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What People Think About Medicines: The Relationship between Medication Beliefs and Adherence to Antidepressant Therapy

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Judith Russell

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Abstract

Major depressive disorder is a common mental disorder seen in primary care and treatment with antidepressant medication has been shown to be an effective treatment. Non-adherence to treatment regimens is considered by many to be the most serious challenge facing medical practice today. Research on medication adherence has more recently shifted its focus to the cognitive factors (i.e., patient beliefs) that determine adherence. Prior research has shown that pre-treatment perception of benefits and barriers to medication predict initial medication adherence. To contribute to this emerging literature, the present study assessed 85 depressed primary care patients about their beliefs in the *necessity* for and *concerns* about antidepressant therapy, and reported adherence using validated questionnaires (BMQ, Horne, Weinman, & Hankins, 1999; MARS, Horne & Weinman, 2002). The results of the present study showed no relationship between patient beliefs about the *necessity* of antidepressant therapy for their health and reported adherence. As predicted, participants holding stronger *concerns* about the potential adverse effects of the medication and stronger *necessity* beliefs, compared to *concerns* beliefs, reported increased rates of adherence. Depression severity was found to be associated with reported adherence, but was independent of the relationship between medication *concerns* and adherence.

The present study replicated previous research and added further support for the theoretical basis of medication adherence by showing that there are similar theoretically based, determinants of adherence among patients with chronic physical health issues and those with mental health issues.

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Chapter One : Introduction to Treatment Adherence

Concern about adherence to treatment regimens has attracted the attention of researchers and clinicians for many years. Hippocrates recognised the problem of adherence describing some patients as "lying about the taking of things prescribed" (Demyttenaere, 1997; Lewis & Abell, 2002). In contemporary practice, non-adherence to treatment regimens is a problem seen by all health professionals and is reported to be one of the most frustrating areas of clinical practice (Sackett & Snow, 1979; Larkin Phillips, 1988; Myers & Midence, 1998). Non adherence to treatment has been the topic of thousands of research articles in the fields of medical and mental health over the last few decades (Trostle, 1988). Some consider that the problem of patient non-adherence to treatment as the most serious challenge facing medical practice today (Becker, 1985).

The purpose of this first chapter is to provide a background to aspects of the adherence literature that are relevant to this study. Three components of the literature will be discussed. Firstly, definitions and terms commonly used in the adherence literature will be defined and discussed. Secondly, difficulties and methodological issues experienced in previous adherence research will be reviewed. Thirdly, the literature will be examined to assess rates of adherence to treatment regimens, and in particular, adherence to medication, the costs and burdens associated with medication non-adherence, and rates of medication adherence in patients with psychiatric disorders.

What is Adherence?

Several descriptions of adherence have been proposed. While one interpretation does not fit all situations, there is one simple description that has been consistently used in the literature to describe adherence (e.g., Awad, 2004; McDonald, Garg, & Haynes, 2002). Haynes (1979), described adherence to treatment as "the extent to which the patient's behaviour coincides with medical or health advice" (p. 7). Non adherence could be simply defined as the failure to follow medical advice and can be applied to a broad range of health related behaviours (Horne, 1993; Meichenbaum & Turk, 1987; Myers & Midence, 1998). Examples of non-adherent behaviours include, early termination of treatment and therapeutic programs, missing therapy appointments, inability to maintain life-style changes (e.g., diet and exercise), or non avoidance of behaviours that are a risk to health (e.g., seat belt use, smoking, drug and alcohol abuse; Meichenbaum & Turk, 1987).

With specific reference to adherence to medication, Meichenbaum and Turk (1987) describe medication adherence as "the correct consumption of prescribed medication" (p.2). In other words, the patient takes the medication as instructed (Horne, 1993). Medication non-adherence includes, failure to fill a prescription, refusal to take the medication, stopping medication prematurely, taking the incorrect amount of medication (including taking too much medicine) or taking it at the wrong times (Demyttenaere, 1997; Meichenbaum & Turk, 1987; Perkins, 2002). The most common form of medication non-adherence involves taking less medication (omission errors) than is prescribed (e.g., Claxton, Li, & McKendrick, 2000; Col, Fanale, & Kronholm, 1990; Simon et al., 2002; Treharne, Lyons, & Kitas,

2004; Wang et al., 2002).

While a more detailed discussion of factors affecting medication adherence follows in chapter 3, there are many reasons why a person may not take their medication as prescribed. For example, even when patients understand and basically agree with the regimen, factors such as stress, business or forgetfulness mean that some people are unable to follow the therapy because it is difficult or complicated (Gordis, 1979). Alternatively, some patients might believe they are complying with the medication regimen but are incorrectly following instructions. This might result from not understanding or hearing the instructions correctly, due to language difficulties or cognitive impairment (Roter et al., 1998).). A patient could also make a clear decision to alter or discontinue the therapy (i.e., intentional non-adherence). Reasons for intentional non-adherence occurring might include feeling better or believing that the medication is no longer required. Other factors might involve the patient's personal medication beliefs and their experience of adverse side effects, perceived ineffectiveness of the therapy or fear of dependency and stigma (Horne, Weinman & Hankins, 1999). Whatever the reason, research has indicated that the patient's decision to discontinue with therapy is often not conveyed to the practitioner (Demyttenaere et al., 2001).

Already, in these early stages of discussion there is an awareness of the complexity and potential possibilities for confusion and misinterpretation, when using the apparently simple term of "adherence". In much of the empirical literature, the terms "compliance" and "adherence" have been used interchangeably. Meichenbaum and Turk (1987) draw attention to the differences they perceive between the two words by describing "compliance" as implying elements of obedience and

subservience. In other words, patients are considered compliant if they do as their practitioner tells them. Others share this interpretation (Haynes, 1979; Horne, 1993; Sarafino, 2002). This description also assumes that the power to decide what action is appropriate rests entirely with the practitioner, while responsibility for action rests with the patient. If a client is non-compliant, it is the client that has the problem (Meichenbaum & Turk, 1987). Practitioners might form negative conclusions and attributions about non-compliant patients and these patients have been described as deviant, troublesome or resistant to therapy (Horne, 1993; Myers & Midence, 1998).

Alternatively, Meichenbaum and Turk (1987) continue their description of the differences between "compliance" and "adherence" by stating that "adherence" implies that the client works with the clinician in an active and collaborative way. Decisions and actions are negotiated together rather than dictated (Fawcett, 1995; Lingham & Scott, 2002; Meichenbaum & Turk, 1987). Adherence acknowledges the patient's ability to choose whether or not to engage in treatment and respects their right to do so. In keeping with the implications of these terms, the present study will use the term "adherence" wherever possible. The term "client" is recommended by the American Psychological Association guidelines, and is the preferred term in much of the psychological literature. However, much of the critique of the literature in this study stems from medical research, where the term "patient" has been almost exclusively used.

Methodological Issues in the Assessment of Medication Adherence

While there has been an abundance of research on medication non-adherence, attempts to assess levels of medication adherence have not been straightforward. Several methodological problems have limited the ability of researchers to draw valid and reliable conclusions or comparisons from empirical research. Examples of these problems include, focusing on narrow measures of adherence, not controlling for co-morbidity and case-mix differences, the use of limited samples of patients and practitioners, and the use of cross-sectional designs (Meichenbaum & Turk, 1987). This discussion will focus on two major factors that have contributed to the variation in the assessment of rates of medication adherence (Haynes, 1979; Meichenbaum & Turk, 1987). Firstly, the lack of a standard definition of adherence that can be applied across situations and populations has affected the ability to compare rates of adherence across studies. Secondly, the use of various methods of measurement in research or clinical settings in the assessment of adherence has further complicated this issue (DiMatteo, 2004a; Meichenbaum & Turk, 1987).

Lack of a Standard Operational Definition. Although it may be tempting to categorise patients as adherent or non-adherent, there is no simple operational standard definition of adherence that may be applied across varied research situations to determine when a patient is adherent or not. For example, some studies choose to report actual compliance rates or the number of treatment units taken, divided by the number of units prescribed (e.g., Haynes et al., 1979). Others, report adherence rates as the percentage of patients judged adherent according to some predetermined

standard. For example, Demyttenaere (1997) used statements such as "good" (75%-100% intake), "fair" (25%-75% intake) or "poor" (less than 25% intake) to define levels of adherence. The issue of defining levels of adherence is further complicated by research indicating that less than 100% adherence may sometimes be adequate to bring about desired health effects. For example, paediatric patients taking prophylactic antibiotics for throat infections only need to comply with their prescribed regimens for approximately one third of the time in order to achieve therapeutic benefit (Gordis, 1979). Conversely, patients with HIV need to be highly adherent (95% intake) to a complex treatment regimen, in order to achieve therapeutic benefit and viral suppression (Catz, Kelly, Bogart, Benotsch, & McAuliffe, 2000; Safren et al., 2001; Singh & Squier, 1996). Thus, 80% adherence to medication may be considered "good" in one situation but "poor" in another.

It is important to determine the precise operational definitions of "adherence" used in research. For example, if the study focuses on omission errors in medication regimens, it is necessary to determine whether reported adherence rates are the mean percentage of individual patient's ingestion of medication or the total percentage of the sample that reached a predetermined adherence cut-off point. Precise definition of non-adherence criteria used in each study would allow comparisons between studies to be made with the appropriate caution (Haynes 1979; Meichenbaum & Turk, 1987).

Assessment Methods. Clinicians and researchers have multiple methods of adherence assessment available to them. These assessment measures fall into two categories. Firstly, "indirect" measures of adherence imply that the medication has

been ingested by the patient and include measures of clinician judgement, self report, medication measurement, micro electronic measurement and pharmacy database reviews (Farmer, 1999). Secondly, "direct" measures of adherence include biochemical analyses of body fluids such as blood or urine and direct observation.

Clinical Judgement. Clinician impressions of their patients' levels of adherence have frequently been used in both clinical and research settings as a method of adherence assessment (Rand & Weeks, 1998). Research suggests that practitioners actually have difficulty in this assessment and have been found to overestimate the level of adherence in their patients (Goldberg, Cohen, & Rubin, 1998). Various studies show, that physicians predict medication non adherence incorrectly 3 out of 4 times when compared to pill counts (Mushlin & Appell, 1977), zero percent when compared to electronic monitoring in anti-psychotic medication (Byerly et al., 2005), and incorrectly predicted adherence in 7 out of 16 patients who missed doses at least once a week, when measured by electronic monitoring (Norell, 1981).

Pharmacy and Prescription Records. Checking pharmacy and prescription records is an indirect method of assessment that has been widely used and is a useful source of measuring medication adherence on individuals, small groups, and large populations across a range of regimens and illnesses (Rand & Weeks, 1998). Medication non-adherence is assumed if a patient presents a repeat prescription to their pharmacy after the time expected. As with other indirect methods of assessment, it is assumed that patients take all their medication as directed (Rand & Weeks, 1998).

A major advantage using pharmacy data is that the patient is unaware of being observed, which eliminates observer effects. However, disadvantages include patients unintentionally confounding the method by the use of more than one pharmacy for the dispensing of their repeat prescriptions. This method provides no information on the medication consumption patterns that may occur (Farmer, 1999; Kwon et al., 2003). Monitoring pharmacy records does not provide information on medication that may be unused, hoarded for the future, shared or given to friends or family, or taken in an inappropriate manner (Kwon et al., 2003).

Medication Measurement. Counting pills, or comparing the amount of medication remaining in the medicine container, and the amount that should have remained, is an indirect method of assessment that has frequently been used in research and clinical settings (Farmer, 1999). Disadvantages of this method include its labour intensity and difficulty to achieve assessment unobtrusively (Rudd et al., 1989). The patient is usually aware that their behaviour is being monitored and so could discard their medication in order to appear adherent (Haynes et al., 1979). Unused bottles can be mislaid or deliberately not returned, and taking occasional extra pills can balance days of missed pills to provide a false impression of adherence (Farmer, 1999; Waterhouse, Calzone, Mele, & Brenner, 1993). As with the assessment of pharmacy records, this method does not provide information on accuracy of dosage or timing of medication. Some research has shown that pill counts are likely to overestimate the degree patients adhere to their medication regimen (Rudd et al., 1989; Waterhouse et al., 1993). Others studies have reported them to be an objective and accurate quantitative measure of adherence (Haynes et al., 1979).

Electronic and Computer Based Monitoring. Recently research has taken advantage of computer based technology by using electronic devices embedded in the medication packaging that record the time and date of each medication use (Choo et al., 1999; Cramer, Scheyer, & Matteson,1990; Spector et al., 1986; Waterhouse et al., 1993). One widely used device, the Medication Event Monitoring System (MEMS-Aprex Corp., Fremont, CA), has a microprocessor embedded in the MEMS cap that electronically registers the date, time, and duration the bottle is open (Reikert & Rand, 2002).

Electronic monitoring has been advantageous in its ability to identify patterns of medication use. These patterns include the patient taking "drug holidays" (i.e., discontinuing medication use for 24-72 hours), increasing adherence several days prior to a medical appointment, and "dumping" (i.e., intentionally discarding medication presumably to look more adherent; Reikert & Rand, 2002). For example, a MEMS monitor assessing patterns of medication use in patients with epilepsy, found that adherence to the drug regimen declined from an average 88% before a clinic visit to 67% one-month later (Cramer et al., 1990). Another study found that almost 14% of adults with asthma "dumped" their medication (defined as >100 inhaler actuations in 3 hours) before a follow-up appointment (Rand & Wise, 1992). "Drug holidays" are also common in acute regimens. In one study, 67% of adults receiving a 7-day course of antibiotics had at least one dosing interval longer than 24 hours (Bachmann, Stephens, Richey, & Hook, 1999).

Until recently, electronic measurement has been expensive to use especially for monitoring large numbers of patients and a high rate of equipment failure has been

associated with it (George, Preveler, Heliger, & Thompson, 2000; Reikert & Rand, 2002). However, electronic monitoring has been increasingly used in recent research especially where there are complicated regimens to follow (e.g., HIV research). As with other indirect methods of assessment, adherence may be adversely affected if the patient is aware of being monitored and the researcher must assume that the medication has actually been ingested (Rand & Weeks, 1998).

Self-Report. Self-report involves having a patient explain how they take their medication. This information can be collected in an interview situation, questionnaire or, alternatively, the patient might be asked to keep a record or diary of their own medication taking behaviour (Farmer, 1999). Recently, the Internet or telephone has been used to record self-reported adherence behaviour (Bull et al., 2002; Katon et al., 1999).

Although self-reports are widely used, applicable to a variety of clinical and research settings, and relatively inexpensive, the accuracy of this method of data collection has been challenged. Self-report has been shown to overestimate true levels of medication adherence especially compared to electronic monitoring methods (Bachmann et al., 1999; Dunbar-Jacob, 1993; Garber, Nau, Erikson, Aikens, & Lawrence, 2004; Gonder-Frederick, Julian, Cox, Clarke, & Carter, 1988; Jeste et al., 2003; Waterhouse et al., 1993).

One summary of the literature from 1978 to 2002 found a variation in comparison between self-report and other methods of assessment, depending on the type of self-report used (Garber et al., 2004). In 86 comparisons of self-report to non

self-report measures (e.g., pill count, blood concentrations, electronic monitors or clinical assessment) only 43% were categorised as highly concordant. On closer examination of the self report measures, interviews had significantly lower concordance with non self-report measures as compared with questionnaires or diaries ($\chi^2 = 8.47$, $p = .01$; Garber et al., 2004). Furthermore, among the 15 comparisons of interviews with electronic measures, none of the comparisons were highly concordant, whereas questionnaires and diaries had moderate to high concordance with electronic measures (75%) in 12 of 16 comparisons (Garber et al., 2004). Two reasons cited for this difference in concordance include the greater specificity of patient response required when reporting adherence behaviours in diaries and questionnaires, as compared to interviews, and the greater anonymity afforded in questionnaires compared to interviews (Garber et al., 2004).

One factor used to maximise the accuracy of self-report has been to assure the participants of the confidentiality of their answers (DiMatteo et al., 1993; Morisky, Green, & Levine, 1986; Horne, Weinman, & Hankins, 1999). Other factors influencing the accuracy and validity of self-report include the interviewer's skill and construction of the questions asked. The quality of the relationship and manner of communication between practitioner and patient have been found to significantly affect adherence (Ley, 1982; Myers & Branthwaite, 1992). The wording of the questions about adherence can also affect how patients will respond. Negatively framed questions can blame the patient for not complying and increase the chance

that the patient will give socially desirable but inaccurate responses in order to be seen in a positive light by their health professional (Gonder- Frederick et al., 1988; Ley, 1982; Morisky et al., 1986).

Recently developed self-report measures have taken steps to reduce the social pressure on patients by rephrasing adherence questions in a non-threatening manner. For example, one structured 4-item questionnaire, specific to medication regimen adherence, was developed to assess and predict adherence to medication in 290 patients with high blood pressure (Morisky et al., 1986). The rationale underlying the development of the four questions in this measure included that drug errors could occur for several reasons including forgetting, carelessness, stopping the drug when feeling better, or starting the drug when feeling worse. The developers further revised the wording of questions so that disclosures, rather than denial of non-adherence, were obtained and that social desirability biases could be limited. This style of questioning has been explored by others and developed into several scales that can be used in the assessment of medication adherence (e.g., Horne, 2005; Thompson, Kulkarni, & Sergejew, 2000).

A further advantage of self-report methods of assessment is that they provide opportunities to gather information on patients' beliefs, attitudes and experience of medical regimens (Farmer, 1999). Specific reasons for non-adherence can be explored. For example, a patient who might alter a regimen due to experiencing unpleasant side effects, or who misunderstands a dosing regimen, will not be identified by more objective methods of assessment such as pill counting (Farmer, 1999).

Biochemical Analysis. Laboratory analysis of drug levels in blood, urine or other body fluid are direct measures of medication adherence that have been used in research and clinical situations to measure the levels of ingested medications in the body. While this form of analysis is the only definitive evidence of dug ingestion, biochemical analysis is not a fool-proof or effective method for day-to-day monitoring of medication usage or for assessing the level of adherence. For example, a low level of drug assay is usually assumed to indicate poor adherence. However an individual patient's quick rate of absorption, metabolism, and excretion of the drug could equally explain the low level observed (Meichenbaum & Turk, 1987). In addition, biochemical analysis gives no indication of the patient's ongoing adherence behaviour outside the assessment period, and would not detect if the patient was usually non-adherent and had only taken the medication shortly before the clinic visit. (Gordis, 1979). Practical issues surrounding the cost and availability of testing facilities, combined with the potential to alienate clients by the invasive nature of specimen collection, makes this method of assessment often prohibitive in general clinical work (Myers & Midence, 1998).

Direct Observation. Direct observation of the patients as they receive their dose or treatment is another direct measure, and was initially used in the treatment of tuberculosis (Rand & Weeks, 1998). While this method has been useful in the monitoring of adherence in children and has been shown to increase medication adherence, it is labour intensive and is not considered a practical option in many situations. In some settings, it has been recognised that patients are still able to feign

adherence by not actually swallowing the medication and removing it when no longer being observed.

A comparison of self report, electronic monitoring, pill counts and blood concentration levels was performed on adherence to tricyclic antidepressants in depressed patients in primary care. (George et al., 2000). This study ($N = 86$) showed that the MEMS system was the most informative technique, allowing for identification of the precise time of container opening, the demonstration of "drug holidays" and early cessation of treatment. Self-report questionnaires based on findings by Morisky et al., (1986) proved a useful and relatively easy to perform screening technique for detecting non-adherence. The sensitivity of self-report in this study was between 72 - 85% for detecting poor compliance, depending on the arbitrary level of cut-off, set for defining satisfactory adherence (>80 % - 100% respectively). With a specificity value of 74.1% at >80% compliance, there is some evidence that for tricyclic antidepressants, self-reporting is a useful technique to assess adherence. Pill counts, although only available on 95.5 % of participants, were unreliable in 21.6% of patients who indicated by other methods of assessment that they had discarded many of their tablets. Blood concentration assays were the least acceptable method to the patient (18 % of patients refused to give blood) and due to various reasons, blood collection was possible in only 60.2% of participants (George et al., 2000).

In summary, the availability of multiple methods of measurement adds to the complexity of adherence research with each method having its own inherent strengths and weaknesses. Demyttenaere (1997) has written that in regard to the detection of levels of adherence, "simple measures are not accurate and accurate measures are not

simple" (p. 30). Although significant progress has been made in the assessment of medication adherence, it appears that researchers are still some way off from achieving a gold standard or recommended method of adherence assessment (Di Matteo, 2004a). At the present time, careful selection of measurement methods is important when planning adherence research. It has been suggested that multiple methods of assessment are advisable to achieve the most reliable results (Rand & Weeks, 1998).

