relationship defies interpretation.

C) Extended indicator sets for enabling characteristics -

While the extended indicator sets for enabling characteristics provided significant predictors for only two health care utilisation measures, the implications of their associations are important. First, as having health insurance predicts an increased number of prescription items bought for personal use, it suggests that within the New Zealand health care system, either doctors are more inclined to prescribe medications for people who have insurance because they can more easily afford them, or that people who require numbers of prescription items need health insurance so that they can afford them. However, given that

doctors are unlikely to know if their clients have health insurance or not, and that they are not entitled to ask their client about this, it is probable that GP prescribing behaviour would not be influenced by the health insurance status of their clients.

In either case, it appears that the type of treatment received is determined to a large extent by what the person can afford, rather than by what the optimal treatment is. This has both ethical implications for the treatment practices of medical practitioners and moral implications for the social policy makers within New Zealand.

Second, as GP costs predicts an increased number of days spent in bed due illness, then sick elderly persons who cannot afford medical treatment may tend to stay in bed, either as a form of self-treatment or because they are too sick to do otherwise. Inevitably, this leads to the contention that the New Zealand health care system is not meeting the needs of the elderly poor. However, if people are not seeking much needed medical treatment because they simply cannot afford to, it could be expected that a low annual income, a perception that income is inadequate to meet needs, or dissatisfaction in standard of living would also predict an increase in the number of days spent in bed because of ill health. Why this is not the case remains unclear, and given that predisposing and enabling characteristics did not significantly improve the model when predicting the number of days spent in bed due illness, care needs to be taken to avoid overinterpretation of these findings.

In his south Auckland study, Gribben (1992) found via regression analysis, that patient fees were not associated with seeing the GP, (although 30% of the 290 participants claimed that the doctor's fee had prevented them from going to the doctor), and suggested that this was indicative of dissatisfaction with charges rather than a barrier to GP access. It may be that the findings of this study indicate an exacerbated degree of dissatisfaction with GP charges, to the extent that for less serious ailments, people prefer to self-manage their treatment rather than pay what is considered to be unaffordable medical costs, when in the past they may have sought advice from their GP.

These findings then, justify the inclusion of more measures of enabling characteristics when using the Andersen model to investigate health care utilisation behaviours of the elderly.

D) Alternative indices of health care utilisation -

As mentioned previously, measures which more fully reflect the variety of health care utilisation behaviours of the elderly have been found in this study to be related to an improved 'fit' of the model. However, given that three of the four measures used in this study were significantly skewed, it may be necessary to use very large population samples so that a more normal distribution of those who have used a particular health care service can be considered and those who have not accessed the service can be ignored. For those health care services accessed by the majority of older adults, e.g. taking

prescription items, optician services, which result in a normal distribution even when non-users are considered, the need for very large sample populations is greatly diminished.

4.3 Limitations of this Study and Suggestions for Future Research

From the previous comments, limitations of the study generally fully into four broad areas; case to IV ratio, representation of health care utilisation behaviours, representation of indicator variables, and restrictions related to the statistical analyses used. These areas are discussed below, with suggestions for future researchers offered.

1. The large number of independent variables (33) used within this study translate into large degrees of freedom in relation to the number of cases being considered. While the case to IV ratio in this study (11:1) is well above the minimum requirement of five times more cases than IV's suggested by Tabachnick and Fidell (1989), it is considerably less than what some researchers argue is the optimal ratio of 20:1. Further, a higher cases-to-IV ratio is needed when the dependent variable is skewed, as in the number of days spent in bed sick variable used in the present study. However, it should be emphasised that because a significantly skewed DV requires more cases to demonstrate a small effect, the total variance accounted for would represent an underestimation of the predictive power of the model. Studies testing the predictiveness of the behavioural model in its entirety therefore require very large sample sizes, in order to identify patterns in behaviours not undertaken by substantial numbers of the

participants.

2. While the total variance accounted for in alternative measures of health care utilisation used in the present study suggest that the model is more powerful when predicting use of more discretionary health services, this study does not comprehensively represent the wide range of health services accessed by older adults. While consideration of the variety of health care professionals consulted by this population group reflects a broader view of health services, the *number of visits* to the various health care professionals was neglected. For the model to truly reflect health care utilisation patterns of older adults, more health services should be investigated, as these also must be considered when planning to meet the prospective needs of older adults. Future research then, should explore the benefits of using alternative health care utilisation measures, such as the number of visits to an optician or optometrist, and the number of consultations with a chemist or pharmacist for personal treatment purposes.

3. While significant predictors of health care utilisation have been identified by this study, further investigation of why they predict the use of health services is required. This includes consideration of the reasons for ethnic differences and the influence of health worry on health care utilisation. However, other predictors also require further investigation. The effects of health risk behaviours were considered only on the basis of whether the participant drank alcohol or not, and allows no insight into a wide variety of potentially detrimental behaviours. Health risk behaviours, in future research, should

therefore consider quality of nutritional intake, amount of exercise taken, whether or not the person smokes and how much and for how long, and volume and type of alcohol consumed to better consider the influence of health risk behaviours of the use of health services by older adults.

4. This study, as all others, is bounded by the limitations of the statistical analyses used. Regression analyses as used in this study expose relationships between variables but do not establish the relationships in terms of cause and effect. Therefore, the direct and indirect influence of health worry on the variety of health professionals seen within the context of gender and ethnicity is indeterminable in this study. However, the use of causal analysis, as argued by previous researchers (Cheng, 1992; Jewett et al, 1992) allows investigation of both direction and the path of influence among variables, and offers a natural extension to this current study.

In summary, the research reported in this thesis has achieved its purpose (specified on p 29) in that the Wolinsky and Johnson (1991) study using the behavioural model has been replicated and extended. The utilisation of health services by older New Zealand adults can, to an extent, be understood by an examination of predisposing, enabling and need characteristics as defined in the Andersen behavioural model of health care use. Important correlates of health care use have been determined and the framework for future research has been laid. Future research could focus on further refinements in the definition and measurement of these characteristics and

an examination of the factors that affect them, as well as the likely reciprocal influences that exist between them. The ultimate goal of future research efforts should be the empowerment of older adults as consumers of health services within a social and political context that is fair and equitable.

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