The Costs of Medication Non Adherence

The costs and adverse effects of medication non-adherence are numerous and widespread. Non adherence represents a loss of opportunity for both the patient and the health professional, and money spent on medication not taken is wasted (DiMatteo & DiNicola, 1982; Horne & Weinman, 1999). The costs of medication non-adherence can be manifested in several ways and are difficult to calculate in monetary terms. The total cost of depression in the USA alone, was estimated to be around $44 billion in 1990 (Greenburg, Stiglin, Finkelstein & Berndt, 1993). Twenty-eight percent, or $12 billion, of the $44 billion total, is from the direct treatment costs associated with treating depression (Greenburg, Stiglin, Finkelstein & Berndt, 1993). Economic costs are also associated with increased levels of absence from work, emergency care, and longer length of stay in hospital admissions (Perkins, 2002). One study of older adults, found that 40% of hospitalisations were attributed to medication non-adherence (Col et al., 1990). Similarly, another study reported medication non-adherence as the reason that 50% of patients ($N = 63$) with schizophrenia were readmitted to hospital after previous discharge (Weiden & Glazer, 1997).

The irregular, diminished, or excessive consumption of medicine can also reduce health or extend illness. Some types of medication must be continued after the symptoms have disappeared or the risk of relapse is greater. For example, failure to complete a full course of antibiotics may result in the evolution of resistant strains of bacteria. This exposes not only the individual to the risk of relapse, but also the whole population, especially where non-adherence relates to communicable diseases (e.g., sexually transmitted diseases or tuberculosis; Meichenbaum & Turk, 1987). Other medications are dangerous if taken in excess (e.g., the anticoagulant warfarin, lithium sulphate and tricyclic antidepressants) and others are ineffective unless a certain minimum effective concentration is taken (Catz et al., 2000; Lewis & Abell, 2002). Non-adherence and the subsequent inadequate treatment of depression has been associated with a higher level of relapse or exacerbation of symptoms (Kennedy, McIntyre, Fallu, & Lam, 2002).

Medication non-adherence may also manifest itself in a patient as a lack of therapeutic gain. Doctors concern over the lack of improvement in patient symptoms, might respond by changing the medication, increasing the dosage or might involve the patient in additional and unnecessary diagnostic and treatment procedures. This generates further costs and possible health problems caused by the treatments themselves (Becker, 1985). In the research setting, a lack of therapeutic gain due to non-adherence could be mistakenly interpreted as non-effectiveness of the drug being examined (Trostle, 1988).

The cost of medication non-adherence is associated with increased mortality, adverse medical outcomes, deficits in patient functioning and well-being, increased use of health services, and decreased productivity. Increasing medication adherence

has potential benefits for both the individual and society. Consequently, a large amount of research into the area of medication non-adherence has been carried out in the last few decades.

Rates of Non-adherence to Treatment Regimens

The assessment of rates of non-adherence to treatment regimens is one area of research that has attracted a great deal of attention. Estimates of adherence generally fall within a broad range of 4% to 92% (Meichenbaum & Turk, 1987). There is a marked variation in levels of adherence in different conditions and situations. In one literature review, 20% to 50% of patients did not attend scheduled appointments. However, the rate improved in this study (75%), when the patients initiated the appointment themselves (Sackett & Snow, 1979). Other studies report that medication adherence rates are most often between 30% to 60% (Kaplan & Simon, 1990). Kaplan and Simon (1990), report 20 to 60% of patients stopped taking their medications prematurely, 17 - 74% did not follow the instructions when taking their medication, 25 - 65% made errors taking the correct amount and 35% of these errors would be considered sufficient to endanger patients' health. Similarly, Meichenbaum and Turk (1987), report that adherence to medication can differ depending on the clinical situation being assessed. For example, about one third of patients do not adhere to regimens for acute illnesses, while rates increase to 50-55% for patients with chronic illness. A further example of rates of medication adherence differing in various situations involves patients diagnosed with significant clinical illness who experience few or no clinical symptoms (e.g., hypertension). Data suggests that when medication

is taken for prophylactic purposes, non-adherence rates are higher (Di Matteo, 2004a; Marston, 1970; Meichenbaum & Turk, 1987). It could be assumed that heart transplant patients would be a highly motivated group. However, one study found that about one-third (34%) are non-adherent in some area of their treatment and, after 3 months post-transplant, non adherence results in more graft losses than any other cause (Sharpiro, Williams, Foray, Gelman, Wukich, & Sciacca, 1997). Similarly, the treatment of HIV requires high rates of adherence. However, there is data to suggest that nearly one-third of HIV patients had missed medication doses in the previous 5 days of treatment (Catz et al., 2000).

Research has shown that rates of non-adherence to all types of antidepressant therapy vary. Lingham and Scott (2002), searched the literature via Medline and PsycLit databases from 1976-2001, and found that reported adherence rates with anti-depressant medication ranged from 10% - 60%. This variation may be partly attributable to differences between studies, with some measuring true non-adherence by patients and others assessing premature cessation of treatment or sub-optimal dosing by the prescriber (Lingham & Scott, 2002). One study found that for 164 depressed patients, 28% stopped treatment within the first month while 44% stopped within the first three months (Lin et al. 1998). Similarly, a retrospective study of pharmacy records from 2432 depressed primary care patients, found that 35% of patients discontinued treatment after 1 month and 65% after 6 months (Simon, Von Korff, Wagner, & Barlow, 1993). While there is methodological variation between studies, these results indicate that rates of non-adherence to antidepressant medication are significant and potentially impact on the treatment of depression.

Despite the development of several theories and the introduction of a number of interventions, research suggests that the overall rates of treatment adherence have changed little over the last decade or more (Haynes, 1979; Meichenbaum & Turk, 1987; Roter et al., 1998). A recent review of 569 studies identified from PsycLit and Medline databases from 1948 to 1998, calculated rates of adherence to medical treatment regimens, ranging from 4.6% to 100% with a median of 76% and an average of 75.2%. After controlling for methodologies, regimens and patient groups, the 48 studies before 1980 had an average adherence rate of 62.6%, whereas the 491 studies published after 1980 had an average of 76.3%. These results suggest a significant trend, reflecting improvements in medical care efficacy, provider awareness of adherence, and patient involvement in their treatment. However, the results might equally be explained by better and more consistent research methods in later studies (Di Matteo, 2004a).

Medication Adherence in Mental Health Disorders

It has been suggested that medication compliance is a greater problem for patients with mental health concerns (Haynes, 1979). However one review of the literature via Medline on medication compliance, in the treatment of mental health issues from 1975-1996, indicates that this may not be the case (Cramer & Rosenheck, 1998). Cramer and Rosenheck's (1998) analysis showed that while different methods of estimating medication compliance were used, patients in 24 studies receiving anti-psychotic medication took an average of 58% of the recommended amount of the medications with a range of 24 - 90%. Patients from 10 studies receiving antidepressants took 65% of the recommended amount, with a range of 40 - 90%.

The mean compliance rates for patients in 12 studies receiving medication for physical disorders was 76%, with a range of 60 - 92%. While it appears that levels of adherence are lower for patients with psychiatric disorders, previous discussion on rates of adherence suggested differences could be attributed to the various operational definitions of adherence used, variations in study design and methods of assessment used in the different studies. All these factors, combined with the large variation of rates reported within each group, contribute to a lack of clarity when attempting to determine if differences in rates of adherence exist between populations with psychiatric illness and physical disorders (Cramer & Rosenheck, 1998). Further reviews have supported the belief that there is no clear evidence to support differences in compliance rates between populations with physical and those with psychiatric disorders. For example, one meta-analysis of studies from Cinahl, Medline and PsycInfo reported rates of non adherence to anti-psychotics varying from 19 – 47% in patients with schizophrenia and 20 – 57% in patients with bipolar affective disorder (Pinikahana, Happell, Taylor, & Kekes, 2002). The same review reports medication adherence in general medical conditions to range from 19 – 80% for patients with diabetes and 55 – 71% for patients with arthritis. Similarly, average compliance rates for patients taking anti-tuberculosis medication, cardiovascular medication, and antibiotics, were 40%, 40%, and 50% respectively (Ley & Llewellyn, 1995).

Chapter Summary

To summarise, this chapter has served to provide basic background information on adherence to treatment regimens. Treatment non-adherence is a

frustrating and serious problem seen by many health professionals. The terms "compliance" and "adherence" have been used interchangeably in the literature. "Adherence" is the preferred term for the present study, as it acknowledges the patient's right to choose whether or not to engage in taking the medication. Methodological issues have complicated the field of medication adherence research. The lack of a standard definition of adherence, and variation in the methods used to assess adherence have been major issues, making comparison of studies difficult. Although electronic monitoring has proved to be an accurate method, the method of self-report has been the most commonly used means of assessment. The disadvantages of using self-report in the assessment of medication regimen adherence have been acknowledged, however recent improvements in the development of questionnaires have begun to show that self-report can be an appropriate and valuable method in which to gather information from patients about their adherence behaviours. The costs of medication non-adherence are numerous and manifested in several ways. Research examining rates of non-adherence to all types of medication vary but, in general, rates range from 30-60%. It has been suggested that medication adherence is a greater problem for patients with mental health concerns. However there is no clear evidence to support differences in adherence rates between populations with physical disorders and those with psychiatric disorders.

Chapter Two: Depression in Primary Care.

The focus of this chapter will be to provide an overview of depression and its management in primary care. In New Zealand and many parts of the world, psychiatrists and mental health professionals recognise that primary care health providers (or general medical practitioners) serve as the main mental health care resource for the vast majority of patients with mental health concerns (Coyne, Thompson, Klinkman, & Nease, 2002; Hornblow, Bushnell, Wells, & Oakley-Browne, 1990; Kessler, et al., 1999). This chapter will begin by discussing the prevalence of mental disorders and depression in the community and primary care populations. Secondly, the burden of depression and the associated morbidity, disability, and economic costs will be explored, followed by the identification of the associated risk factors for depression in primary care patients. Next, the nature of depression, its diagnostic criteria, comorbidity and severity of symptoms is discussed. Finally, a brief summary of two models for depression will be presented, specifically from an aetiological and treatment perspective. It is important to note that in this chapter the terms "general practice" and "primary care" will be used interchangeably.

The Prevalence of Mental Disorders

Several large multi-centre community studies have found that a high proportion of the general population meets the criteria for a DSM disorder. Two such studies are the Epidemiological Catchment Area (ECA) studies (e.g., Burnam, Hough,

Richard, Escobar, & Karno, 1987; Reiger, et al., 1993; Wells, Bushnell, Hornblow, Joyce, & Oakley-Browne, 1989a) and the National Institute of Mental Health's (NIMH) National Comorbidity Survey (NCS) study (Kessler et al., 1994). In New Zealand, the Christchurch based ECA study found the lifetime prevalence rate for affective disorders in the community was 14.7% and was higher than that reported at other ECA sites (Puerto Rico, Edmonton, Los Angeles and St Louis; Wells et al., 1989a). Of particular interest, and similar to other parts of the world, only a small proportion of the community who met a DSM diagnosis, visited a health service or professional for a mental health consultation, and 75% of those that had sought a consultation did so with a general medical practitioner (Hornblow et al., 1990).

Research investigating mental illness in the general practice setting has found approximately 20% of all general practice patients suffer from a mental disorder as defined by the DSM diagnostic criteria. This figure would rise to 40% if subclinical disorders were included (Sartorius, Ustun, Costa de Silva, & Goldburg, 1993). A more recent study in New Zealand found that more than one third of all patients attending their GP for whatever reason, had a diagnosable mental disorder during the 12 months prior to their visit (MaGPIe, 2003).

The Epidemiology and Prevalence of Depression in Primary Care

In spite of a growing awareness, acceptance and availability of effective treatments, depression remains a widespread and debilitative psychiatric disorder. Research estimates of prevalence rates of depression in primary care vary. One systematic review of studies investigating depression in primary care from 1975 to

1990 identified 41 studies using either depression rating scales or structured psychiatric interviews to determine the prevalence of major depression (Katon & Schulberg, 1992). The 30 studies using depression self-rating scales generated a large variation (9-30%) in prevalence rates. The authors attributed this variation to the differences in operational definitions of depression between studies and the use of varied measures. More specifically, these differences included the use of different screening scales, the use of different cut-off points applied within the same screening scale, the different populations ,nd inadequate sample sizes affecting the reliability of reported rates. In comparison, the eleven studies using psychiatric interviews (i.e., Diagnostic Interview Schedule, Present-State Examination and Schedule of Affective Disorders) and specific diagnostic criteria, yielded point prevalence rates of between 4.8 to 8.6% across instruments and studies (Katon & Schulberg, 1992). Katon and Schulberg (1992) conclude that using psychiatric interviews produces more consistent estimates of prevalence than self-rating scales. Interestingly, Katon and Schulberg (1992) provide no comment regarding the measurement of the level of practitioner adherence to the various interview schedules.

Since the review by Katon and Schulberg, (1992) a number of studies investigating prevalence rates have been conducted (e g., Coyne, Fechner-Bates, & Schwenk, 1994; Yeung et al., 2004). One review of studies from 1980 to 2000 identified through Medline and HealthSTAR revealed such large methodological variation between studies that the authors believe comparative analyses are difficult to perform (Waraich, Goldner, Somers, & Hsu, 2004). The strict inclusion criteria for this review required that studies had large sample sizes ($>N = 450$), examined age-

ranges covering the adult population, and used diagnostic criteria and case identification based on either standardised instruments or clinician diagnosis (Waraich et al., 2004). The best estimates for 1-year and lifetime prevalence were 4.1% and 6.7% respectively (Waraich et al., 2004). Using a structured clinical interview, the New Zealand MaGPIe study (2003) determined that 18.1% of primary care patients ($N = 3414$) suffered from a depressive disorder in the last 12 months with 4.4% meeting the criteria for severe depression, 6.6% moderate and 6.7% mild depression (MaGPIe, 2003). Research into the recognition of mental disorders in primary care patients has suggested that up to one half of patients with diagnosable mental disorders are not recognised by their GP (Bushell, 2004; Ormel, Koeter, van den Brink, & van de Willige, 1991).

Overall, the estimated prevalence of depressed patients in primary care varies from 6-20% (e.g., Kessler et al., 1994; MaGPIe, 2003; Sartorius et al., 1993; Weissman et al., 1996; Yeung et al., 2004). This variability is reported to be related more to the psychometric properties of the assessment instruments and variation in research methods, rather than to variations in the true prevalence of major depressive disorder in primary care (Kessler, et al., 1994). However, even with this variability, it is clear that major depressive disorder is a common mental health disorder in primary care.

The Burden of Depression

In 1990, the annual economic burden of depression in the United States alone was estimated to be in excess of $44 billion (Greenberg, Stiglin, Finkelstein, & Berndt, 1993). The serious problem depression presents to society is accentuated

by researchers reporting that most estimates of economic burden are probably low. Reasons for underestimating the burden of depression include the under-diagnosis and misdiagnosis of depression by practitioners, a low percentage of depressed patients seeking help, and the exclusion of subclinical symptoms in many research studies (Dozois & Westra, 2004).

Depression is a leading cause of disability and premature death among people aged between 18-44 (Greden, 2001). Researchers predict that by 2020, depression will be second only to ischaemic heart disease in terms of overall cost to society (Murray & Lopez, 1996). Research investigating the impact of depression on individuals' functioning and on the economy has demonstrated that one area of disruption associated with depression is poor work productivity. This is indicated by depressed workers taking 1.5-3.2 more sick days in a 30-day period than other workers, and visiting their doctor 3 times more than those not suffering from depression (Kessler, Birnhaum, & Frank, 1999). Additional burdens associated with depression include patient suffering, family distress and conflict and a significant risk of suicide (Judd et al., 2000). The Medical Outcome Study (Wells et al., 1989b) investigated patient physical functioning in several chronic disorders of adults in the United States. Patients with major depression had functioning scores similar to those with advanced coronary artery disease, and scores that were lower than all other conditions studied, including hypertension, diabetes mellitus and arthritis (Wells et al., 1989b). Furthermore, when depression occurs with other general medical conditions patient adherence to treatment is worsened, chances for improvement or recovery from other conditions lessened, and healthcare costs are further increased (DiMatteo, Lepper, &

Croghan, 2000; Katon & Ciechanowski, 2002). Recovery from depression is also associated with significant reduction in work disability and likely reductions in healthcare costs (Simon et al., 2000). When considering the level of impairment caused by depression and the high prevalence of the illness in the general population it is not surprising that some researchers believe that unipolar major depression is a leading cause of disability world-wide (Murray & Lopez, 1996). Researchers have predicted that by 2020, depression will be second only to ischaemic heart-disease in terms of overall cost to society (Murray & Lopez, 1996). Taking this into account, the importance of accurate diagnosis and the adequate treatment of depression is further realised. The level of disability experienced by the patient and subsequent burdens felt by family, friends, and the community at large, are substantial reasons to ensure that research continues on the treatment of depression in primary care.

The Nature of Depression

The diagnosis of depression is based on a careful evaluation of symptoms during a clinical interview. According to the DSM-IV-R (American Psychological Association, 2000), an episode of major depressive disorder (MDD), is characterised by depressed mood or loss of interest in almost all activities for a period of two or more weeks. In addition to these two primary symptoms, of which one must be present, individuals with major depressive disorder experience pervasive depressive symptoms, including, the inability to concentrate, suicidal thoughts, insomnia or hypersomnia, fatigue, psychomotor agitation or retardation, weight or appetite loss or gain, and feelings of worthlessness or excessive guilt. Areas of functioning and well-

being typically affected by depression include limitations to physical functioning, such as participating in sports activities, climbing stairs, walking, dressing and bathing. Other areas of functioning affected are social functioning, including changes in the ability to interact with friends and occupational functioning, the extent to which depression interferes with work, housework or school work (Dozois & Westra, 2004; Wells et al., 1989b). For many people, MDD is a life-long episodic disorder with multiple recurrences. Approximately 20-25% of MDD patients experience a chronic, unremitting course. Severity of symptoms of major depression is correlated with the level of disability experienced by the patient (Judd et al., 2000).

Opinion differs as to whether the nature of depression seen in general practice is essentially the same as depression seen in other mental health services, but at a less severe or early stage (Suh & Gallo, 1997). Some report that depression seen in mental health services differs in terms of symptom profiles, natural course, prognosis and response to medication (Williamson & Yates, 1989). Others suggest that patients in primary care, meeting the standard diagnostic criteria for major depression, are likely to be similar to those patients seen in mental health services with respect to age, gender, ethnic identification, marital status, global assessment of functioning, levels on the Hamilton Depression Rating Scale and self-reported distress (Schwenk, Coyne, & Fechner-Bates, 1996). Research difficulties are highlighted when comparing community samples with populations of mental health patients. Of particular interest is the variation in recruitment protocols between studies, and the presence of other comorbid diagnoses in random controlled trails. These factors might contribute to

difficulty experienced when assessing possible differences between populations (Stirman, DeRubeis, Crits-Christoph & Brody, 2003).

Risk Factors for Depression

Traditionally, some have believed that major depression is a disorder of middle age and onwards (Dunn & Skuse, 1981). However, research has also reported that

major depressive disorder is predominantly a disorder of younger adults. Three sites in the NIMH study in the USA found that the lifetime prevalence rates for major depressive disorder (MDD) were significantly greater in the younger as opposed to the older respondents. Specifically, it was found that the peak age group was 25-44 years (Robins, 1984). Consistent with the NIMH results, the highest prevalence of depression in New Zealand occurred among younger adults (18-24 years) followed by adults between 25-44 years (MaGPIe, 2003).

Many psychiatric and community studies have investigated gender differences in depressive disorders (e.g., Blazer, Kessler, McGonagle, & Swartz, 1994; Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993; Weissman et al., 1996). The gender ratio of prevalence in these studies is almost consistent at 2:1 (female: male). The NCS, found the lifetime prevalence of MDD in the US population to be 21.3% in women and 12.7% in men (Blazer et al., 1994). This is consistent with analysis of data from the World Health Organisation's (WHO) study "Psychological Problems in Primary Care". This study found a higher prevalence of depression among females even when the initial sample's gender distribution was controlled for (Maier et al., 1999). In New Zealand, the MaGPIe study (2003), reported almost two thirds of

general practice patients were women, and depression was more common in females than males.

A number of social factors are also associated with increased risk for depression. A wide range of environmental adversities such as job loss, marital difficulties, major health problems and loss of close personal relationships are associated with a substantial increase in risk for the onset of MDD (Kessler, 1997; O'Sullivan, 2004). A range of environmental stressors present in childhood including physical and sexual abuse, bullying, poor parent–child relationships, and parental discord and divorce almost certainly increase the risk for MDD in later life (Kessler, 1997; O'Sullivan, 2004). A range of other risk factors has been proposed for MDD. These include family history, lower social class and urban residence (Blazer, et al., 1994; Parikh, Waslenki, & Wong, 1996; Romans-Clarkson, Walton, Herbison, & Mullen, 1990), or a perceived lack of a close confidant and social support (O' Sullivan, 2004).

Comorbidity

A pattern of comorbidity (the presence of more than one specific disorder in a person at one time) with other psychological disorders is well established and recognised in depression (Kessler et al., 1994; Rush et al., 2005, Vuorilehto, Melartin, & Isometsa, 2005). In one study of 1376 outpatients, only 38.2% of participants diagnosed with MDD had no current comorbidities, while 25.6% suffered one, 16.1% suffered two and 20.2% suffered three or more comorbid conditions. Most frequently these comorbid disorders are anxiety disorders and substance use disorders (Coyne et al., 1994; Rush et al., 2005; Sartorius et al., 1993).

Depression is also common among the medically ill. For example, a study of the relationship between pain and depression found pain to be related to both anxiety and depression. (Von Korff & Simon, 1996). Symptoms of pain were amplified when depression was present. Specifically, the extent of the diffuseness of the pain and the extent to which it interfered with activities were related to depression (Von Korff & Simon, 1996).

There is considerable evidence that when depression is comorbid with other disorders (both physical and psychological) there is a negative effect on associated impairments and disabilities (Brown, Schulberg, Madonia, Shear, & Houck, 1996; Newman, Moffit, Caspi, & Silva, 1998). Consequently, depending on the type and degree of comorbidity, there is considerable consequence for the individual and society as a whole, when depression is present with another physical or psychological disorder.

Etiology of Depression: Two Empirically Supported Models

The Medical or Biological Model. While there are many theories and treatments of depression, the "modern" view that depression is primarily a medical or biological condition can be traced back to early Greek medicine (Rosenhan & Seligman, 1995). This biological model holds that depression is a disorder of motivation associated with dysregulation of the biogenic amine metabolites or neurotransmitters. These neurotransmitters facilitate neural transmission in the brain (Rosenhan & Seligman, 1995). The two biogenic amines most implicated in depression are norepinephrine and serotonin (Sadock & Sadock, 2003). A more

detailed discussion of the biochemical changes associated with depression is beyond the scope of this thesis and is provided by others (e.g., Sadock & Sadock, 2003).

The Cognitive Model of Depression. The second model of depression discussed in this study is the psychologically based cognitive model (Beck, Rush, Shaw, & Emery, 1979). This model has arisen from recognition that dysfunctional cognitive processes such as negative thinking, gloomy thoughts, and a pessimistic view of the future mediate the relationship between stressful life events and depression (Hamilton & Dobson, 2002). According to cognitive theory, the "cognitive triad" is central to depression (Beck et al., 1979). Specifically, individuals who tend to view *themselves*, *others,* and the *world* or *future,* in a biased and negative manner, are more vulnerable to depression. This theory of depression emphasises that these processes do not result from depression but are involved in the development and continuance of depression (Beck et al., 1979). The negative cognitions typical of a depressed person, (described as core beliefs or schemata), are enduring, rigid, and negative underlying assumptions that guide the interpretation and evaluation of incoming stimuli (Beck, 1995). Dysfunctional core beliefs influence the development of an intermediate class of beliefs consisting of dysfunctional attitudes, rules and assumptions. This intermediate level of processing stimulates a more superficial level of processing characterised by automatic thoughts. Automatic thoughts are brief transient thoughts, often not recognised by the individual and directly impact on the feelings, emotions and behaviour that the person then experiences (Beck, 1995).

In addition, one important hypothesis of this cognitive model is the theory that certain beliefs lead to a vulnerability to depression (stress diathesis model; Beck,

2005). This theory proposes that predisposing beliefs could be differentiated on the basis of the individual's personality was autonomous or sociotropic. Autonomy can be characterised as a person's emphasis on individuality, self reliance and a sense of power to do what they want (Luty, Joyce, Mulder, Sullivan, & McKenzie, 2002). For such an individual, repeated failure in performing a personal task could lead to depression. Similarly, sociotropic individuals need to lean on others for personal satisfaction and place importance on seeking approval from others, trying to avoid disapproval from others (Joyce, Mulder, McKenzie, Luty, & Cloninger, 2004). Loss of a significant person in one's life may lead to depression in a sociotropic individual but would be less likely to have an effect in an autonomous individual.

The Treatment of Depression

The American Psychiatric Association (APA, 2000) and the Royal Australian and New Zealand College of Psychiatrists (2004), suggest that there is a choice between several treatment modalities for the treatment of depression. Treatment modalities include pharmacotherapy, psychotherapy, a combination of both, or electroconvulsive therapy (ECT). Treatment choice depends on the clinical situation, the clinician's skill, and the patient's preferences and circumstances (Royal Australian and New Zealand College of Psychiatrists, 2004).

The American Psychiatric Association (APA, 2000), recommend the use of antidepressant therapy for the treatment for acute, severe and recurrent depression. Others include the presence of suicidal ideation, and a history of failure to respond to psychotherapy, as indicators of medication therapy (Andrew & Oakley-Brown, 2000). The APA recommend that therapy should continue for 6-8 weeks, followed by 4 to 9

months of maintenance therapy once the symptoms have resolved. The goals of treatment with antidepressants are full remission of all symptoms (defined as resolution of symptoms for at least 4 to 6 months and a return to prodromal functioning) and prevention of recurrence (APA, 2000; Kennedy, McIntyre, Fallu & Lam, 2002).

However, research has indicated that for a significant number of patients', depression is not an acute illness with a good long-term prognosis. Depression can follow a chronic course of relapsing and remitting episodes in approximately 10% of patients (Lin et al., 1998; Solomon et el., 2000). One cohort study of ($N = 251$) of depressed primary care patients assessed at baseline, 7-months, and 19-months, found that 37.1% of patients reported the recurrence of depressive symptoms within 12 months of acute and continuation phase treatment (Lin et al., 1998). The same study indicated that the two predictors of relapse were the persistence of sub-threshold depressive symptoms and a history of at least 2 major episodes of depression or chronic mood disorders for 2 years or longer (Lin et al., 1998). For those who have experienced two episodes of depression, the likelihood of a third episode increases to 80% to 90% (Lin et al., 1998; Myers & Brainthwaite, 1992). One study assessing the association between proper use of treatment guidelines and incidence of relapse over 2 years, found that less than 30% of patients received therapy that complied with the APA guidelines, and 24% of these patients experienced relapse or recurrence (Kennedy et al., 2002). Another analysis using an UK Primary Care database ($N =$ 7493) found that patients who received at least 120 days of antidepressant treatment experienced the lowest level of relapse or recurrence of depressive symptoms during an 18 month follow up period (19.1%), compared to those who discontinued use of

the antidepressant prematurely (23.0%) or switched and/or augmented their initial SSRI (29.1%; Claxton et al., 2000). Relapse rates have also been observed to be lowest in patients receiving greater than 24 weeks of treatment with a SSRI beyond the resolution of the initial depressive symptoms (Kennedy et al., 2002).

A specific, effective psychotherapy alone might be considered as an initial treatment modality for patients with mild to moderate MDD whose clinical presentation includes such features as the presence of psychosocial stressors or interpersonal difficulties (APA, 2000). The combination of psychotherapy and medication might be considered with patients with psychosocial stressors etc. in combination with moderate to severe MDD (APA, 2000). Cognitive therapy for depression is one form of psychotherapy that has been used to treat depression (Scott, 2001). Cognitive therapy for depression is a collaborative, goal-oriented, time-limited, and present-focused approach that rests on three principles (A.T. Beck et al., 1979, Hamilton & Dobson, 2004). The first assumption is that depression is influenced by the cognitive interpretation of experience. A depressed person (and the depression-prone person), begins to interpret their past and present experiences as failures and, on that basis, anticipates that their future experiences will also be failures. The second assumption presumes that cognitions can be identified, monitored and evaluated (Beck, 1995). Therapy teaches clients to use the outcomes of their behaviours to test the accuracy of their dysfunctional thought processes or cognitive processes. Thirdly it is believed that modified cognition's influence affect and behaviour (Beck, 1995).

Chapter Summary

In summary, the prevalence of major depressive disorder in primary health care varies from 6-20% depending on the method of assessment and research employed. Patient disability, patient and family suffering, economic cost and a high risk of suicide are characteristic of depression and a number of risk factors have been found to be associated with the development of depression. Comorbidity with anxiety and substance abuse disorders is common. Depression is diagnosed by a clinical assessment of symptoms as outlined in the DSM-IV. The most commonly utilised therapy for primary care patients in New Zealand is antidepressant medication. This therapy is based on the biological view that depression is caused by biochemical changes in the brain. Research has shown that a significant number of patients do not take their antidepressant therapy as prescribed, resulting in higher rates of symptom exacerbation and relapse. An alternative cognitive theory of depression states that the dysfunctional cognitions, and subsequent interpretation of experience, influence depression. Cognitive therapy works to modify dysfunctional cognitions.

Chapter Three: Factors Affecting Medication Adherence.

There has been significant prior research focusing on factors related to treatment adherence. Rationale for this research focus came from the notion that identification of factors contributing to adherence would lead to the development of interventions aimed at improving the levels of treatment adherence and other therapeutic outcomes (Trostle, 1988). This approach has met with some success. For example, medication adherence rates in older adults (> 65 years), with age related memory deficits, significantly improve with the use of prompts (i.e., alarms and calendars; Cramer, 1998). Over 200 interrelated, overlapping, and interacting factors have been examined in relation to adherence (Haynes, 1979). These variables can be broadly categorised into four groups. These are, *patient characteristics, characteristics of the relationship between the doctor and the patient, treatment regimen characteristics,* and *disease characteristics*. Several summaries of this research have been published (e.g., Meichenbaum & Turk, 1989; Haynes, 1979). This chapter will limit its review to factors that have been frequently cited with particular emphasis on factors relevant to adherence to medication in the treatment of major depressive disorder. Demographic and socio-economic variables and their relationship to adherence will be examined first, followed by a brief summary of doctor-patient communication and relationship variables that affect medication adherence behaviours. Lastly, factors important in adherence to antidepressant therapy will be explored.

Demographic and Socio-Economic Factors

There has been substantive research attempting to identifying the demographic and socio-economic characteristics of the non-adherent patient (eg., DiMatteo, 2004a; Haynes, 1979; Marston, 1970; Meichenbaum & Turk, 1987). These factors include demographic variables such as age, gender, ethnicity or socio-economic factors like income and education. One review of ($N = 569$) empirical studies from Medline and PsycLit databases, conducted between 1948 and 1998, found that while correlations between adherence and socio-demographic factors were sometimes significant in certain situations, in all cases they were "quite modest in magnitude" (i.e., $r < .15$; Di Matteo, 2004a, p. 203). In other words the consensus has been that that considerable research has struggled to identify any stable socio-demographic characteristics that can consistently describe the non-adherent patient (DiMatteo, 2004a).

However, socio-demographic factors should not be dismissed completely as they may be related to adherence in some situations (DiMatteo, 2004a; Meichenbaum & Turk, 1987). For example, the effects of age on adherence have been shown to be a significant a factor in some situations. Research has indicated that rates of adherence decrease as children get older with a peak rate of poor adherence occurring during adolescence (Bryon, 1998; Di Matteo, 2004a; Hailey & Moss, 2000). One explanation for this finding might be that parents are largely responsible for the younger child's treatment adherence and, as children move through their teenage years, they become increasingly independent of their parents, and the responsibility of medication adherence tends to shift from the parents to the teenager.

Additional research has indicated that age is not consistently related to adherence from adolescence until the age of 65 years (Di Matteo, 2004a; Haynes,

1979; Marston, 1970). However, medication non-adherence rates in older adults (over age 65 years), are higher and are estimated to be between 40-75% (Murdaugh, 1998). One study has indicated that 40% of hospital admissions for drug-related illnesses in the older adult population were related to medication non-adherence (Col et al., 1990). Possible reasons for this increase in non-adherence in older adults include the increased occurrence of age-related cognitive changes (e.g., vision, hearing, memory) that affect an older person's ability to follow a medical regimen (Fleischhaker, Oehl, & Mummer, 2003; Isaac & Tamblyn, 1993; Jeste et al., 2003). Other factors include the complexity of the treatment regimen (Col et al., 1990; DiMatteo & DiNicola, 1982). Eighty to 85% of older adults are estimated to have at least one chronic disease or physical impairment, resulting in the administration of a large number of medications (Ryan, 1999). One study has found that the greater number of medications prescribed for older adults resulted in greater medication non-adherence (Col et al., 1990). The issue of regimen complexity is continued later in this chapter.

To summarise, the examination of socio-demographic variables gives opportunity for the appreciation of the complex and variable nature of medication adherence. However, the modest association between these variables and adherence behaviour, combined with the recognition that socio-demographic characteristics are difficult to change, have led researchers to change their focus of research towards investigation of other aspects of adherence behaviour (Hailey & Moss, 2000).

Doctor –Patient Relationship and Communication

One area of research that has produced significant empirical findings is the quality of the practitioner-patient relationship on rates of medication adherence.

Although adherence research has tended to focus on the patient's role and responsibilities, the modern concept of adherence implies a more active voluntary collaborative involvement between doctor and patient. The doctor is seen as an expert at making the diagnosis and providing the appropriate treatment, while the patient is an expert at being able to identify their own health changes and the ways in which any recommended treatment can be implemented within their environment (Dunbar-Jacob, 1993). This approach involves a fundamental change of conceptualisation from one of "medication adherence" to "therapeutic alliance" (Berk, Berk, & Castle, 2004; Meichenbaum & Turk, 1987). The role of the doctor-patient relationship in adherence to treatment has been an abundant and promising area of research (DiMatteo & DiNicola, 1982; DiMatteo, 2004a; Ley & Llewelyn, 1995).

There is evidence which indicates that adherence behaviours and the doctor-patient relationship are intertwined, and the quality of doctor-patient communication significantly affects a variety of health outcomes, including adherence (e.g., DiMatteo, Giordani, Lepper & Croghan, 2002; Fawcett, 1995; Hall, Roter, & Katz, 1988; Ley, 1982). One study ($N = 155$) of patients in primary care, identified by pharmacy data and medical records, suggested that explicit communication with patients regarding the expected duration of antidepressant therapy may reduce premature discontinuation of medication use (Lin et al, 1995). Eighty-three percent of patients receiving the instructions not to stop taking the anti depressants before discussing it with the doctor, were still adherent at one month, compared with 56.6% of patients who did not receive the same instruction (Lin et al., 1995). Similarly, another study conducted a telephone survey of 100 depressed patients enrolled in community pharmacies (Bultman & Svarstad, 2000). Patients in the Bultman and

Svarstad study (2000), were given information about what, how much, and when to take the antidepressant, when to expect to feel better, potential side effects and ways to alleviate these side effects, expected length of treatment, and a general idea of how the medication works. Patients receiving this information were more knowledgable about their medication and patient knowledge of the regimen predicted satisfaction with the antidepressant (ß = 0.19, $p < 0.02$). Satisfaction with the antidepressant was predictive of fewer instances of forgetting to take the medication (c = - 0.25, $p <$ 0.03). Overall, 21% of the variation in medication omissions was explained by the doctor's collaborative communication style and client satisfaction with the antidepressant (Bultman & Svarstad, 2000). This study assumes that providing information about medication is evidence of a collaborative relationship. It is hard to determine whether knowledge about medicine impacts adherence, or the collaborative relationship affects adherence. Interestingly, doctors who express positive verbal communications including reassurance, support, and encouragement, refrain from negative verbal communications such as anger and anxiety (Hall et al., 1988) and listen more to their patients' concerns (Moore et al., 2004), positively influence adherence to medication.

There is an increasing awareness that the beliefs patients hold about illness and medication have significant impact on their acceptance and adherence to prescribed medications (Lingham & Scott, 2002). The impact of illness beliefs on adherence to treatment behaviours is a major area for later discussion and the focus of the present study. To date, there has been less specific work focusing on ways in which doctor-patient communication impacts illness beliefs and behaviour. However, studies have found that illness beliefs are seldom fully explored during routine

consultations (Leventhal & Cameron, 1987), and illness beliefs held by patients are often different to those held by practitioners (Molzahn & Northcott, 1989; Stevenson, Gerrett, Rivers, & Wallace, 2000).

Disappearance or Lack of Symptoms

Despite prominent health warnings stating that the early termination of treatment is a non-therapeutic practice resulting in significant health risks, many patients stop taking their medication when they feel better (Col et al., 1990; Meichenbaum & Turk, 1989). In one study of ($N = 802$) elderly outpatients, 15.1% reported the reason they were non-adherent to their medication was because their symptoms had disappeared (Spagnoli et al., 1989). Some have suggested that low medication adherence rates are observed in conditions that are often symptomless but with potential serious consequences such as, hypertension and maintenance treatment for depression (Blackwell, 1976; Demyttenaere, 1997). However, one review of studies examining the relationship between symptoms and medication adherence in the treatment of hypertension, found no evidence to indicate that adherence improved with increased severity of symptoms (Haynes et al., 1979).

Increased adherence has been observed in conditions such as diabetes, where the relationship between ceasing to take medications and the recurrence of symptoms is easily observed (Demyttenaere, 1997). This relationship is less easily observed in depression (Demyttenaere, 1997; Katon et al., 1995). However, the disappearance of symptoms and its relationship to medication adherence issues is important in the treatment of depression (Katon et al., 1995). Fifty-five precent of depressed patients

($N = 272$) in primary care settings cited "feeling better" as the reason for prematurely stopping their antidepressant medication (Demyttenaere et al., 2001). Interestingly, this study followed patients at monthly intervals for up to 6 months after the commencement of antidepressant therapy. The patients who dropped out because of "side-effects" (23%) did so after a mean period of 6.5 weeks; "lack of efficacy" after 7 weeks; "feeling better" after 11 weeks (Demyttenaere et al., 2001). These findings indicate that depressive symptoms diminish before the underlying condition is resolved, leaving the patient vulnerable to residual symptoms and increased chances of relapse (Demyttenaere et al., 2001; Katon et al., 1999; Myers & Branthwaite, 1992). The impact of these findings on clinical practice is significant. Patient education regarding the need to continue taking the medication even when the depressive symptoms have disappeared is critical to ensure the risk of relapse of symptoms is minimised.

Complexity of the Medication Regimen

The treatment of depression with antidepressant medication is not generally considered a complex treatment regimen. Nonetheless, the significance of treatment complexity on adherence to antidepressants increases when there is a comorbid presentation (psychological and physical). A comorbid presentation can lead to greater numbers of medications being prescribed.

Studies have indicated that the complexity of the therapeutic regimen is an important variable affecting adherence (Becker, 1985; Col et al., 1990; Demyttenaere, 1997; Haynes, 1979; Meichenbaum & Turk, 1987). The prescription of multiple

medications and increased frequency of dosing are considered to affect adherence adversely (Haynes, 1979). For example, patients with chronic renal failure must adhere to a variety of complicated tasks in order to attain maximum therapeutic benefit. These tasks include haemodialysis treatment, taking large quantities of medication and adhering to strict dietary changes. (Hilbrands, Hoitsma, & Koene, 1995). Research on medication adherence has indicated that the quantity of medication the patient is prescribed can influence non-adherence rates. In one study of medication adherence in older adults ($N = 315$), the greater number of pills taken daily, and the greater the number of different medications prescribed, the higher the risk of non-compliance (Col et al., 1990).

Alternatively, frequency of dosing may be a better predictor of adherence rather than the number of medications taken at each dosing interval (Bloom, 2001; Cramer, 1998; Griffith, 1990; Singh & Squier, 1996). The research on dosing schedules and complexity of the treatment has produced mixed results. A review of frequency of dosing data, using various definitions of non adherence and methods of assessment, found that once- or twice-a-day regimens were associated with significantly better compliance (73% and 70%, respectively) than regimens of were three or four times daily (52% and 42 %, respectively; Greenburg, 1984). However, one study of 89 depressed patients found that dosage regimens (once or three times daily) made no difference in adherence rates to antidepressant therapy (Myers and Branthwaite, 1992). Overall, existing research on other drugs would suggest that a once-daily regimen is preferable to a more-than-once daily regimen but the relevance of findings for the specific situation of antidepressants is not clear.

Unpleasant Side Effects

Patients frequently report the presence of unpleasant side effects as the reason that they discontinue taking medication (Bull et al., 2002; Catz et al., 2003; Col et al., 1990; Conrad, 1985, Hudson et al., 2004; Mundt, Clarke, Burroughs, Brenneman, & Griest, 2001; Robinson et al., 2002). Between one-quarter and two-thirds of patients with schizophrenia cite side effects as their primary reason for non-adherence to anti-psychotic medication (Fenton, Blyler & Heinssen, 1997). Similarly, 43% of depressed patients discontinued treatment within 3 months of starting therapy because of side effects (Bull et al., 2002). Interestingly, the same study found that informing patients of the nature of the side effects commonly experienced (e.g., depressed patients taking selective serotonin re-uptake inhibitors (SSRIs), who may expect cardiovascular effects, dry mouth, sedation, nausea or agitation), significantly increased the level of medication adherence (Bull et al., 2002).

However, the relationship between side effects and adherence can be over simplified. Even although adverse effects of medication are commonly associated with adherence problems, some patients are adherent to medication despite experiencing substantial side effects. Some medication side effects (e.g., sexual dysfunction) may be clinically innocuous but nevertheless distressing to the client (Hummer et al., 1999). Side effects that cause subjective distress to the patient are likely to be more influential on willingness to take medication, and there is considerable variability in the individual's willingness to tolerate medications. One study has found that patients with epilepsy are more tolerant of side effects, such as swollen and bleeding gums, sore throat and skin rashes, than impairment of social skills, such as, impaired memory, slurring of speech, and drowsiness (Conrad, 1985).

Side effects resulting from medication taken for asymptomatic conditions (e.g., hypertension) are less likely to be tolerated than those produced by medication which relieves symptoms (Meichenbaum & Turk, 1989).

Stigma

Mental illness stigma is a matter of great concern to mental health advocates. Negative responses to people identified as having a mental illness is seen as a major obstacle to recovery, limiting opportunities and undermining self-esteem. Individuals who have mental health concerns report being shunned and avoided by others (Wahl, 1999). A nationwide survey of 1301 mental health consumers in the United States, found the majority of respondents (74%) attempted to conceal their disorders and worried that others would discover their mental health status and treat them unfavourably (Wahl, 1999). A study of stigma and depression in primary care found the stigma associated with depression was greater than for hypertension or diabetes, but not for HIV (Roeloffs et al., 2003). There has been an impression that there has been a change for the better regarding public attitudes towards depressed people. However, this impression was not upheld in a recent study, reporting that public attitudes towards people with depression had not improved over the last decade from 1990 to 2001 (Angermeyer & Matschinger, 2004).

Research investigating how perceived social barriers, such as stigma, may be important in predicting treatment behaviours, such as adherence to medication, is ongoing. Research to date has shown that the full effects of stigma on the treatment of depression and other mental illnesses is complex and not fully understood (Roeloffs et al., 2003). A pilot study ($N = 153$) investigating medication adherence in

schizophrenia identified stigma as one of the most common barriers to taking medication (Hudson et al., 2004). Similarly, in a study of ($N = 92$) depressed older adults (> 60 years) it was found that those who felt highly stigmatised by their illness were more likely to discontinue their antidepressant medication (Sirey et al., 2001).

Social Support

Social support is often cited as having an influence on treatment adherence (Di Matteo, 2004b; Meichenbaum & Turk, 1987). A positive relationship between social support and its contribution to health outcomes, such as medication adherence, has been observed in patients with AIDS (Gordillo, Del Amo, Soriano, & Gonzalez-Lahoz, 1999), solid organ transplant (Bunzel & Laederach-Hofman, 2000), diabetes (Lo, 1999), and HIV treatment (Power et al., 2003). A meta-analysis of 122 studies from 1948 to 2001, provided good evidence that social support has substantial effects on patient treatment-adherence as well as other treatment outcomes (DiMatteo, 2004b). Closer inspection of the research also reveals the complexity of the relationship between social support and adherence. For example, "functional" social support (practical and emotional support) was found to have stronger effects on treatment adherence than "structural" social support (marital status and living arrangements; Di Matteo, 2004b, p 212). One study of 73 HIV patients, found a positive relationship between partner support and adherence to medication. However, despite this result, adherence was not associated with social support from friends and family (Power et al., 2003).

The precise means by which social support contributes to medication adherence, and the factors that moderate and mediate this relationship, are complex

and not fully understood. For example, patient depression is strongly related to both social support and patient adherence and may be a mediator between them. This relationship may be further moderated by factors such as type of support, treatment regimen or the experience of stress (DiMatteo, 2004b).

Psychiatric Disorders and Adherence

Several studies have implicated psychiatric disorders including substance abuse as predictors of non-adherence to treatment regimens (e.g., Power et al., 2003). For example, Sharpiro et al., (1995) found substance abuse (alcohol and drugs) in heart transplant patients to be the most powerful predictor for post operative non-adherence. One study found that patients with schizophrenia who missed 20% or more appointments ($N = 342$ outpatients) were significantly more likely to abuse drugs and alcohol (Coodin, Staley, Cortens, Desrochers, & McLlandress, 2004). Similarly, AIDS patients ($N = 1655$), using cocaine were found to be less adherent to treatment than non-users (Sharpe, Lee, Nakashima, Elam-Evans & Fleming, 2004).

The relationship between depression and adherence has been studied in several patient populations and treatment settings. One study examined the extent to which depression and anxiety might be related to non-adherence to treatment regimens in patients with medical illness (DiMatteo et al., 2000). This meta-analysis of 25 articles demonstrated a small and insignificant association between anxiety and non-adherence. However, the relationship between depression and non-adherence was consistent and significant. Compared to non-depressed patients, the odds are 3 times greater that depressed patients will be non-adherent with medical treatment recommendations (DiMatteo et al., 2000). This finding supports other studies

suggesting that depression is an important risk factor for poor outcomes in patients who are not adhering to medical advice (e g., Carney, Freedland, Eisen, Rich, & Jaffe, 1995; Herman et al., 2002; Wang et al., 2002).

Chapter Summary

In summary, this chapter has drawn attention to many factors that have been linked to non-adherence to treatment regimens, including medication adherence in some patient groups. However, as discussed, it is difficult to identify patient characteristics that are consistent across patient groups and, consequently, the development of intervention programs addressing these issues have been limited. Even if a patient profile, stable associations, or at risk groups, can be identified, many of these characteristics can be difficult to change (Hailey & Moss, 2000; Horne, 1998). These difficulties have led some to move their research focus towards investigating the relationship between patient cognitions and non-adherence to treatment regimens.

Chapter Four: Cognitions and Adherence.

Previous discussion has highlighted the difficulties experienced when research has attempted to discover stable socio-demographic characteristics or other factors that can consistently predict circumstances where higher levels of medication adherence might be expected. Furthermore, previous research has highlighted the complexity and variability of adherence. For example, adherence levels have been found to vary between and within patients with the same disease and treatment (Horwitz et al., 1990; Horne, Sumner, Jubraj, Weinman, & Frost, 2001). These variations in adherence over time and between different components of treatment has led researchers to rethink the difficulties associated with adherence and to move towards conceptualising non-adherence as a behavioural variable, rather than a stable characteristic of the person (Horne et al., 2001). Specifically, one area of recent research has shifted its focus towards investigating attitudes and beliefs held by patients that may be associated with those non-adherent patients who visit the doctor and then decide not to take the medication prescribed.

There are several models including Social Cognition Models, Stage Models or the Transtheoretical Model (Prochaska & DiClemente, 1983), and the Self-Regulatory Model (Leventhal, Nerenz, & Steele, 1984) that have been developed from the field of health and social psychology to explain aspects of treatment adherence. This chapter will provide an outline of the features of the models that are more relevant to medication adherence and provide examples of their application. The three social cognition models discussed are the Health Belief Model, the Theory of Reasoned Action and the Theory of Planned Behaviour. The Self-Regulatory Model is then

discussed with an emphasis on research investigating treatment beliefs. Finally, continuing the discussion of cognitions and adherence, specific cognitions or beliefs related to medication adherence will be discussed from the perspective of Beck's cognitive therapy model.

Social Cognition Models and Adherence.

Psychologists and other health-related professionals have turned to the field of social psychology to aid in the understanding of factors that contribute health behaviours such as medication compliance (Connor & Norman, 1996). Social psychology describes social behaviour as a "function of people's perceptions of reality, rather than as a function of an objective description of the environment" that surrounds and simulates them (Connor & Norman, 1996, p5).

Social cognition models (SCMs), have been used to explore complex adherence issues. These models are based on the belief that behaviour is the product of cognitions, attitudes and beliefs, which occur within everyday life situations (Conner & Norman, 1996). Behaviour in response to health threats or information arises from an active decision by the patient. This "rational" decision is based on the subjective value of beliefs that are derived from the person's evaluation of expectancies that certain health behaviours or actions (e.g., taking medication or exercising) will lead to a particular outcome (e.g., improved health; Horne & Weinman, 1998). The SCMs that have been used to describe health-related behaviours include the Health Belief Model (Rosenstock, 1974), Health Locus of Control (Wallston & Wallston, 1982), Protection Motivation Theory (Rogers, 1975),

Theory of Reasoned Action, the Theory of Planned Behaviour (Ajzen, 1991) and the Self-Efficiacy Theory (Bandura,1982). The Health Belief Model (HBM), and the Theories of Reasoned Action (TRA) and Planned Behaviour (TPB) have been used to explain various aspects concerning medication adherence.

Health Belief Model. The Health Belief Model (HBM) was the first social cognition theory developed to address adherence behaviours (Rosenstock, 1974). Initially the HBM attempted to predict which individuals would accept the one-time behaviour of immunisations (Rosenstock, 1974). This model originally described five constructs, predicting that the likelihood of a person carrying out a health behaviour resulted from them weighing up their personal beliefs about the perceived threat of the illness against a behavioural evaluation of the risks and benefits of the action that was available to them (Sheeran & Abraham, 1996). Within this model, the perception of the health threat depends on two beliefs. Firstly, the perceived *susceptibility* to illness (e.g., belief that they are likely to experience a relapse) and secondly, the anticipated *severity* of the consequences of such illness (e.g., belief that relapse would have negative medical/clinical or social consequences; Sheeran & Abraham,1996). Behavioural evaluation also consists of two distinct sets of beliefs. Firstly, beliefs concerning the *benefits or efficacy* of a recommended health behaviour (e.g., beliefs that medication does or does not help in some way) and those concerning the *cost* of or *barriers* to enacting the behaviour (Sheeran & Abraham,1996). Barriers might include practical issues like the expense of medication or other therapies, or anticipation of unpleasant side effects. Additional barriers include psychological obstacles such as anxiety or stigma related to taking the medication. The fifth constuct

in the HBM model proposes that *cues to action* could trigger health behaviour when appropriate beliefs are held. These *cues to action* may be internal (e.g., recognition of early depressive symptoms) or external (e.g., comments from significant others). An individual's general *health motivation* or readiness to be concerned about health matters was later included as the six construct in HBM model (Janz & Becker, 1984). The HBM predicts the likelihood of action is increased if the perceived threat is high and if the threat is thought to outweigh the barriers. Individuals are likely to engage in health behaviours such as medication adherence if they believe themselves to be susceptible to a particular serious illness and if the benefits of the action taken to counteract the condition outweigh the costs of doing so (Armitage & Conner, 2000).

The HBM or its components have been used in a large number of research studies investigating health-related behaviours, and findings have been conflicting (e.g., Adams & Scott, 2000; Brown & Segal, 1996; Brownlee-Duffeck et al., 1987; Harrison, Mullen, & Green, 1992; Kelly, Mamon, & Scott, 1987; Maidment, Livingston, & Katona, 2002; Perkins, 2002; Reid & Christensen, 1988; Taylor, 1979). Studies of psychiatric populations receiving various medications for different length of times have suggested that the HBM accounts for 0-20% of the variance in adherence behaviour (e.g., Budd, Hughes, & Smith, 1996; Kelly et al., 1987). One study has explored the ability of the HBM to differentiate between 30 highly adherent and partially adherent subjects with affective disorders or schizophrenia (Adams & Scott, 2000). Subjects with well-defined, severe mental disorders receiving long-term prophylaxis were assessed on each of the components of the HBM using well-established, robust measures. Results found that highly adherent and partially

adherent subjects differed significantly in their perception of illness *severity*, their beliefs about themselves and their *control* over the disorder, and their *concerns* about further hospitalisations. Furthermore, two of the components of the HBM (perceived *severity* of illness and perceived *benefits* of treatment) explained 43% of the variance in adherence behaviour (Adams & Scott, 2000).

Limitations of the HBM have been discussed in the scientific literature (Horne & Weinman, 1998; Sheeran & Abraham, 1996). Usually, studies using the HBM have operationalised the constructs as a series of up to six separate independent variables that potentially account for some variance in observed or reported health behaviours. Criticism of this model has focused on the lack of definition or specification of the beliefs underlying these six constructs. This, combined with a lack of combinational rules when using multiple constructs within the model has lead to reduced ability to compare studies (Sheeran & Abraham, 1996). Criticism of the model also cites limited evidence for discriminant validity between the HBM components and variables from other models (Armitage & Conner, 2000). Others believe, that the HBM implies that health behaviours' result from a single rational decision based on perceived benefits being weighted against perceived barriers (Horne & Weinman, 1998). The study of adherence behaviours in chronic physical illness has suggested that adherence behaviours are more complex. However, while results are conflicting and methodological issues highlighted, evidence from HBM research supports examining patients' own beliefs about their illness and treatment as a means of increasing our understanding of adherence (Horne, 1998).

The Theory of Reasoned Action and theTheory of Planned Behaviour. Two further limitations of the HBM stimulated the development of other models that might better explain the complex issue of medication adherence. The first limitation is the lack of acknowledgment of the possible social influences that impact behaviour. The second limitation is its lack of a mechanism, or process, that links the individual's beliefs about the threat of illness, and possible health behaviours that might motivate the person towards carrying out that behaviour. Description of such a mechanism is provided in the Theory of Reasoned Action (TRA), and the Theory of Planned Behaviour (TPB; Ajzen, 1991). These models propose that the immediate precursor of behaviour is the intention to perform health behaviours. The TRA model states that intentions are in turn determined by beliefs surrounding a person's attitudes, and subjective norms regarding particular health behaviours (Abraham & Sheeran, 1997). The perception of likely behavioural consequences combined with the evaluation of the possible advantages and disadvantages, both influence a person's intention to perform health behaviours (Abraham & Sheeran, 1997). Importantly, the TRA also acknowledges the importance of other people's views on intentions and behaviours. A person's subjective norm combines perceptions about the extent to which other people approve of a behaviour (stigma) and perceptions and desires to conform to other peoples wishes (Abraham & Sheeran, 1997).

The TPB is a further developed model of the TRA and introduces the *perception of control* over that behaviour. Perception of control is a person's expectation that the performance of that behaviour is within their control (Armitage and Conner, 2000). Overall, these two models propose that individuals are likely to

follow a particular health action if they believe that the behaviour will lead to an outcome that they value. Health behaviours are also more likely to be engaged in if significant others (e.g., friends, family, doctors) believe that the individual should carry out the behaviour. Lastly, if the individual feels that they have the necessary resources and opportunities to perform the behaviour, combined with the absence of anticipated obstacles or impediments, they are also more likely to complete that behaviour (Conner & Sparks, 1996). For example, a depressed person might believe that they would benefit from antidepressant therapy (e.g., this drug worked well for my friend when she was depressed). However, they might also be aware that others believe using antidepressant therapy is a sign of personal weakness and inadequacy. Alternatively, for some, the side effects of antidepressants might seem to be worse than the depression symptoms themselves. These factors might negatively influence their intention to take their antidepressant therapy.

The TRA and the TPB have been used in research to aid the understanding of a variety of behaviours and have had varying amounts of success. One meta-analysis of 56 TPB studies showed that the TPB accounted for 41% of the variance in behavioural intentions and 34% of the variance in behaviours for a range of health behaviours (Godin and Kok, 1996). Aspects of these models fit well with adherence to medication issues, however, medication specific research using the TRB and TRA is not extensive. One study has used the TPB to explore psychological factors influencing mothers' intentions to use oral re-hydration therapy (ORT) for the treatment of children's diarrhoea in rural Africa ($N = 128$). Perceived barriers to ORT use ($r = -0.25, p < 0.01$) and perceived consequences of using ORT ($r = 0.57, p <$

.01) were significant predictors of intention (Hounsa, Godin, Alihonou, Valois, & Girard, 1993). A further study, investigating treatment for urinary infection ($N = 113$), found that expectations of significant others play a significant role in the development of intention. However, a patient's own beliefs and situational circumstances had a greater influence on whether they actually completed their course of antibiotics (Reid & Christensen, 1988). Miller, Wikoff, & Hiatt (1992), investigated the compliance behaviour of ($N = 56$) hypertensive patients to prescriptions of diet, smoking cessation, activity, stress management, and medications. Results indicated that attitudes (beliefs about advantages and disadvantages of taking the medication) and the desire to do what significant others think, directly influenced regimen adherence.

In summary, the advantages of using social cognition models in health psychology include the ability to provide a clear theoretical framework on which to develop research. These models have made it easier to select research variables, develop reliable and valid measures and they have provided some insight into how some of these variables overlap or combine, enabling the prediction of some health behaviours (Conner & Norman, 1996). The social cognition models have also enabled the development of interventions, aimed at altering the cognitions that underlie unhealthy behaviours. Discussion about the limitations of exclusively relying on the social cognition models to understand health behaviours focuses on the inconsistency across studies, and the fact that the proportion of variance in adherence behaviours that can be explained by these models is usually small (Conner & Norman, 1995).

The Self Regulatory Model of Illness

The Self-Regulatory Model (SRM; Leventhal, Diefenbach & Leventhal, 1992) was developed to provide a means of explaining complex adherence behaviours. The SRM is based on the belief that adherence and other health related behaviours are influenced by the patient's own beliefs, perceptions, or representations of the illness (Leventhal & Cameron, 1987; Leventhal, Diefenbach & Leventhal, 1992). The SRM asserts that these illness beliefs are structured around five dimensions. These beliefs are *illness identity* (concrete symptoms and signs that are given a label), *time-line* (perceptions about likely course of illness), *cause* (ideas about how a patient gets a disease), *consequences* (expected outcome) and *control-cure* (patients beliefs about potential cure and control of illness; Leventhal, Diefenbach & Leventhal, 1992). The specific contents of each of these components are highly individualised and influenced by cultural experiences, past experiences and views of significant others. Within this framework the patient is seen as an active problem solver of threats to health and illness. The patient interprets and evaluates the illness based on their interpretation and evaluation of the problems facing them (Horne & Weinman, 1998).

The SRM views decisions and responses to health related threats as following three broad stages (Horne & Weinman, 1998). Firstly, the meaning or cognitive representation of the health threat is identified. Both internal cues (e.g., symptoms) and/or external cues (e.g., information) can stimulate this. Secondly, a coping plan or strategy is developed to cope with the threat. Lastly, the SRM differs from other SCM's with the addition of an appraisal of the efficacy of the plan. The coping

strategy is modified or, alternatively, the illness perception might even change if the plan needs to be changed (Horne, 1997; Horne & Weinman, 1998). The SRM also stresses that symptom experience is key to formulating beliefs and cognitive representations about illness, and guides the evaluation of significant threats. The interactions between the experience of symptoms and appraisal of the coping mechanism employed are dynamic and are guided by the patient's need to maintain "coherence" between them (Horne, 1997). Horne (1997) describes non-adherent behaviour as a "common sense" response from the patient to address a perceived lack of coherence between ideas about the illness, their experience of symptoms and the doctor's instruction. For example, a depressed patient might think, "These antidepressants make me feel even more tired. They don't help me at all. I won't continue to take them". Alternatively, "These tablets are taking a long time to work. Nothing is going to work for me" or "My uncle died while taking antidepressants. I might die if I take them".

The SRM also describes a second emotional process that works along side the cognitive processes described above. Emotional reactions, such as fear and anger, can be observed when a person is experiencing health related symptoms, a sense of failure from previous strategies to cope with health threats, or receives a diagnosis concerning a health threat and the predicted consequences of that threat (Cameron et al., 1993). Care-seeking may therefore result from an effort to control the distress felt after other coping procedures have not been successful (Cameron et al., 1993).

The development of the Illness Perception Questionnaire (IPQ; Weinman, Petrie Moss-Morris, & Horne, 1996) and its more recent version the Revised Illness

Perception Questionnaire (IPQ-R; Moss-Morris, Weinman, Petrie, Horne, Cameron & Buick, 2002), provided a method of empirically evaluating the five key components of illness representations or beliefs in the SRM.

Illness perception models have been incorporated into a variety of clinical situations investigating health beliefs in physical illness. Research applications of the model have included the aetiology and maintenance of chronic fatigue syndrome (Edwards, Suresh, Lynch, Clarkson & Stanley, 2001; Moss-Morris & Chalder, 2003), recovery and rehabilitation following myocardial infarction (Cooper, Lloyd, Weinman, & Jackson, 1999; Petrie & Weinman, 1996; Whitmarsh, Koutantji, & Sidell, 2003), treatment of haemophilia (Llewellyn, Miners, Lee, Harrington & Weinman, 2003) and adherence to asthma medication (Byer & Myers, 2000).

Research assessing whether the five dimensions of the SRM have any relevance to models of depression have found that illness beliefs are similar in content and structure to those observed in physical ill models (Fortune, Barrowclough, & Lobban, 2004). The dimensions most commonly described in accounts of both their recent physical illness and their depression were the *identity* of the illness and the *consequences* of the illness on their life (Fortune et al., 2004). Although there is no data on the reliability and validity of this measure in a depressed population, preliminary investigations using the IPQ-R with mild to moderately depressed patients ($n = 41$) found that illness cognitions were significantly associated with medication adherence, treatment-seeking behaviours and coping strategies (Brown et al., 2001).

According to the SRM's view of the "active problem solver", illness perceptions about health threats might also contribute to perceptions about the treatment (e.g., medication) that is being offered for that illness (Horne, 1997). Using findings from previous qualitative studies, particular beliefs about medicines could be identified, including a number of misconceptions that were related to patients' non-adherence to prescribed treatments (Horne, 1997). These misconceptions included beliefs that medication should be taken only when the person feels ill, that the body needs a rest from medicines from time to time, and that people can become dependent or immune to the effects of medication (Horne, 1997).

Interest in how perceptions might effect adherence to medication led researchers to use these findings to develop the Beliefs about Medicines Questionnaire (BMQ; Horne et al., 1999). Four core themes or factors underlie these beliefs or cognitive representations. The factors are its perceived *necessity* for maintaining health (e.g., "My health depends on my medicines") and *concerns* based on beliefs about the potential for dependence or harmful long-term side-effects and that medication-taking is disruptive (e.g., "Having to take these medicines worries me"). Beliefs about medicines in general are also grouped around two themes. The first relates to the inherent properties of medicines, and the extent to which they are *harmful* addictive poisons, which should be taken regularly for long periods of time (general-*harm*). The second theme (general-*overuse*) deals with views about whether medicines are *overused* by doctors (Horne et al., 1999).

The BMQ has been applied to the investigation of non-adherence issues in chronic physical illness situations. Examples include home treatment with clotting factor in individuals with severe haemophilia (Llewellyn et al., 2003), adherence to

asthma medication, (Byer & Myers, 2000; Horne & Weinman, 2002) and rheumatoid arthritis, (Treharne et al., 2004). Early research using the BMQ on four illness groups (haemodialysis, asthma, cardiac, and cancer) found considerable variation in reported adherence and treatment beliefs within and between illness groups. Significantly, medication beliefs were found to be stronger predictors of reported adherence than clinical or socio-demographic variables (Horne & Weinman, 1998). More recently, several studies have confirmed that treatment beliefs, as measured by the BMQ, are related to adherence. For example, one group of renal transplant recipients held strong beliefs in the *necessity* of the medication with over 90% scoring in the upper half of the *necessity* scale and lower belief in the *necessity* of medication was strongly associated with non-adherence (Butler, Peveler, Smith, Horne, & Mason, 2004). Of additional interest, is the finding that the *necessity* scores for the two drugs surveyed were significantly different from each other, and only moderately correlated, indicating that subjects had different beliefs about the need for the individual medications. *Concerns* about medication and the number of reported side effects were not significantly associated with adherence (Butler et al., 2004). Similarly, in another group of haemodialysis patients, around 90% believed in the *necessity* of medication they were prescribed, as indicated by higher than mid point scores on the *necessity* scale (Horne et al., 2001). However, close to 32% also reported strong *concerns* about medication dependency issues and long term effects. In this study, increased *concerns* about medication correlated with reports of intentional non-adherence ($r_s = -0.39$; $p < 0.01$) but not to adherence to fluid-diet restrictions (Horne et al., 2001).

The dilemma many patients face as they weigh up the potential benefits of taking the medication against their concerns about their potential harm can be summarised in the calculation of a *necessity – concern* differential (NCD; Horne, 2003; Horne & Weinman, 1999). This differential is the difference between the total *necessity* and *concerns* scores. If the patient perceives that the benefits of taking the medication outweigh the costs or concerns, the NCD is positive and adherence is likely to be greater. In contrast, if the patient perceives the costs to be greater than benefits (i.e., NCD is negative), adherence is lower. Research has indicated that NCD scores are strongly correlated with reported adherence (e.g., Horne, 2003; Horne & Weinman, 1999).

To date, published research investigating medication beliefs of people with mental health issues is scarce. Some have reported that illness perceptions held by people with mental health issues are similar to those with physical health problems (Lobban et al., 2003). More specifically, on examination of the literature concerning medication beliefs for people with depression, one study has reported that "favourable attitudes" towards medication, are significant predictors of long-term antidepressant therapy (Lin et al., 2003). However, examining medication beliefs in a depressed population is not without complications as depression itself is characterised by changes in cognitive, as well as somatic and affective symptoms. The very nature of depression is that cognitions themselves are part of the syndrome and diagnostic criteria. (Beck et al., 1979).

The Cognitive Model of Medication Adherence

The cognitive therapy approach to medication adherence (Beck, 2001) is based on Beck's cognitive theory (Beck at al., 1979) and is useful in the conceptualisation and treatment of medication non-adherence. Specifically, cognitive theory proposes that individuals' affects and behaviours are influenced by their perceptions of situations (Beck, 1995). As previously stated, these perceptions arise in the mind as unbidden, spontaneous, automatic thoughts. Automatic thoughts are often dysfunctional or distorted, especially when people are depressed. However, people tend to assume that their perceptions are accurate (Beck, 1995).

According to cognitive theory, automatic thoughts specifically associated with medication non-adherence can centre on several categories (Beck, 2001). These categories include thoughts about *the medication* (e.g., "this medication won't work", "medication side effects are worse than being ill" "medication should only be taken as a last resort" "medications are addictive" or "I don't need it"), thoughts about *the doctor* (e.g.," this doctor has no idea what its like to be ill" "all doctors over-prescribe medicines" or "this doctor thinks she knows everything"), thoughts about *the illness* ("illness is a weakness", "this infection can be cured without medication") and thoughts about *oneself* (e.g., "I don't deserve to feel better", "my friends will think I'm useless", "taking this medicine will confirm to others that I am not strong"). Research indicates that many of the cognitions found to be common in people with mental illness are similar to those held by people with physical health problems who are non-adherent to treatment with medication (Lobban, et al., 2003). Patients bring to

the consultation their unique beliefs about medication, beliefs about the doctor, beliefs about themselves and beliefs about the illness. Interpretations (automatic thoughts) that are distorted are important precursors that often lead to non-adherent behaviour. Treatment of medication non-adherence with cognitive therapy involves initial emphasis on dysfunctional automatic thoughts. The aim of treatment is to identify, evaluate, and modify these thoughts, so that symptom relief is experienced. The next step is to identify the beliefs that underlie the dysfunctional thoughts and subsequently modify these beliefs so that patients' conclusions about and perceptions of events are changed and medication adherence is increased (Beck, 2001).

Chapter Summary

This chapter has briefly outlined social cognition models and shown that although there are issues in the use of them to aid understanding of health behaviours they can provide a framework from which adherence to medications can sometimes be further understood. The limitations of the social cognition models have led researchers to develop new and improved models that have provided greater understanding of certain behaviours. The Self-Regulatory model is one such model that has been used to explain adherence to treatment and more specifically, adherence to medications in the physical health field and mental health situations. One questionnaire that has been developed to access beliefs related to medications is the Beliefs about Medicine Questionnaire (Horne et al., 1999). The use of this questionnaire has shown that beliefs about the *necessity* of medication and *concern* about the adverse effects of taking medication are related to levels of medication

adherence for physical illness in several studies. This chapter concluded with a brief introduction to the cognitive model of medication non-adherence. Cognitions typically present in depressed patients with medication adherence problems can be seen to arise from their negative beliefs about themselves, others and the world.

Chapter Five: The Present Study

What People Think About Medicines

Aim

The present study has been designed to examine the extent to which beliefs about medicines are associated with adherence among primary care patients. The small amount of prior research on the relationship between treatment beliefs and adherence in patients with mental health issues prompted the development of this study. The broad aim of the present study is to contribute to existing research so that practitioners are provided with empirically-based evidence that impacts future methods of practice. More specifically, the present study will use the BMQ to assess beliefs about medicines in a depressed primary care population.

Hypotheses

Based on previous research using the BMQ to assess beliefs about medicines physical health situations (e.g., Butler et al., 2004; Byer & Myers, 2000; Treharne et al., 2004; Horne et al., 2001). Four specific hypotheses were proposed for the present study. It was hypothesised that stronger beliefs about the *necessity* of antidepressants for the treatment of depression would be associated with higher adherence (Hypothesis 1). It is also hypothesised that stronger beliefs regarding *concerns* about the potential adverse effects of taking their antidepressants will be associated with less medication adherence (Hypothesis 2). Greater medication adherence will be observed

when patients have stronger beliefs about the *necessity* of medication compared to their *concerns* about taking it (Hypothesis 3). Finally, greater levels of depressive symptoms will be associated with less medication adherence (Hypothesis 4).

Chapter Six: Method

Research Design

The present study is a preliminary cross-sectional study using two commonly used questionnaires to examine the relationship between beliefs about treatment, depression severity and adherence to antidepressant medications in a depressed primary care population. At the time of the present study, there are no published reports of the relationship between medication beliefs and adherence in a depressed primary care population.[1]

Participants

Primary care patients were invited to participate by their General Medical Practitioner (GP) at the end of a routine medical consultation. Fifteen GPs from 14 primary care practices in the central Auckland and Rodney districts recruited the participants in the study (Appendix A). Due to the unique treatment adherence behaviours associated with adolescents (Bryon, 1998; Di Matteo, 2004a; Hailey & Moss, 2000) and older adults (Murdaugh, 1998), it was decided to exclude these population groups from the present study. Thus, selection criteria required that participants were between 18-65 years of age. Participants were also selected on the basis that they were prescribed antidepressant medication of the selective serotonin re-uptake inhibitor type (SSRI), specifically for a DSM-IV-TR diagnosis of major

1. During data collection, one study was published investigating the relationship between treatment beliefs as measured by the BMQ and adherence to antidepressants a maintenance phase, depressed population (Aikens, Nease, Nau, Klinkman, & Schwenk, 2005).

depressive disorder (APA, 2000). Due to the cross-sectional nature of the present study, it was required that a minimum period of medication administration was required to allow for a pattern of medication adherence behaviour to be established. Consequently, participants had to have been prescribed antidepressant medication for a minimum period of six weeks duration.

Measures

In the present study, self-report questionnaires were used to assess participants' beliefs about their antidepressant medication and the extent of their medication adherence. Participants were also asked to complete an index of depression severity and provide demographic information.

Beliefs about Medicine Questionnaire (BMQ).[2] The BMQ was designed to assess beliefs about medicines (Horne et al., 1999). The BMQ is split into two scales, the *specific* and *general* scales. The *BMQ-Specific* scale assesses patients' beliefs about medication prescribed for their illness (i.e., in the present study, antidepressant medication and depression), and is comprised of two further sub-scales assessing personal beliefs about the *necessity* of prescribed medication for controlling their depression (e.g., My health at the moment depends on these medicines" and "Without these medicines I would be very ill"), and their *concerns* about the potential adverse consequences of taking it (e.g., My medicines disrupt my life" and "I sometimes worry about the long term effects of these medicines"). The *BMQ-General*

2. Another questionnaire known by the initials BMQ is the as Brief Medication Questionnaire (Svarstad, Chewing, Sleath, & Claesson, 1999). The Svarstad et al., (1999) BMQ is a self-report tool for screening adherence and barriers to medication adherence.

scale is also comprised of two sub-scales that deal with more general views about medicine as a whole. The *overuse* sub-scale assesses participants' beliefs about the general overuse of medications by health care workers and addresses personal beliefs about the extent to which doctors place too much emphasis on medicines. Items in this scale include statements such as "Doctors use too many medicines" and "Natural remedies are safer than medicines". The *harm* sub-scale assesses beliefs about the potential harm of medicines (e.g., "Most medicines are addictive" and "Medicines do more harm than good").

The present study used a specific variation of the original BMQ designed for assessing treatment beliefs in a depressed population (Appendix B). This BMQ-*depression* questionnaire consisted of five *specific-necessity* scale questions and fourteen *specific-concerns* questions. Further modifications in the BMQ-*depression* questionnaire involved changing the wording of several questions so that they were specific to those patients taking antidepressant medication. For example "These are statements other people have made about their medication" and "My health at present depends on medication" were changed to "These are statements other people have made about their antidepressants" and "My health at present depends on antidepressants". Participants indicate their degree of agreement with each individual statement on a 5-point Likert scale that range from 1 (*strongly disagree*) to 5 (*strongly agree*). Scores obtained for the individual *necessity* items were summed to give a total *necessity* scale score and the individual concern items were summed to give a total *concerns* scale score. Higher scores on these scales indicate stronger beliefs in the *necessity* and greater *concerns* about taking the medication.

The psychometric properties of the original BMQ have been thoroughly examined and have subsequently been used in a wide range of clinical conditions (i.e., asthma, diabetes, renal, cardiac, psychiatric and general medical populations; Horne et al., 1999). In this research the BMQ-Specific and the BMQ-General scales demonstrated satisfactory internal consistency with the exception of the General-Harm scale, and the test-retest reliability of all scales for asthmatic patients ($n = 31$), were within acceptable limits (0.60- 0.78; Horne et al., 1999). One study, using the BMQ to assess beliefs about medicines in patients with rheumatoid arthritis, found that the internal consistency of the *specific-necessity* scale was excellent (Cronbach's $\alpha = 0.88$) but "borderline" for the *specific-concerns* scale (Cronbach's $\alpha = 0.56$; Treharne, et al., 2004). In the present study, the Cronbach's α coefficient for the BMQ *total,* BMQ *necessity* and BMQ *concern* scales were 0.81, 0.81, and 0.87 respectively.

Medication Adherence Report Scale (MARS).[3] The Medication Adherence Report Scale is a recently developed 5-item scale that elicits patients' self-reports of non-adherence (Horne & Weinman, 2002; Appendix B). Eliciting reports of non-adherence, rather than reports of adherence, has been described in previous research (e.g., Kravitz et al., 1993; Rand & Wise, 1994). The MARS has been designed to diminish the social pressure on participants to report high adherence. This is achieved by assuring the participants that their responses will be confidential and anonymous

3. Another questionnaire known as the Medication Adherence Rating Scale (MARS; Thompson, Kulkarni, & Sergejew, 2000) is a 10 item self-report tool for the measurement of medication compliance in psychiatric populations.

(Horne & Weinman, 2002; Morisky et al., 1986). Furthermore, the introductory statements and instructions are phrased in a non-threatening manner, whereby non-completion of prescribed treatment is normalised, and difficulty completing the prescribed course is assumed. For example, the questionnaire's instructions for completion are '*Many people find a way of using their medicines which suits them. This may differ from the instructions on the label or from what their doctor has said. We would like to ask you a few questions about how you use your medicines".* Participants are asked to rate the frequency with which they engage in each of the five aspects of non-adherent behaviour listed in the MARS (Table 1).

Table 1

MARS Statements of Non Adherence

I forget to take them
I alter the dose
I stop taking them for a while
I decide to miss a dose
I take less than instructed

MARS items are rated on a 5-point Likert scale where responses range from 5 (*never*) to 1 (*very often*). Scores for each item are summed to give a total score, ranging from 5 to 25. Higher scores indicate higher levels of adherence, yielding a

continuous adherence scale, rather than a dichotomous division, where participants are asked to answer "yes" or "no" in response to questions asked. Using continuous adherence scales has been tested in several studies (Haynes et al., 1979; Morisky et al., 1986).

The psychometric properties of the MARS have recently been evaluated (Horne, 2005). Psychometric evaluation was performed on an outpatient sample of patients receiving treatment for asthma ($n = 100$), diabetes, ($n = 165$), hypertension, ($n = 50$), chronic pain ($n = 104$) and hypertension ($n = 109$; Horne, 2005). Internal reliability (Cronbach's α) ranged from 0.67 to 0.90 and the test-retest reliability over 14 days ($r = 0.97$, $p < .001$) was excellent. A significant positive correlation demonstrated concurrent validity between the Morisky self-report measure (Morisky, et al., 1986) and the MARS ($r = 0.62$, $p < .001$). Criterion-related validity as demonstrated by the observation that more adherent hypertension patients had better blood pressure control ($\chi^2 = 4.24$, $df = 1$, $p < 0.05$). In the present study, the MARS demonstrated good internal consistency with a Cronbach's α coefficient of 0.83. Item –total calculations indicated that Item 1 ("I forget to take them") scored well below the other items ($r = .281$) and below the accepted correlation of $r = .30$ for revision of items on the scale. However, this result should be treated with caution as the present study sample represented a highly adherent group of participants, and "Item 1" on the MARS, was where a high proportion of participants indicated their lack of adherence. Due to the unusually high level of adherence in the present study it is unlikely that a large correlation would be achieved.

Beck Depression Inventory-Revised (BDI-II). The BDI-II (A.T. Beck, Steer, & Brown, 1996) is a widely used self-report measure of depressive symptom severity containing 21 items used to assess the severity of depression in populations diagnosed with depression, and for detecting depression in normal populations (Beck, Steer, & Garbin, 1988). The BDI-II asks the participant to describe how they have been feeling "during the past two weeks, including today". DSM-IV-TR criteria for Major Depressive Disorder are assessed in the BDI-II, except for weight changes (i.e., depressed mood or loss of interest in almost all activities, inability to concentrate, suicidal thoughts, insomnia or hypersomnia, fatigue, psychomotor agitation or retardation, and feelings of worthlessness or excessive guilt). Items are rated on a 4-point scale, where responses range from 0 to 3 and respondents are instructed to circle the number that corresponds with the statement best describing them. A rating of 0 indicates the absence of a symptom whereas a rating of 3 indicates high symptom-severity. Total BDI-II scores of less than 14 are classified *mild* or *low*, 14-20 is *moderate* and 21 or more is considered *severe*. The questionnaire is expected to require 5-10 minutes to complete (Beck et al., 1996).

Psychometric support for the original BDI is based on the examination of 25 years of research using the measure (Beck et al., 1988). This review by Beck, reported the internal consistency of the BDI to be .86 (range = .73 to .95) across a wide variation of diverse populations. There is also support for content, concurrent, discriminant and construct validity of the BDI. Correlations between the BDI and the clinician-rated Hamilton Rating Scale of Depression ranged from .61 to .87. (Beck et al., 1988). Research investigating the psychometric properties of the BDI-II has demonstrated that the BDI-II is highly congruent with the original BDI (Beck et al.,

1996; Dozois, Dobson, & Ahnberg, 1998). In addition, one study has demonstrated that the BDI-II gives reliable, internally consistent, and valid scores in primary care medical settings (Arnau, Meagher, Norris, & Bramson, 2001; Arroll, Goodyear-Smith, & Lloyd, 2002).

The BDI-II is used in the present study because it is a readily available self-report measure of depressive symptoms. It is considered simple to administer and has previously been widely used in clinical and research settings (e.g., Arroll et al., 2002).

Questionnaire Package. In addition to the BMQ, MARS and BDI-II questionnaires, participant demographic information (gender, age, ethnic identity and highest academic achievement) and medication information (name of antidepressant and length of time the medication has been prescribed) was surveyed (Appendix C). In their discussion of good survey design, Frazer and Lawley (2000) recommend presenting participants with the most difficult tasks early, and leaving questionnaires or tasks that are easier or less cognitively demanding, till the later stages of the tasks they are required to complete. For this reason the BDI-II, BMQ, and MARS questionnaires were presented to participants before the demographic information sheet.

Procedure

Participant Recruitment. Before data collection commenced it was planned that ten GPs would recruit 10 participants each within a 3-month data collection

4. In order to preserve the copyright conditions attached to this widely used psychometric test, an copy of the test will not be included in an appendix.

period. Data collection commenced in August 2004 and was completed in March 2005. Data collection took longer than anticipated. An informal inquiry revealed that high workload was the greatest barrier to data collection. In fact, data collection period coincided with a winter flu-epidemic and the beginning of a nation-wide meningococcal meningitis immunisation program. Nonetheless, two GPs reported that they did not invite a patient to participate because they considered participation in this study would be detrimental to the patient's mental health. No data were collected to determine how many potential participants were not invited to participate, or how many patients were invited but declined to participate.

Data Collection. Participants who agreed to participate in the present study were allocated a uniquely coded sealable envelope, containing information and consent forms. The participants returned to the practice waiting room and were asked to read the implications of consent, and sign the written consent form indicating their knowledge of the study, and their willingness to participate in the study (Appendix C). Participants completed the Beck Depression Inventory (BDI-II), the Beliefs about Medicines Questionnaire (BMQ), and the Medication Adherence Report Scale (MARS). The demographic information sheet (Appendix C) was completed last by the participant, and a medication information sheet (Appendix C) was completed by the GP.

Once all the questionnaires were completed by the participants, they were sealed along with the medication information sheet (from the GP) sealed in the coded envelope, and returned to the practice nurse, or receptionist, before the participant left the practice environment. These sealed envelopes were kept in a box in a secure area until the researcher collected them from the practice in person.

Ethics

The research was conducted in accordance with the ethical standards required for the treatment of human participants as outlined by the New Zealand Psychological Society Code of Ethics. The present study was reviewed and approved by the Massey University, Human Ethics Committee (Albany Campus) and the Auckland Health and Disability Ethics Committee.

Participant identification was kept confidential by the allocation of a unique participant code to all the questionnaires. Only the researcher had access to the consent forms containing participant names and codes.

No potential harm to participants was expected. The likelihood of adverse effects being experienced was believed to be low. Participants in the present study had already been identified as having mental health concerns, had received antidepressant medication for at least six weeks and were only being asked to complete well-established psychometric or self-report questionnaires. Nevertheless, practice staff were instructed to inform the doctor if there was concern about the well-being of any participant.

With the allocation and use of the unique identification code during data collection anonymous entry of data was assured. All the anonymously coded questionnaires and consent forms will be stored at Massey University in secure storage for a period of 5 years, as required by Massey University policy.

Power calculations

To calculate the sample size required for the present study, prior research was surveyed to calculate an average effect size. It is recommended that the product-moment correlation coefficient be used as the effect size when calculating the participant numbers required to detect a significant correlation (Lipsey & Wilson (2001; Weinberg & Abramowitz, 2002). Following this recommendation, the correlation coefficient of previous studies was taken as the effect size in the present study.

Previous studies have used the BMQ to explore the relationship between treatment beliefs and levels of treatment adherence. These studies have obtained effects sizes from $r = 0.21$ to 0.44 (e.g., Byer & Myers, 2000; Horne & Weinman, 2002; Horne & Weinman, 1998; Horne et al., 1999; Llewellyn et al., 2003). Although there are methodological differences between these studies (e.g., variation in participant populations and multiple methods of adherence assessment), the best effect size estimate, using weighted averages of the effect sizes in previous research, was taken as $r = 0.30$. With alpha at 0.05 and a desired power of 80% (Cohen, 1992), it was predicted that 85 participants would be required to detect an effect size of $r = 0.30$.

Statistical Analysis Procedure

Analysis of the data was conducted using the Statistical Package for the Social Sciences (SPSS) for Windows (Version 11). Inferential analysis for the hypothesis testing in this study involved correlation and regression techniques. Data screening was conducted prior to analysis of the data.

Data Entry and Screening. Data from six participants who did not meet the participant selection criteria (i.e., age and medication type) requirements were excluded from the study. Screening for missing data values was performed prior to data entry. Of the sample that met the selection criteria, only a small proportion (n = 5), had missing data. Those participants with missing values on the BMQ, MARS and the BDI-II were excluded from data entry and missing data was not imputed (Croy & Novins, 2004; Tabachnick & Fidell, 2001). Eighty-six complete sets of data were entered for analysis.

Data Analysis. Before analysis, computation of the *necessity–concern* differential (NCD) was carried out. Due to the uneven number of item in the scales, the individual scale totals (i.e., BMQ-*necessity* and BMQ-*concerns)* were converted to standardised Z scores. The Z-BMQ-*concern* score was then subtracted from the Z-BMQ-*necessity* score to give the NCD.

Correlational techniques were used to detect the strength and direction of the relationship between the independent and dependent variables in the present study (i.e., Hypotheses 1, 2, 3 and 4). The underlying assumptions required for the performance of correlation techniques were assessed. The scales of measurement for the variables were continuous. SPSS was used to evaluate the other assumptions of correlational analysis, and results indicated that a number of the assumptions required for correlation analyses were violated. Given that correlation techniques are sensitive to the presence of outliers (Tabachnick & Fidell, 2001), box plots of the continuous variables were examined for possible extreme values. One outlier was identified and deleted. The exclusion of this further participant from analysis reduced the total number of participants to N = 85.

Histograms of the variable distributions were examined for evidence of normal distributions, and scatter-plots were inspected for evidence of linear relationships (see Appendix D and E, respectively). Variables were tested for skewness, kurtosis and a specific test for normality was applied (Kolmogorov-Smirnov). Results obtained were Beck Depression-II Index (.714; -.149; .035; respectively), BMQ-*necessity* (.278; -.167; .003; respectively), BMQ-*concern* (.207; -.820, .055; respectively), NCD (.257; -.280; .200; respectively) and the MARS total (-1.774; 3.116, .000; respectively). A non-significant result ($p > .05$) indicates normality for the Kolmogorov-Smirnov statistic (Pallant, 2005). A logarithmic transformation was performed on the dependent variable (MARS total) to improve the normality of the MARS distribution. This transformation allowed the order of values in the distribution to be retained even though the relative distances between values were changed (Tabachnick & Fidell, 2001; Weinburg & Abramowitz, 2002). Following the transformation, skewness, kurtosis, and Kolmogrorov-Smirov tests were applied and results were, .446; -.635; .000; respectively. These results indicate an improved distribution towards normality for the transformed dependent variable. This transformed MARS total score is used in the correlation and multiple regression analysis. Taking into account the non-normal distribution of continuous variables, analysis of the relationships between variables was performed using non-parametric statistical tests. Spearman's correlation coefficient (r_s) is the appropriate non-parametric correlational technique under non-normal distributions.

Multiple regression enabled a more extensive exploration of the inter-relationship between multiple independent variables and a single dependent variable (Tabachnick & Fidell, 2001). Previous research has indicated that depression severity

is related to medication adherence (Hypothesis 4). Multiple regression was used to examine the possible interaction between significant relationships identified in the correlation analysis. (i.e., depression severity and treatment beliefs as they related to treatment adherence). The dependent variable used in the multiple regression equation was the transformed MARS total score. The independent predictor variables were BMQ-*concerns* and depression severity (BDI-II), and these variables were entered into the equation simultaneously.

The assumptions of multiple regression were reviewed prior to data analysis. Multiple regression requires sufficient participants to produce a reliable equation. Tabachnick and Fidell (2001), give a formula for calculating the sample size requirements taking into account the number of independent variables, where total sample numbers are greater that fifty, plus eight times the number of variables. Using this formula, a minimum of 66 cases were required with two predictor variables. The present study exceeds this requirement. The assumptions of normality, linearity, homoscedasticity, and multicollinearity were all met for the present study (Spicer, 2005; Tabachnick & Fidell, 2002). There were no significant multivariate outliers identified with Mahalanobis' distance (Tabachnick & Fidell, 2001). Multicollinearity and singularity (including variables that are redundant or a combination of other variables in the equation) of variables in the regression equation are issues to be considered in the present study (Tabachnick & Fidell, 2001). Multicolllinearity or the inclusion of two independent variables with bivariate correlations of more than .7, and the inclusion of variables that are derived from or are a combination of other variables, is not recommended (Tabachnick & Fidell, 2001). As the BMQ-concerns was strongly negatively correlated with NCD differential in the present study (r_s = -

.77, $N = 85$, $p < .001$), and the NCD differential is calculated from the BMQ-*necessity* and the BMQ-*concerns* scale, the NCD differential was not included as a variable in the regression equation (Tabachnick & Fidell, 2001).

Chapter Seven: Results

Participants

One hundred questionnaire packs were distributed to the 15 general practitioners recruiting the participants. Three questionnaires were returned unanswered. After screening procedures, data from a total of 85 participants were included in data analysis. Table 2. shows the demographic characteristics of the present sample.

Table 2.

Demographic Characteristics of Participants ($N = 85$).

	Frequency (n)	%
Gender		
Male	24	28
Female	61	72
Age		
18 – 35	22	26
36 – 50	40	47
51 – 65	23	27
Ethnicity		
NZ European	72	85
Other European	12	14
Indian	1	1
Education		
Primary	0	0
Secondary	6	42
Tertiary	37	44
Postgraduate	12	14

Participants were aged between 21 and 64 years ($M = 43.7$, $Mdn = 45.0$, $SD = 11.49$). Over half of the participants were female ($n = 61$; 72%) and identified themselves as New Zealand Europeans ($n = 72$; 84%). A high percentage of participants stated that they had received education at tertiary or post-graduate levels ($n = 49$; 58%).

Descriptive Statistics

Descriptive statistics of the independent variables are presented in Table 3. From a possible range of 5 to 25, the total BMQ *necessity* scores in the present study ranged from 9 to 25, ($M = 17$; $SD = 3.6$). A mean score of 17 on the BMQ *necessity* scale is above the scale midpoint of 12.5, and indicates that the participant group was higher than average in their beliefs regarding the *necessity* of the medication for the treatment of depression. Similarly, from a possible range of 6 to 30, the BMQ-*concern* scores ranged from 18 to 57 ($M = 35.9$; $SD = 9.9$). A mean score of 35.9 is just above the scale midpoint of 34 which indicates that, as a group, the participants in the present study had a moderate degree of *concern* about the adverse effects of their medication. Dichotomising the *necessity* and *concerns* score at the midpoints (12.5 and 34 respectively) is another way of interpreting data and is an easy way to categorise participants according to the strength of their views about medication. In the present study, 38 % of participants had scores higher than the midpoint on the BMQ *necessity* scale whereas 48 % scored higher than the midpoint on the BMQ

concern scale. Overall, participants had a higher degree of *concern* about the adverse effects of their antidepressant medication, compared to their beliefs that the medication was *necessary* for their treatment of depression.

Table 3.

Descriptive Statistics for Dependent Measures

	M	*Mdn*	*SD*
BDI-II	15.0	13.0	10.98
BMQ *necessity*	17.0	17.0	3.58
BMQ *concern*	35.9	34.0	9.92
NCD	.013	-.17	1.50

Note. BDI-II = Beck Depression Inventory-II; BMQ *necessity* = Beliefs about Medicines *necessity* scale; BMQ *concern* = Beliefs about Medicine *concern* scale; NCD = *Necessity-Concern* Differential.

Participants in the present study were highly adherent. Fifty-four percent of participants had a score above the median (24 or more) on the MARS adherence scale (possible range 5 to 25). The frequency and distribution of participant depression severity, as determined by the BDI-II, is shown in Table 4. Over half of the participants (51 %) in the present study report minimal depressive symptoms or less. Forty-nine percent of participants reported mild or moderate, with 13% reporting severe depressive symptoms.

Table 4.

Frequency and distributions of BDI-II scores in present sample ($N = 85$).

Total Score	Range	Frequency	Percentage
0 - 13	Minimal	43	51
14 - 19	Mild	16	19
20 - 28	Moderate	15	17
29 - 63	Severe	11	13

Data Analysis

Correlational techniques, using Spearman correlation coefficient (r_s), were used to detect the strength and direction of the relationship between treatment beliefs, depression, and adherence. Spearman correlations for these analyses are shown in Table 5. These correlations indicated that there is no significant association between *necessity* beliefs and adherence (Hypothesis 1). A medium negative correlation was found between participants' *concern* about the medication and adherence, indicating that patients with greater *concerns* are less adherent (Hypothesis 2). A small positive correlation between adherence and the NCD differential was detected. Participants whose beliefs about the *necessity* outweighed their *concerns* about taking their medication were more adherent (Hypothesis 3). A medium negative correlation was found to exist between depression severity and adherence to antidepressant medication, indicating that participants with greater levels of depressive symptoms are less adherent (Hypothesis 4).

Table 5.

Spearman correlations of relationships between medication beliefs, depression severity and adherence ($N = 85$)

Subscale	1	2	3	4	5
1. BMQ-necessity	-	-.08	.67**	.00	.03
2. BMQ-concerns		-	-.75**	.52**	-.34**
3. NCD differential			-	-.37**	.24 **
4. BDI-II				-	.33**
5. MARS (adherence)					-

**$p < .001$, two-tailed.

Multiple regression was utilised to better understand or explain the effects of the independent variables on adherence. In this analysis, the two independent variables were BMQ *concern* and depression severity. The dependent variable was the transformed MARS adherence scale. The total amount of variance accounted for in this model was 15.3% ($R^2 = .153$). The R value for regression was significantly different from zero $F(2, 82) = 7.41$, $p = .001$, indicating the combination of these two variables produced a statistically significant model. BMQ *concerns* was a statistically significant unique predictor of variance in this model ($t = 2.00$, $p < .05$). Depression severity was not a significant predictor variable ($t = 1.74$, $p > .05$).

During the data collection period, a study by the developers of the BMQ and MARS questionnaires was published (Horne et al., 2004).[1] Therefore patients in the present study were categorized in *high* and *low* adherence groups to further examine the hypothesised relationships with treatment beliefs and depression severity. Fifty four percent of participants had a MARS score of 24 or above (possible range 5–25). Thus, a categorical split at MARS total of 23 was performed.[2] Participants scoring 23 and above ($n = 61$, 71.8 %) were classified in the *high* adherence group. Those participants scoring 22 and below ($n = 24$, 28.2%) were placed in the *low* adherence group. Non-parametric t-tests were performed to assess group differences between the

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1. Statistical analysis by Horne et al., (2004), categorised HIV patients prescribed anti-retroviral therapy (HAART) into high and low adherence groups based on a median split of their MARS scores. A trend for stronger *necessity* beliefs to be associated with high adherence did not reach statistical significance ($t = 1.64$, $p = .052$), but patients were significantly more likely to be in the low adherence group if they had greater *concerns* about the medication ($t = 1.64$, $p < .05$). The *necessity-concerns* differential (NCD) was significantly related to adherence with highly adherent patients having significantly higher scores ($t = 2.49$; $p < .01$; Horne et al., 2004).

2. To address the issue of restricted range in the present study, a categorical split at MARS total of 23 was performed after consultation with the test developer Dr Rob Horne, personal communication, October, 2005.

high and *low* adherence groups. To protect against increasing chances of making a Type-I error, a Bonferroni adjustment was applied when making multiple between-group comparisons between *high* and *low* adherence groups. In addition, a more conservative alpha value of 0.13 was taken as the criterion for statistical significance.

Results indicated that participants in the *low* adherence group had significantly greater *concern* beliefs about the antidepressant therapy than those in the *high* adherence group ($t = -2.94, p < .013$; Hypothesis 2). A significant difference was found between groups for the *necessity-concern* differential (NCD). Highly adherent patients had significantly higher NCD differentials than those in the *low* adherence group ($t = 2.72, p < .013$; Hypothesis 3). Participants in the *high* adherence group had stronger *necessity* beliefs relative to their *concerns* about the medication. There was no significant difference, between *high* and *low* adherence groups, for beliefs about the *necessity* of antidepressant medication ($t = -.66, p > .05$; Hypothesis 1), and depression severity ($t = -2.03, p > .013$; Hypothesis 4).

Chapter Eight: Discussion

The aim of the present study was to examine the relationships between treatment beliefs and adherence to antidepressant medication in a depressed primary care population. Data for the present study were generated using self-report measures of non-adherence (MARS; Horne & Weinman, 2002), treatment beliefs (BMQ; Horne et al., 1999), and depression severity (BDI-II; Beck, et al., 1996). This chapter will first review and discuss the findings of the study hypotheses. The study limitations will be outlined second. Finally, areas of future research will be discussed.

Review of findings

The present study investigated the relationship between treatment beliefs and adherence to antidepressant medication in primary care patients. In particular, it was hypothesised that participants with stronger beliefs about the *necessity* of antidepressants would be more adherent to medication (Hypothesis 1). This hypothesis was not supported in the present study. Several studies from previous research using the BMQ in situations of chronic physical illness have demonstrated significant relationships between beliefs about the *necessity* of medication and adherence (e.g., Horne & Weinman, 2002; Llewellyn et al., 2003). However, other studies have not detected a significant association between these variables (e.g., Horne et al., 2004; Horne et al., 2001).

The inability to detect a significant relationship between *necessity* beliefs and adherence may be due to limitations of study design, and these are discussed later in this chapter. However, it is interesting to note that, as a group, the participants

reported low levels of *necessity* beliefs. The theoretical background of the present study would predict that high adherence is related to stronger *necessity* beliefs, so this result is particularly interesting when considering the high levels of adherence reported by the participant group. One interpretation is that as a group, depressed patients have low levels of beliefs in the *necessity* of medication. This interpretation is supported by one study finding that 56% of depressed patients who discontinued antidepressant therapy within the first 30 days, believed that they did not need the medication (Lin et al., 1995). Theoretical models (e.g., HBM, SCM) can also be used to explain this finding. For example, the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB), view the beliefs of significant others as influencing the performance of health behaviours, such as medication adherence. Unfortunately, depression is the subject of considerable social stigma, with many people viewing depression as a sign of personal weakness, and an illness that the individual should be able to get over by themselves (Roeloffs et al., 2003). Thus, there is preliminary empirical and theoretical support for the assertion that the negative views of others could influence an individual's belief in the *necessity* of antidepressant medication in a negative manner.

The present study also hypothesised that participants with stronger beliefs or perceptions of *concern* regarding the treatment of their depression with antidepressants would be less likely to adhere to their medication (Hypothesis 2). The BMQ *concern* scale represents the *costs or barriers* (e.g., unpleasant side effects, disruption to daily life when taking the medication, the fear of what others think of them taking the medication, fears of dependency with extended use and fear of possible long term effects) perceived by patients as they weigh up the costs and

benefits of taking medication. Prior research has indicated that patient *concerns* about the adverse effects experienced when taking medication are related to adherence in many situations (e.g., Horne & Weinman, 1999; Horne, et al., 2001; Horne et al., 1999). In the present study, this hypothesis was supported. A significant correlation was found between reported non-adherence and *concerns* about the potential adverse effects of the antidepressant medication. In addition, a significant difference was found to exist between *high* and *low* adherence groups for strength of *concerns* about the medication. Those participants reporting higher levels of non-adherent behaviour also reported greater *concern* about taking the antidepressants. Furthermore, 48% of participants scored higher than the mid-point on the *concern* scale. This percentage compares to previous research in physical illness situations where, on average, about one third of participants typically have scores above the *concern* scale mid-point (Horne, 2003). The regression analysis confirmed that *concern* about the adverse effects of medication was a significant predictor of adherence even when the effects of depression severity were taken into account.

Interestingly, comparison of the individual responses to the questions, contributing to the *concerns* about medication scale with those reported in other Studies, indicates there may be differences in the types of medication beliefs in different situations and illnesses. For example, in a study of adherence to medication, in patients with AIDS had largest concerns about long-term effects, side effects, and disruption to life (Horne et al., 2004). These concerns are understandable when taking into account the high level of side effects experienced by AIDS patients and their need to adhere to a very complex and demanding treatment regimen (Catz et al., 2000). In the present study, 50% of the participants agreed or strongly agreed that

they "tend to hide the fact they are taking antidepressants from other people". Similarly, 44% "worry that other people won't approve of them taking them". Forty-one percent of participants agreed or strongly agreed that they are "worried about the long-term effects of the antidepressants" they are taking, and 37% worry about "becoming dependent on the medication". Nine percent of participants agreed or strongly agreed that they experienced unpleasant side effects. Thus, there is evidence to suggest that the opinion of significant others is an important factor in adherence to antidepressants. Depressed individuals are more likely to take their medication if others approve of their doing so and support them in taking their medication.

From a theoretical perspective, Social Cognition Models provide some explanation why patients with depression may have high levels of *concern* about the adverse effects of taking antidepressants. The Health Belief Model, TRA, TPB and the Self-Regulatory Model all emphasise that beliefs determine behaviour and, in the present context, an assessment of the costs and benefits is involved in the decision to take medication. Therefore, individuals concerned that others may disapprove of them taking antidepressant medication are likely to be less adherent to their medication (Roeloffs et al., 2003). The findings of the present study are consistent with previous research, as the relevant items in the BMQ-*concern* scale regarding the beliefs of significant others were the most frequently endorsed.

The evaluation of the risks and benefits as outlined in the social cognition models is reflected in the *necessity-concern* differential (NCD) of the present study. It was hypothesised that participants whose beliefs about the *necessity* of their medication were greater than their *concerns* about potential adverse effects of the medication (i.e., a positive NCD differential) would have higher levels of adherence

to their antidepressant medication (Hypothesis 3). In the present study, this hypothesis was supported. A small positive correlation between the NCD and adherence was detected. In addition, participants in the *high* adherence group had higher NCD differentials than those in the *low* adherence group. This finding is similar to previous research showing moderate relationships between NCD scores and associated adherence rates. Empirical research also suggests that NCD scores are more strongly correlated with reported adherence than *necessity* beliefs and *concerns* in isolation (Horne et al., 2004; Horne & Weinman, 1999) however, this was not found in the present study. A stronger relationship was detected between *concern* about the adverse effects of the medication and adherence than with the NCD differential and adherence.

Lastly, the present study hypothesised those participants with more severe depression would be less likely to adhere to their antidepressant medication (Hypothesis 4). Previous research findings have suggested that depression severity impacts levels of adherence to treatment regimens, including treatment with medication (DiMatteo, Lepper, & Croghan, 2000). Consistent with previous research, those participants in the present study with increased levels of depression symptomatology were less adherent to their medication. However, no difference was detected between high and low adherence groups for depression severity. The narrow range of variability in depression severity and adherence in the present sample is a limitation of the present study. Although *concerns* was a significant predictor variable in the multiple regression analysis when depression severity was held constant, further research on populations with greater variance on these variables is warranted before

the true relationship between depression severity and medication beliefs can be determined.

Taken altogether, the results from the present study are consistent and support the theoretical models on which the research was based. Individuals balance the costs and benefits of taking medication, and results of this appraisal, influence behaviours such as adherence (Adams & Scott, 2000; Janz & Becker, 1984). The development of the Self-Regulatory model and related questionnaires, have provided an opportunity to examine the complexity of the relationship between the content of these medication beliefs and perceptions that contribute towards non-adherent behaviour. Illness perceptions as outlined in the Self- Regulatory model (i.e., symptom perceptions, causal attribution perceptions, consequences and time-line perceptions and control/cure perceptions), form the basis of the content of these medication beliefs and relate to the decisions patients make about treatment necessity. Within this model, treatment perceptions result from an evaluation of the representations of the threat posed by medication. For example, in depression, non-adherence may result from the need to take medications being seen as a threat to one's self-coping mechanisms, or not being able to resist the illness threat. Similarly, concerns about what others might think, and beliefs that taking medication will result in unpleasant side effects, may be a cause of anxiety and worry such that medication is not taken.

From a cognitive therapy perspective (Beck et al., 1979), depressed individuals have dysfunctional attitudes and thoughts that can be grouped by the "negative cognitive triad" (i.e., negative thought of themselves, others and the future). The findings of the present study are consistent with the understanding of medication adherence in depressed patients. Although results indicate that the depressed

participants in this sample did not have high levels of belief in the *necessity* of antidepressants, they did report significant levels of *concern* about the adverse and unpleasant effects of taking the medication. Specifically, there was focus on concern about social stigma. Medication is seen by some to have perceived benefits. However, this is often countered by beliefs that medication is associated with adverse effects.

Study Limitations

Results from the present study have highlighted several promising findings that contribute to knowledge about treatment beliefs in depressed primary care patients and the impact of those beliefs on adherence to antidepressant medication. However, there are several study-design limitations, and these give sufficient reasons to interpret the study findings with caution. These factors will be discussed in the following section.

One limitation of the present study is the recruitment of a particularly adherent group of participants, resulting in a narrow range of variability in the dependent variable. This lack of variability has restricted the interpretation results. There are several factors that have contributed to the recruitment of this highly adherent sample. Firstly, study design required that participants were invited to participate at the end of a routine consultation. This requirement meant that patients that had already decided to discontinue with their medication, and had not returned to their GP, were not able to participate in the study. Secondly, a highly adherent group of participants may have resulted from GPs unintentionally inviting patients who were more adherent to their medication. While there is no evidence to support this, it was reported by several GPs

that if the medical consultation had taken longer than the allocated time, then the GP did not always invite that patient to participate. The reason for not inviting patients to participate is to limit the possibility of keeping the next patient waiting. However, it might be, that patients who are more severely depressed require more time spent in consultation with their GP. If this is so, valuable potential participants were not recruited. Lastly, it is possible that the non-randomised recruitment procedures led to those participants consenting to participate being more adherent to their medication than those who declined. The present study did not collect data on numbers of patients who were invited but declined to participate. However, it is possible that potential participants may have declined to participate because they were not taking their medication.

Additional aspects of the present study's design (e.g., participant selection criteria) limit the ability to generalise the findings to all patient groups. For example, these findings do not apply to those who seek specialised mental health treatment, have higher levels of depressive symptoms as measured by the BDI-II, or those populations of different age groups and ethnic diversity not represented in the study sample. The selection criteria of the present study specified that participants were to meet the DSM-IV criteria for Major Depressive Disorder. While the GPs were verbally reminded, and were supplied with a written copy the of the DSM-IV diagnostic criteria for MDD, there was no evaluation of the diagnosis through a structured diagnostic interview. Similarly, there were no inter-rater reliability measures for clinician judgement, and adherence checks, to see that patients were actually selected according to the study selection criteria. A further limitation was the lack of acknowledgment of possible comorbid diagnoses in participants.

The use of a single adherence measure is another limitation of the present study. The use of multiple measures of adherence in research situations is recommended (e.g., Rand & Weeks, 1998). The adherence measure used in the present study (MARS) was developed to minimise potential for self-report bias (social desirability) by phrasing the adherence questions in a non-threatening manner, and providing reassurance that their responses were anonymous and confidential (Horne, 2005). Therefore, the present study used the best available adherence measure.

Future research

The results from the present study have highlighted many areas of future research. While some significant relationships were detected, overcoming deficiencies in the present study design could have improved the ability to interpret study results. Assessing treatment beliefs of non-adherent patients would be desirable. This could be achieved with a prospective study design where treatment beliefs are assessed at the commencement of therapy, and monitored along with adherence behaviours, at regular intervals throughout treatment. This longitudinal design would provide data on patients who are prescribed medication but then decide not to take it. The data could also be used to investigate whether the assessment of treatment beliefs can be used to predict future adherence. A longitudinal study on a depressed population is reported to be in progress at the present time, and preliminary results are encouraging (Horne, personal communication, October, 2005).

Other research topics arising from the results of the present study include investigation of the effects of depression severity on treatment beliefs and adherence in depressed populations. Although the preliminary investigation of this relationship

was conducted, the lack of variability in adherence, and depression severity variables in the present study, meant that interpretation of the results is limited. A greater range of participant depression severity might be achieved by assessing treatment beliefs of patients in secondary care. A randomised design, where the recruitment of participants were not dependent on GPs determining whether or not to invite particular patients to participate, would also increase the range of participant depression severity.

The uncertainty raised by the present study's results, concerning the unexpected low level of *necessity* beliefs in the study population, also requires further investigation. A larger sample size would go some way to determine the characteristic beliefs of depressed patients. However, the sampling of participants with varying levels of depression severity (e.g., primary and secondary care patients) and adherence behaviours (i.e., assessing beliefs at the beginning of therapy) would provide more informative results.

The low response rate to questions relating to medication side effects is a further area of interest. Low levels of treatment beliefs regarding side effects of the medication could be a characteristic of all depressed patients, depressed patients who have been taking their medication for at least 6 weeks, or alternatively, highly adherent patients. Again, a prospective study assessing treatment beliefs at the commencement of therapy, and at regular intervals throughout, would provide further information. A prospective study would also be able to provide information on treatment beliefs during the various stages of treatment for depression.

While the effects of demographic characteristics on medication adherence have been largely dismissed, it is possible that they may have some effects on

medication beliefs. For example, the comparison of possible differences in treatment beliefs of patients on the basis of gender and age groups would be a worthwhile area of inquiry.

The suggestions outlined above are just a sample of research topics that could provide knowledge about how people perceive antidepressant medication. In addition, research investigating treatment beliefs and adherence can be used to develop interventions that influence how beliefs about medicines are processed and acted on. Cognitive therapy is based the assumption that dysfunctional attitudes and beliefs about medications can be changed and behaviour modified (Beck, 1995). Medication adherence therapy based on cognitive therapy has been suggested to be effective. (Beck, 2001, Safren, Hendreiksen, Mayer, Mimiaga, Pickard, & Otto 2004, Weber et al., 2004). Results from the present study highlight the possible benefits of developing a brief, time efficient intervention that is designed to increase medication adherence in depressed patients. To date, cognitive interventions in the area of medication adherence have involved using an empathetic and supportive approach and educating the patient about the illness and treatment options available (Beck, 1995). Others have included problem solving training, relaxation training, and cognitive restructuring techniques for specific issues related to medication adherence (Safren et al., 2004). Eliciting and responding to patient fears is another important component of cognitive therapy and a cost-benefit analysis can be used to help overcome resistance to medication. Results from the present study would suggest that depressed patients have significant concerns about what others think of them taking antidepressant medication. If further studies found that these beliefs were present in a wider depressed population, a cognitive therapy based intervention aimed at identifying and

subsequently modifying these dysfunctional beliefs, so that medication adherence is increased, would be of great value to patients and clinicians alike.

Conclusion

The present study was aimed to investigate the effects of beliefs about antidepressant medication on reported adherence in a depressed primary care population. More specifically, beliefs about the *necessity* of the medication and *concerns* about the potential adverse effects were targeted. Relationships between medication beliefs and levels of adherence have been reported in previous research involving patients with chronic physical illness. The present study represented a preliminary investigation into the treatment beliefs in a mental health population and their possible effects on adherence to medication.

Data from the present study indicated that beliefs about the *necessity* of the medication for the treatment of depression were not associated with adherence. Participants holding stronger *concerns* about the potential adverse effects of the medication reported lower levels of adherence. Furthermore, those participants holding stronger *necessity* beliefs relative to their *concerns* beliefs (i.e., as shown by a positive NCD differential) reported higher levels of adherence. This result reflected the process of weighing up the costs of taking medication against the risk of adverse effects. Depression severity was found to be associated with adherence. Furthermore, depression severity was shown not to influence the relationship between *concern* about adverse effects and adherence. Although the present study had a number of design limitations, the findings still contribute to the existing literature by providing a preliminary investigation of medication beliefs in individuals with depression. These

findings are consistent to those investigating medication beliefs and adherence in other situations of chronic physical illness. Further research in this area would benefit from the assessment of treatment beliefs of depressed patients in secondary care. Significant findings from a longitudinal study design where treatment beliefs were assessed at the commencement of therapy, and reassessed at intervals along with adherence, would provide valuable knowledge about the role of treatment beliefs on medication adherence. Ultimately, this knowledge should be used in the development of interventions aimed at modifying treatment beliefs so that adherence is increased and the burden of depression on individuals and their families is lessened.

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APPENDIX A

List of Participating General Practitioners

Participating Medical Practitioners

Dr Mark Arbuckle. Bairds Road Family & Christian Medical Centre, Otara.

Dr Peter Bowden, Four Kauri Medical Centre, Mt Albert.

Dr Raymond Chan, Stoddard Rd Medical Centre, Mt Roskill

Dr Peter Clemo, St Heliers health Centre, St Heliers.

Dr Ivan Connell. Hillsborough Medical Centre, Hillsborough.

Dr Cathy Ferguson. Kowhai Clinic, Glenfield

Dr William Ferguson. Kumeu Medical Centre, Kumeu.

Dr Janet Frater. Balmoral Doctors, Balmoral.

Dr Kirsty Gendall. Remuera Rd, Remuera.

Dr David Going. Peninsula Medical Centre, Te Atatu.

Dr Wee-Ling Khoo. Cornwall Medical Centre, Royal Oak.

Dr Andrew Lawson. St Lukes Medical Centre, St Lukes.

Dr James Lello. Marsden Medical Centre, Mt Eden.

Dr Richard Mercer. Reeves Rd Medical Centre, Pakauranga.

Dr John Russell. Hillsborough Medical Centre, Hillsborough.

APPENDIX B

Questionnaires Used in the Present Study

Beliefs about Medicines Questionnaire (BMQ)

Medication Adherence Report Scale (MARS)

Q-AD

Project Number .....

Your views about
ANTIDEPRESSANT MEDICATION
prescribed for you

We would like to ask you about your personal views about the antidepressant medicine that has been prescribed for you.

These are statements other people have made about their antidepressant medicines.

Please show how much you agree or disagree with them by ticking the appropriate box.

There are no right or wrong answers
We are interested in your personal views

Views about ANTIDEPRESSANTS PRESCRIBED FOR YOU	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
My health, at present, depends on antidepressants					
Having to take antidepressant medicine worries me					
My life would be impossible without antidepressants					
I sometimes worry about long-term effects of antidepressants					
Without these antidepressants I would be very ill					
These antidepressants are a mystery to me					
My health in the future will depend on antidepressants					
These antidepressants disrupt my life					
I sometimes worry about becoming too dependent on antidepressants					
These antidepressants protect me from becoming worse					
These antidepressants give me unpleasant side effects					
I sometimes worry that I am not in control of my moods whilst on antidepressants					
I think that my decision to take antidepressants is a sign of strength					
I sometimes worry that other people may not approve of me taking antidepressants					
I tend to hide the fact from other people that I am taking antidepressants					
I sometimes worry about becoming addicted to antidepressants					
Having to use antidepressants has a negative effect on my self-image					
Having to use antidepressants is an unpleasant reminder of my condition					
Having to use antidepressants is embarrassing					

QUESTIONS ABOUT USING YOUR MEDICINES

- **Many people find a way of using their medicines which suits them.**
- **This may differ from the instructions on the label or from what their doctor has said.**
- **We would like to ask you a few questions about how you use your medicines**

Here are some ways in which people have said that they use their medicines

For each of the statements, please tick the box which best applies to you

	Your own way of using your medicines	Always	Often	Sometimes	Rarely	Never
M1	I forget to take them					
M2	I alter the dose					
M3	I stop taking them for a while					
M4	I decide to miss out a dose					
M5	I take less than instructed					

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APPENDIX C

Participant Forms Used in the Present Study

Participant Information Sheet

Participant Consent Form

Demographic Information Sheet

Medication Information Sheet

Massey University
COLLEGE OF HUMANITIES AND SOCIAL SCIENCES

SCHOOL OF PSYCHOLOGY
Private Bag 102 904
North Shore MSC
Auckland
New Zealand
T 64 9 414 0800 extn 9180
F 64 9 441 8157
www.massey.ac.nz

What People Think about Medicines.

Principal Investigator: Judith Russell, student, School of Psychology, Massey University (Albany Campus). Private Bag 102 904, North Shore, Auckland. Phone (09) 414 0800 Ext 9198.
Supervisor: Dr Nikolaos Kazantzis, Lecturer and Registered Clinical Psychologist, School of Psychology, Massey University (Albany Campus). Private Bag 102 904, North Shore, Auckland. Phone (09) 414 0800 Ext 9198.

Information Sheet.

You are invited to take part in a study of 100 participants from various medical practices in Auckland that are currently prescribed antidepressant medication. The results of this study will help doctors find out more about what people think about medicines.

If you decide to participate in this study, you will be asked to give written consent for your doctor to provide information about the name of the medication you have been prescribed and the length of time you have been taking it. You are then asked to complete three short questionnaires. We anticipate that the questionnaires will take approximately 15-20minutes. These questionnaires have been used in previous research and there are no known harmful effects or discomfort resulting from completing them.

You are under no obligation to accept this invitation. If you decide to participate, you have the right to decline to answer any particular question or withdraw from the study up to the time you hand in the questionnaires, without any effect on your future health care.

All the information you provide for this study will be kept confidential and not be seen by your General Practitioner. Your responses will be given an anonymous code and stored in a secure place at Massey University for a period of ten years, after which time the data will be destroyed. We are anticipating that the study will be complete by March, 2005.

No material which could personally identify you will be used in any reports on this study. Results will be summarized for the overall group only. If you wish to be given a summary of the project findings when it is concluded, please give your name and address to the practice nurse or receptionist.

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F 64 9 441 8157
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Should you have any questions about the study or want any further information, please feel free to contact either Judith Russell or Dr Nik Kazantzis on (09) 414 0800 Ext 9198. If you have any queries or concerns regarding your rights as a participant in this study, you may wish to contact a Health and Disability Advocate, telephone 0800 555 050.

This study has received ethical approval from the Auckland Ethics Committee.

Version 3 28/06/04

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www.massey.ac.nz

What People Think about Medicines.

Consent Form.

I have read the Information Sheet dated 28/06/04 and have had the details of the study explained to me. I have had the project explained to me by my General Practitioner and considered whether to take part. I have had the opportunity to discuss this study and my questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I have had the opportunity to use family, whanau, or a friend to help me ask questions and understand the study. Should I want to consult with family, whanau or friend, I understand that I am able to return to the medical practice at a later date to complete the questionnaires.

I agree to participate in this study on a voluntary basis and that I may withdraw from the study up to the time I hand in the questionnaires. This will in no way affect my future health care. I know who to contact if I experience any adverse effects from participating in this study.

I understand that by giving consent I give my General Practitioner permission to provide information concerning the medicines I take and how long I have been taking them. I also understand that my individual responses will be kept confidential and not seen by my General Practitioner.

In all reports from this study, no individual participant will be identified. Results will be summarized for the overall group only.

I would like a copy of the study results..... YES/NO.

I _____(full name) hereby consent to take part in this study.

Signed ..... Date: .....

Version 3 28/06/04

What People Believe About Medicines

Demographic Information.

What gender are you? 1. Male 2. Female

How old are you? ..... years

With which ethnic group do you mostly identify?

1. New Zealand European.
2. Other European.
3. Maori.
4. Samoan.
5. Cook Island Maori.
6. Tongan.
7. Nuiean.
8. Indian.
9. Chinese.
10. Other (such ad Japanese, Tokelauan, etc....) .....

What is your highest level of academic achievement?

1. Primary.
2. Secondary.
3. Tertiary.
4. Postgraduate.

What People Think About Medicines.

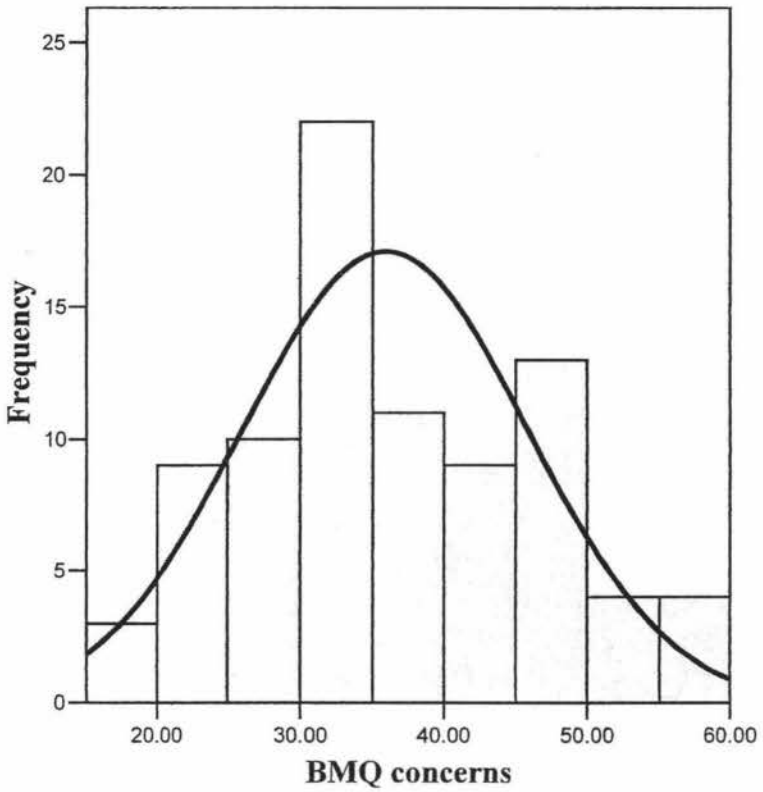
Medication Information.

Name of antidepressant prescribed.

How long has this patient been taking this antidepressant?

APPENDIX D

Histograms of Variable Distributions


Frequency
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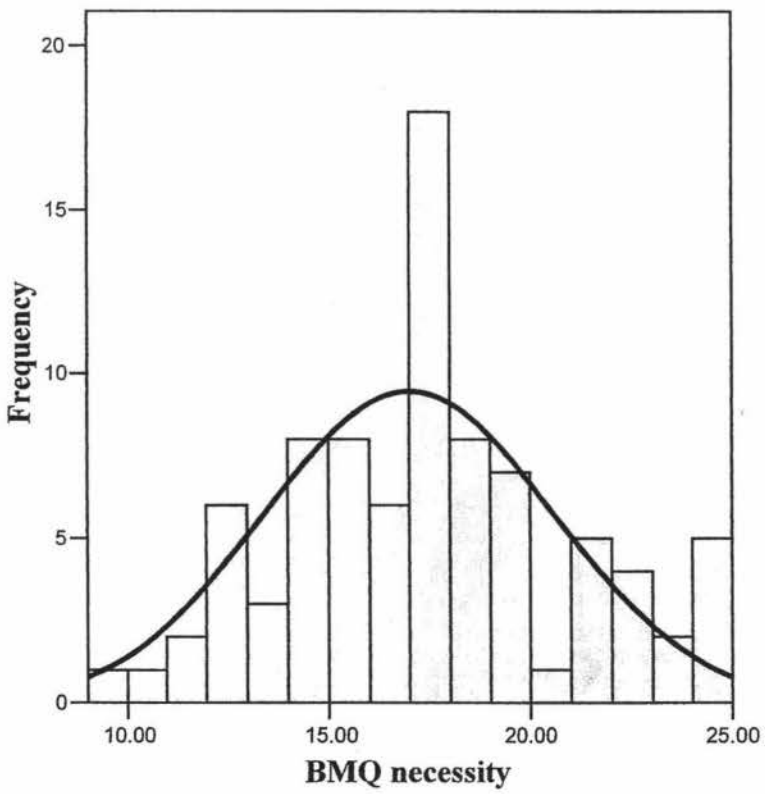
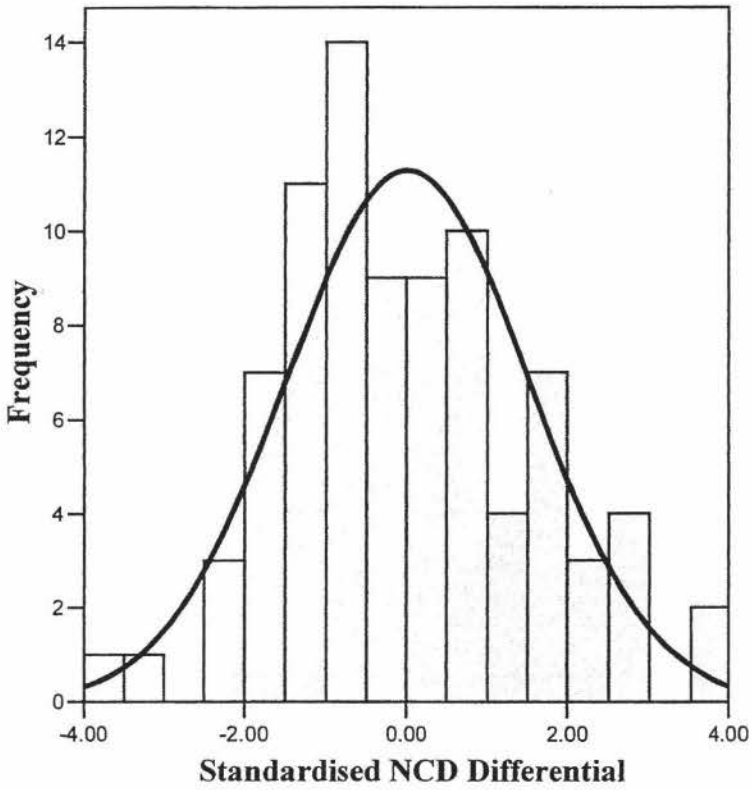
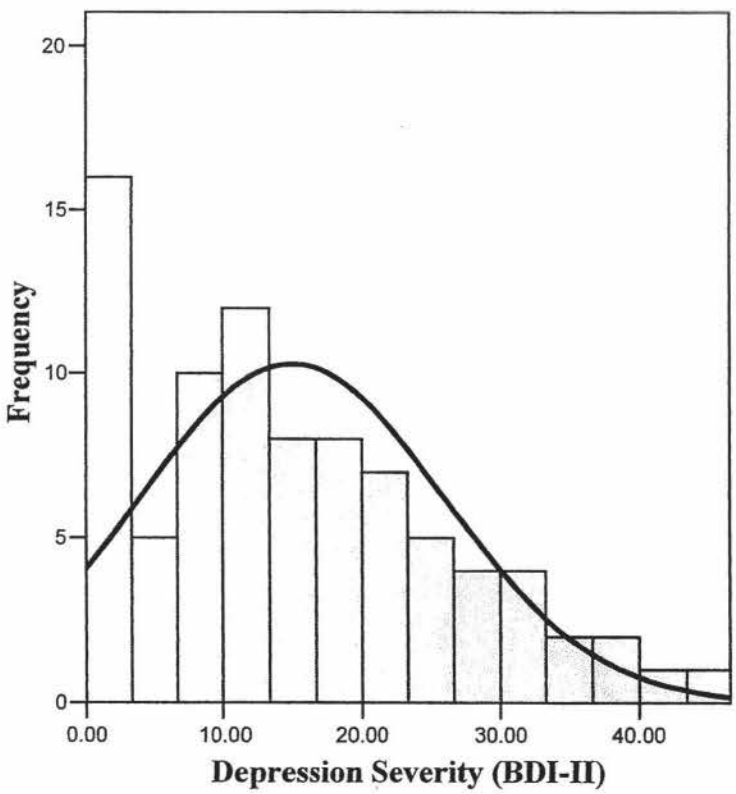
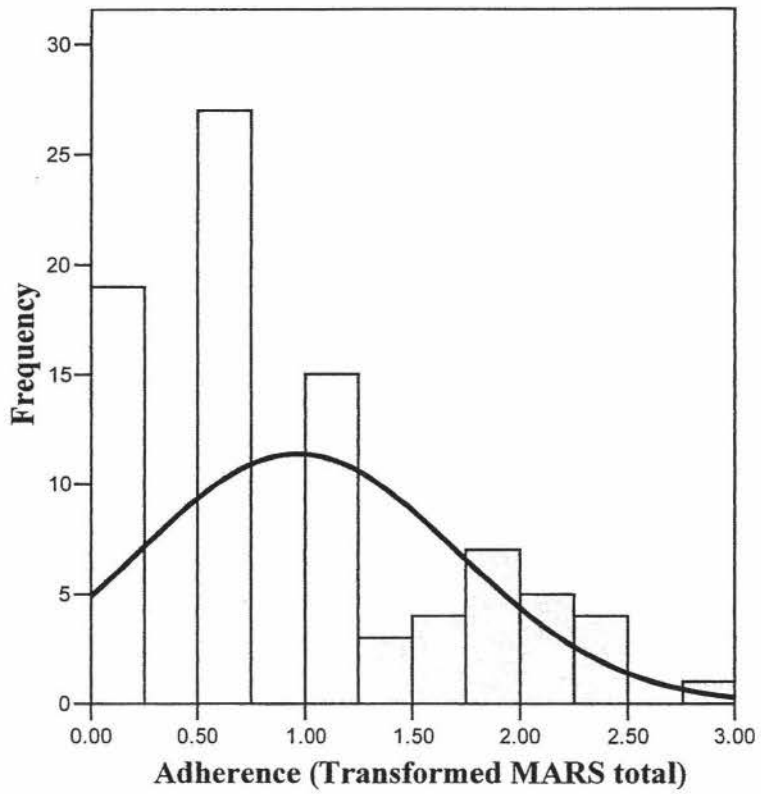
20
15
10
5
0
20.00
30.00
40.00
50.00
60.00
BMQ concerns


Frequency
20
15
10
5
0
10.00
15.00
20.00
25.00
BMQ necessity


Frequency
14
12
10
8
6
4
2
0
-4.00
-2.00
0.00
2.00
4.00
Standardised NCD Differential


Frequency
20
15
10
5
0
0.00
10.00
20.00
30.00
40.00
Depression Severity (BDI-II)


Frequency
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25
20
15
10
5
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0.00
0.50
1.00
1.50
2.00
2.50
3.00
Adherence (Transformed MARS total)

APPENDIX E

Scatter-plots of Variable Relationships

Appendix E:

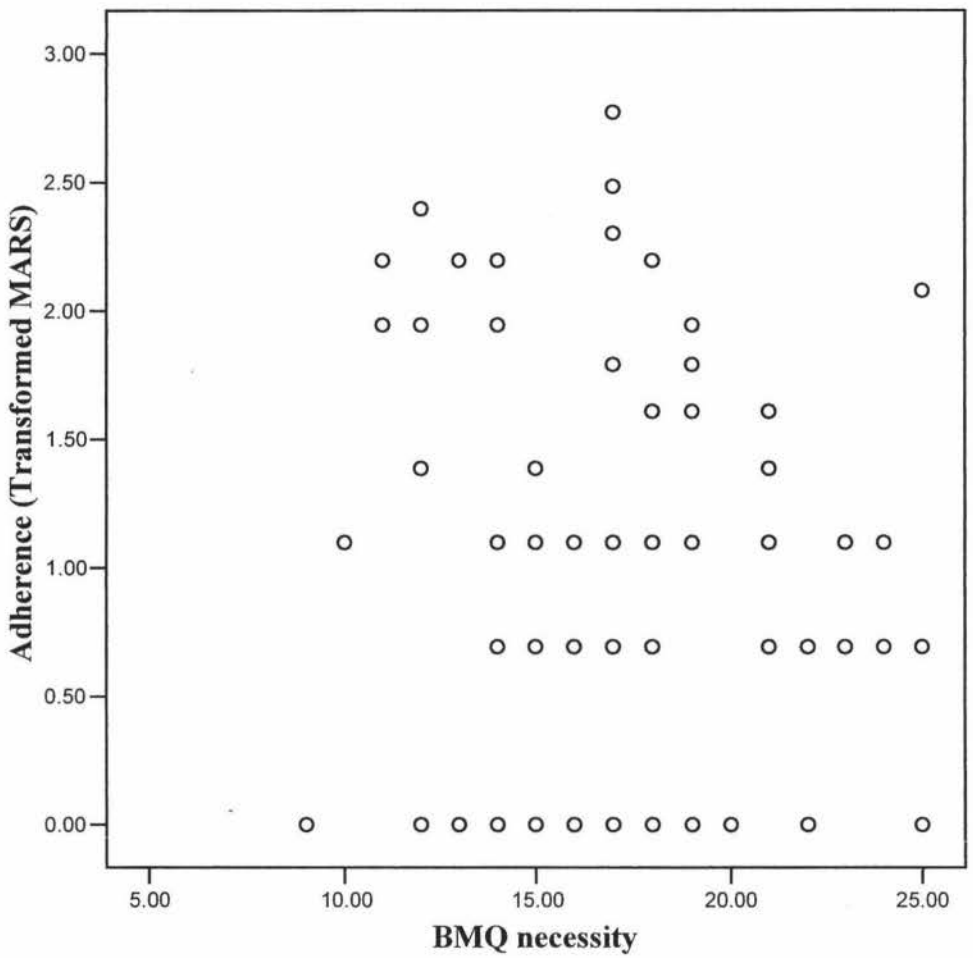

Figure X. Scatter-plot of relationship between BMQ necessity and adherence.

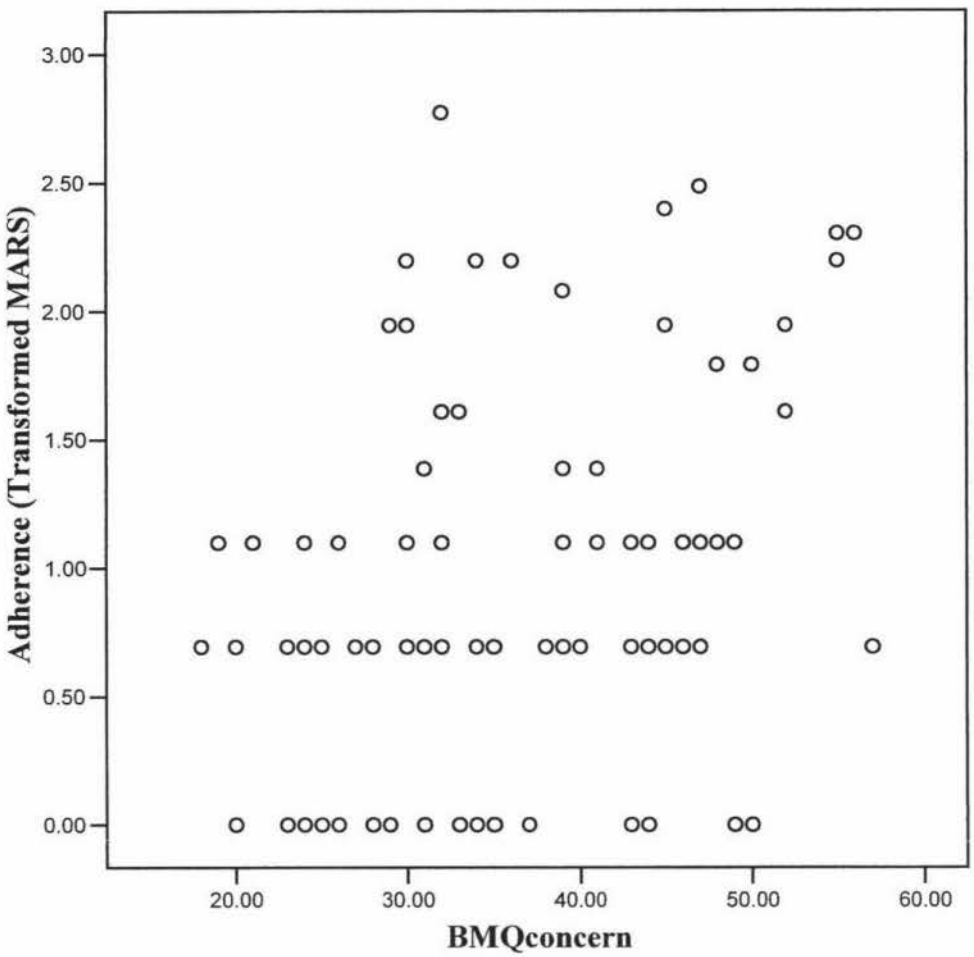

Figure X. Scatter-plot of relationship between BMQ concerns and adherence.

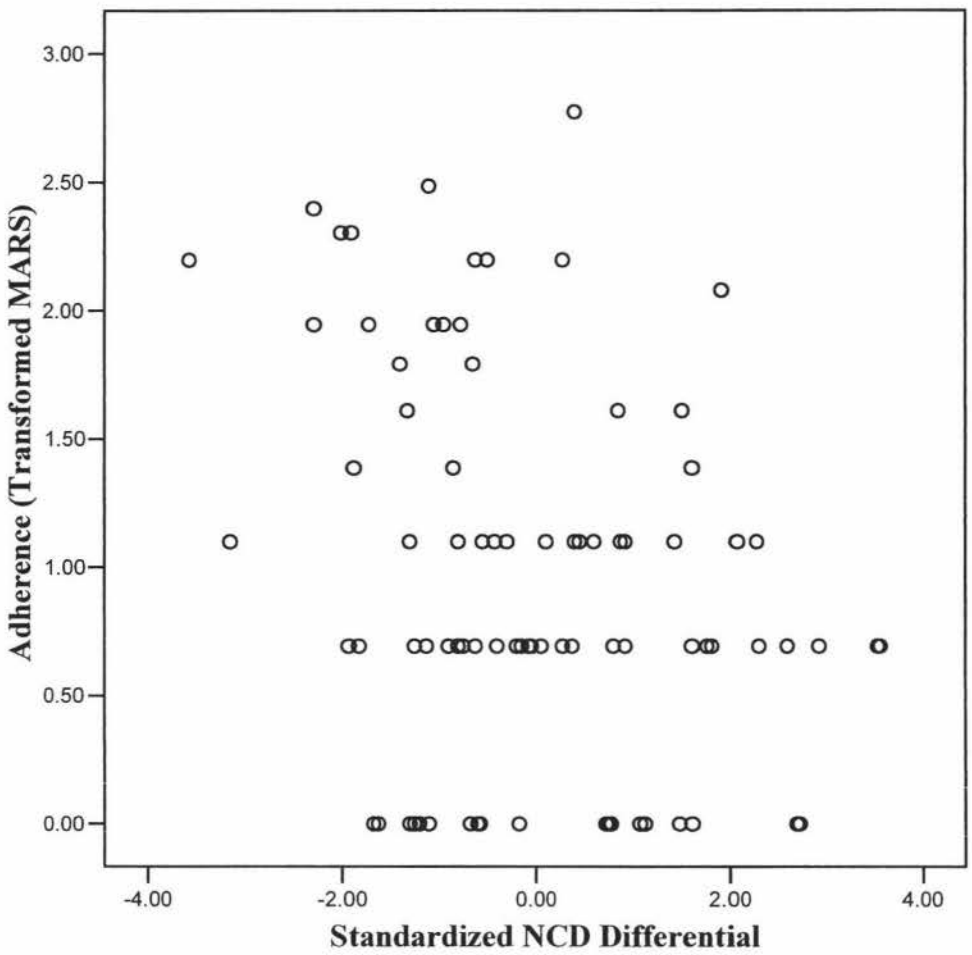

Figure X. Scatter-plot of relationship between NCD differential and adherence.

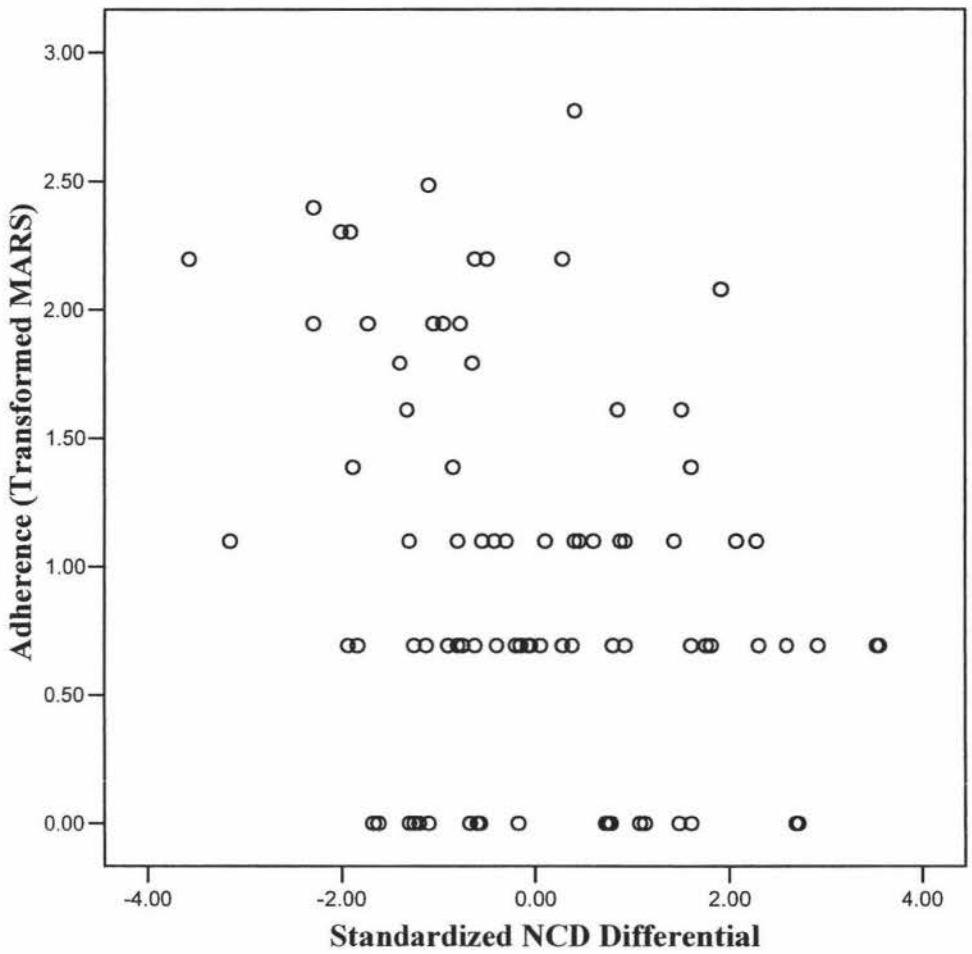

Figure X. Scatter-plot of relationship between NCD differential and adherence.